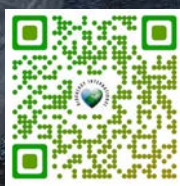


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Pellets Special 12



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COVER PHOTO



Hans-Jörg Bullinger (left), and Salmatec's Timo Müller. At Holzwerke Bullinger Group Abtsgmünd site in Germany is a nocturnal pellet plant, all part of a bigger, future-proofing, circular economy and heritage picture (photo Alan Sherrard).

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MARKING 25 YEARS OF BIOENERGY

While this issue marks our first calendar year as independents, it is also the 25th anniversary issue of Bioenergy International. *The very first edition of Bioenergy International was launched in May 2001, for the Sustain 2001 exhibition held in Amsterdam, the Netherlands, and it has been in publication ever since.* With its four pages, the debut issue was really more of a biomass manifesto. A forest fuel one at that seeing as it was entirely devoted to "Pellets, the new international fuel for large-scale as well as for small-scale consumers." The issue featured a site report entitled "Production and use of pellets" with a detailed run-through of the at the time new 90,000 tonne-per-annum (tpa) Bioenergi i Luleå AB pellet plant in northern Sweden, headed by the late Roger Lehtonen, who was a well-known figure in green circles.

And with technology suppliers such as ACO Automation Components and Amandus Kahl celebrating 25 and 150 years in business respectively, it is very fitting this 25th anniversary issue of Bioenergy International, issue 144, should be the 2026 Pellet Special edition. On the topic of technology, every pellet plant uses dies. As a core wear part, I dare say there are as many opinions on "the good, the bad and the ugly" of dies as there are pellet plant operators. The article on page 32 provides an insight into the art and science of die production at Ferotec, a French third-party die producer with international clientele. In addition, two technology cats are out of their respective bags – Sweden's KlingMill, and Switzerland's Proxipel. The former is a disruptive size-reduction technology; the latter is a mobile one tonne-per-hour pellet plant complete with dryer on a truck trailer chassis.

Back in 2001, 90,000 tpa was considered an industrial-scale plant. Nowadays, plants a factor of five larger are relatively common, and the first plants a factor of ten larger are operational. According to Bioenergy Europe's latest Pellet Statistical Report, global wood pellet production reached 53.5 million tonnes in 2025, a 10 percent increase over 2024, and global pellet consumption also reached a new all-time high of 51.5 million tonnes. The 2026 World of Pellets map, produced in cooperation with the European Pellet Council (ENplus), Sustainable Biomass Program (SBP), and World Bioenergy Association (WBA) and which accompanies this issue, lists 1,388 operational biomass pellet plants in 73 countries (excluding Belarus and Russia) that combined had a total installed capacity of almost 83.3 million tpa. In reality, there are tonnes more of capacity, and many more pellet plants, as production facilities under the 10,000 tpa threshold are not listed on the map. For example, in Kosovo, one of Europe's youngest countries, where efforts are underway to develop regional supply chains for woodchips and pellet production are reported on page 22.

Bearing in mind that the world's first ever trans-oceanic shipment of pellets only took place in 1998 – some 15,000 tonnes from British Columbia (BC), Canada to Sweden, pioneered by another pellet industry legend John Swaan – this growth in global pellet production, consumption, and trade is nothing short of remarkable. While no longer new, pellets are indeed an international fuel. According to a FutureMetrics forecast, the 2026 global trade in pellets is estimated to be worth around US\$5 billion, with around 30 million tonnes to be loaded on ships on every continent except Antarctica, about 2,000 times more tonnes than in 1998!



While continents such as South America and Africa are emerging on the pellets map with several new listings, so too is expansion into non-forest biomass feedstocks, and new market applications—for example, purpose-grown C4-grasses in the Dominican Republic and Senegal as reported on page 25. The WBA has recently identified some 43 biomass pellet facilities in Africa, operational and/or in development, ranging from 500 tpa to 120,000 tpa, utilising a range of feedstocks including agricultural residues such as straw, rice, and coffee husks. And, as noted in previous issues, biomass pellets have a potentially significant role to play in the clean cooking market, not least the institutional segment.

Today, the reasons for investing in pellet production can be more intricate, beyond the obvious of producing a commodity-like renewable fuel product. Apart from being hallowed ground for metal fans (Summer Breeze Open Air 1997 to 2006), Abtsgmünd in Germany is where Bullinger Pellets is located. Commissioned in 2022, it is an unusual, if not unique, pellet plant in a German context, and often referenced by technology suppliers Salmatec. Head to page 18 to find out what makes Bullinger such a special facility. In a similar vein, the papermaking town of Grycksbo in Sweden is home to another unique pellet plant installation. Built at the paper mill by Estonian turnkey contractors Hekotek for Arctic Paper Grycksbo, the entire project features several novelties, including the first installation to use a Mantex Biomass Analyzer, and the first in Sweden with CPM's twin-track solution – the report starts on page 12.

Alan Sherrard

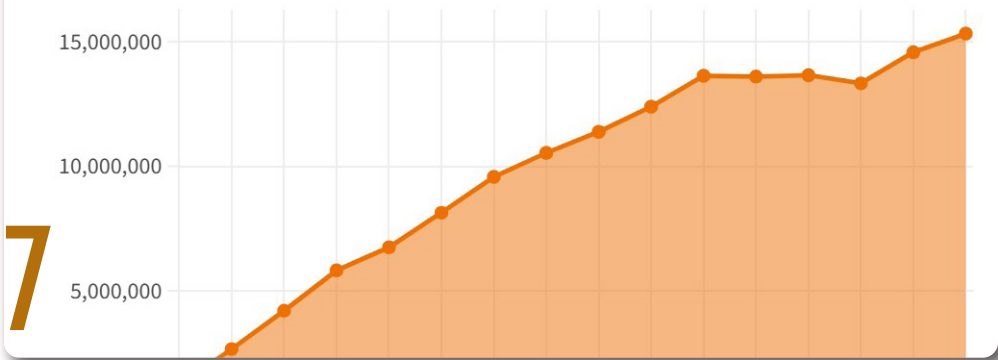


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ENplus® certified pellets produced worldwide (tonnes)



Market

Bioenergy Europe has published its latest Pellet Statistical Report, providing a detailed overview of global and European pellet market trends and their role in the clean heat transition.



Feedstock

While most biomass pellet producers use residuals from agriculture or wood processing industries, one Swedish company has taken a more holistic approach by using purpose-grown grasses as feedstock.



Technology

Rural Brittany is the site for one of Europe's leading independent third-party designers, manufacturers, and distributors of dies and wear parts for pelleting plants.



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Bioenergy International is the official publication for World Bioenergy Association (WBA).



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Technology

As a supplier of complete pelleting plants, Amandus Kahl manufactures all machines for wood pellet production – from grinding and drying to pelleting and pellet cooling.





Markets

Predictions are always tricky, but it seems likely that in two years from now, there will be major changes in the pellet markets. The only way to stay ahead of the game is to be well informed and proactive



Event

"Trust your technology suppliers" was takeaway advice given by Michael Wild, President of the International Biomass Torrefaction and Carbonisation Council (IBTC), at the 2026 European Biochar Summit.



Pellet plant

Founded in 1913, the fourth-generation family-held Holzwerke Bullinger Group has grown into one of Germany's largest producers of customised glulam (BSH), structural timber and laminated timber beams (KVH).



Pellet plant

One of Europe's youngest countries, the Republic of Kosovo (Kosovo) has good potential for developing domestically available woody and agricultural biomass as a renewable and sustainable energy source, especially for space heating.



Pellet plant

The project team – Johan Dunbäck (left), Hekotek; Stefan Gatu, Arctic Paper Grycksbo; Alari Roosi, Hekotek; Markus Westman, Arctic Paper Grycksbo; and Tõnis Haldna, Hekotek have every reason to smile. With the new pellet plant, Arctic Paper Grycksbo has maximised its fuel and energy flexibility and redundancy.



Pellet plant

2017 marked the founding of H&D Pellet Sh.p.k (H&D Pellet), which built the first greenfield pellet plant in Kosovo. Over the years, the company has carved out a reputation in the Balkans region for producing quality pellets for residential heating.

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2025 HAS BEEN A GOOD YEAR, BUT CHANGE IS ON THE HORIZON

After two consecutive years of contraction, European pellet production, excluding Belarus and Russia, increased by 10 percent to 24.1 million tonnes, setting a new regional record. While Bioenergy Europe's Pellet Statistical Report 2025 shows that Europe continues to lead global pellet production and retain its position as the largest pellet-consuming region, Manolis Karampinis, Director Business Development & Membership, Bioenergy Europe, and General Manager, European Pellet Council, notes that change is on the horizon.

THE PELLET SECTOR ALWAYS LIKES A COLD WINTER, and the 2025 – 2026 heating season generously provided one after all. Stocks that had accumulated along the supply chain – some from 2022 and 2023 – finally ran out, leading to a boost in production across several European markets: a nice contrast from the situation in the last two years.

Sometimes, too much of a good thing can be stressful. Tensions were felt around February 2026, when pellet supply dried up, and prices started an upward trend. In some countries, the situation was such that the pellet sector was brought back into the media spotlight (probably for the first time since 2022), but thankfully the tension was short-lived as temperatures rose and spring came. Although nobody would call this a “crisis”, it highlighted that the supply-and-demand gap for pellets is not always comfortably wide on the supply side.

But could we be heading into an oversupply situation quite soon? The market has been pondering about this for some time, as the industrial pellet consumption cliff-edge of 2027 draws nearer. Looking at the 2025 industrial pellet consumption data – which reached a historical high of more than 30 million tonnes - one would fail to find such a trend. Growth in Japan remains impressive, and even European demand is almost back to the historic highs of 2021.

However, we already know that the new-bridging mechanism for Drax (progress has been made for Lynemouth as well) is expected roughly to halve UK demand; temporary spikes (due to electricity demand and prices) or more per-

manent demand (from new data centres) may push this boundary somewhat upwards, but at least in the short term the demand destruction is expected to be significant. Naturally, this causes major concerns to almost all industrial pellet producers. Beyond expectations for new markets such as biocarbon, heavy industry, sustainable aviation fuel (SAF), etc., the premium pellet market has also become more appealing.

Could this happen? The possibility certainly exists, but as we have discussed extensively in the Working Group Pellets of Bioenergy Europe, there are some major barriers and considerations that hinder an easy transition. Still, in the next heating season we could anticipate some interesting new dynamics in the global trade of wood pellets.

On the pellet appliance front, political discussions on revision of the Ecodesign Regulation appear to have frozen for now. The market situation shows a recovery of pellet boiler and stove sales in 2025; however, the numbers remain well below the historical highs of 2021-2022, and the situation in 2023-2024 has been generally very bad. But there are two main trends worth discussing briefly.

The first is that the situation in the pellet stoves market looks somewhat better than the pellet boiler market. Buyers of pellet stoves range from high-income households who want an impressive fire in a beautiful appliance in their living room, to low-income households who prioritise cost savings, so creating a uniform narrative

and explanations for this is not straightforward. But on the whole, it seems that pellet stoves dovetail the wider electrification trend in heating and are increasingly being deployed as a complementary heating system with heat pumps.

The second trend concerns pellet boilers and their connection with subsidies for their purchase. As more expensive investments overall, pellet boiler sales boom when there is good support for their purchase – as has been the case in recent years in Austria and Poland.

Staying on the intersection of politics and markets, the European Deforestation Regulation (EUDR) was delayed another year, this time accompanied by a “simplification” that makes life much easier for those producing wood pellets from sawdust and other residues within the EU market. For those importing pellets into the EU, though, not much has changed, and importers are expected to provide geolocation data and due diligence statements starting in 2027 onwards.

At the time of writing, there is an ongoing public consultation on EUDR's product scope, and Bioenergy Europe continues to push for a horizontal exception for residues; however, its outcome is not yet certain. Industrial pellet producers outside of the EU are, on the whole, more familiar with the topic than the premium pellet producers outside of the Union. An interesting question for next year is whether EUDR will impact wood pellet trade flows, potentially facilitating a realignment of the premium pellet imports within the EU. >>



“Predictions are always tricky, but it seems likely that in two years from now, there will be major changes in the pellet markets. The only way to stay ahead of the game is to be well informed and proactive”

MANOLIS KARAMPINIS, DIRECTOR BUSINESS DEVELOPMENT & MEMBERSHIP, BIOENERGY EUROPE, AND GENERAL MANAGER, EUROPEAN PELLET COUNCIL

GLOBAL PELLET MARKET HITS NEW HIGH AS EUROPE WEIGHS ITS CLEAN HEAT OPTIONS

Bioenergy Europe has published its latest Pellet Statistical Report, providing a detailed overview of global and European pellet market trends and their role in the clean heat transition. Amongst other things, the report shows renewed momentum for the sector in 2025 with global pellet production and global pellet consumption recording strong growth.

ACCORDING TO THE REPORT, global wood pellet production reached 53.5 million tonnes in 2025, a 10 percent increase over 2024 and the strongest year-on-year growth in recent years. Global pellet consumption also reached a new all-time high of 51.5 million tonnes, confirming the continued relevance of pellets across both industrial applications and small-scale heating.

Europe remains the world's largest pellet-consuming region, representing 70 percent of global demand when industrial and small-scale uses are combined. It also continues to lead global production, accounting for 45 percent of world output. After two consecutive years of contraction, European pellet production, excluding Belarus and Russia, increased by 10 percent to 24.1 million tonnes, setting a new regional record.

Growing role in Europe's clean heat transition

According to Bioenergy Europe, its 2026 Pellet Report comes at a decisive moment for Europe's heating sector.

In EU buildings, renewable energy sources represent around one-third of household heating consumption; however, fossil gas remains the dominant fuel. This underlines both the scale of the challenge and the opportunity.

Fossil fuel heating systems will need to be progressively replaced by renewable alternatives if Europe is to meet its 2030 and 2040 objectives.

Modern pellet heating systems can contribute to this shift by offering a renewable, cost-competitive solution that is resilient to geopolitical supply shocks. Citizens, municipalities, and businesses can benefit from them, especially in rural areas, colder regions, and buildings where different clean heat options must work together.



Photo: Jeanette Fogelmark

Residential consumption and heating adoption

European small-scale pellet consumption reached more than 19 million tonnes in 2025, a new historical record.

Residential consumption alone rose to 15.3 million tonnes, increasing by 5 percent compared with 2024 after several years of more modest growth. Across Europe, pellet appliances now provide renewable heating to more than 6.5 million households.

As Europe prepares a new EU Heating and Cooling Strategy in 2026, the Pellet Statistical Report shows that pellets are already part of the renewable heating landscape.

With stable market conditions and enabling public policy, the sector can help more households move away from fossil fuels while supporting Europe's energy resilience and climate objectives.

– In 2025, we have seen signs of recovery in

cont. p. 9

>> And finally, to the big picture issues. In case you felt that you could worry a bit less about the Renewable Energy Directive (REDIII) – which has yet to be fully implemented in most EU Member States – the Commission has already launched consultations for the post-2030 framework, which means – guess what – a REDIV coming along the way. At this stage, it's anyone's guess what the outcome of the discussion will be; however, items on the agenda include extending sustainability criteria to sectors beyond bioenergy, optimising use of biomass resources, and an open discussion on strengthening and/or simplifying the sustainability criteria.

Global geopolitics are also expected to play a role in the final outcome of a REDIV. In the summer of 2025, a US-EU trade war was avoided, and discussions of possible counter-tariffs on imported US wood pellets, along with many other commodities, were shelved. But the situation in Iran and the Straits of Hormuz has wreaked another wave of chaos in the global energy markets. Energy security is higher than ever in the EU agenda, but so is industrial competitiveness. The biomass/wood pellet sector has good arguments to offer both considerations, but we still have not seen clear policy signals in our favour.

All in all, 2025 has been a good year for both premium and industrial pellet markets. But several ongoing issues remain unresolved and are carrying over into 2026 and 2027. Predictions are always tricky, but it seems likely that in two years from now, there will be major changes in the pellet markets. The only way to stay ahead of the game is to be well informed and proactive.

Text: Manolis Karampinis

Photo: Alan Sherrard

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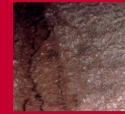
Grape
waste



Wood
chips



Bark



Olive
pomace



Olive pits



Grape
seeds

cont. from p. 7

pellet stove sales across several markets, highlighting that such appliances complement well the wider electrification trend in household heating. Well-designed public support can support households to address upfront investment costs for the replacement of their heating appliance, commented Manolis Karampinis, Business Development & Membership Director at Bioenergy Europe and General Manager of the European Pellet Council (EPC).

Record 2025 for ENplus

After a year of stabilisation, the ENplus certification scheme has confirmed a renewed growth in certified volumes, reaching over 14.5 million tonnes of wood pellets in 2025, based on the data submitted by certified companies to the European Pellet Council (EPC), the managing body for ENplus.

ENplus remains as the world-leading certification scheme for wood pellet quality, ensuring high standards across the entire supply chain and supporting the development of a transparent and reliable market.

Europe continues to be central

With around 3.95 million tonnes of ENplus-certified pellets produced in 2025, Germany continues to top certified production. Austria follows with 1.89 million tonnes, while France ranks third with more than 1.08 million tonnes. The Top 5 also includes Poland and Spain, both maintaining strong production levels and reinforcing Europe’s central role in ENplus-certified pellet production. Projections for 2026, based on submissions from certified companies, suggest a further increase in certified volumes, which are projected to exceed 15 million tonnes worldwide.

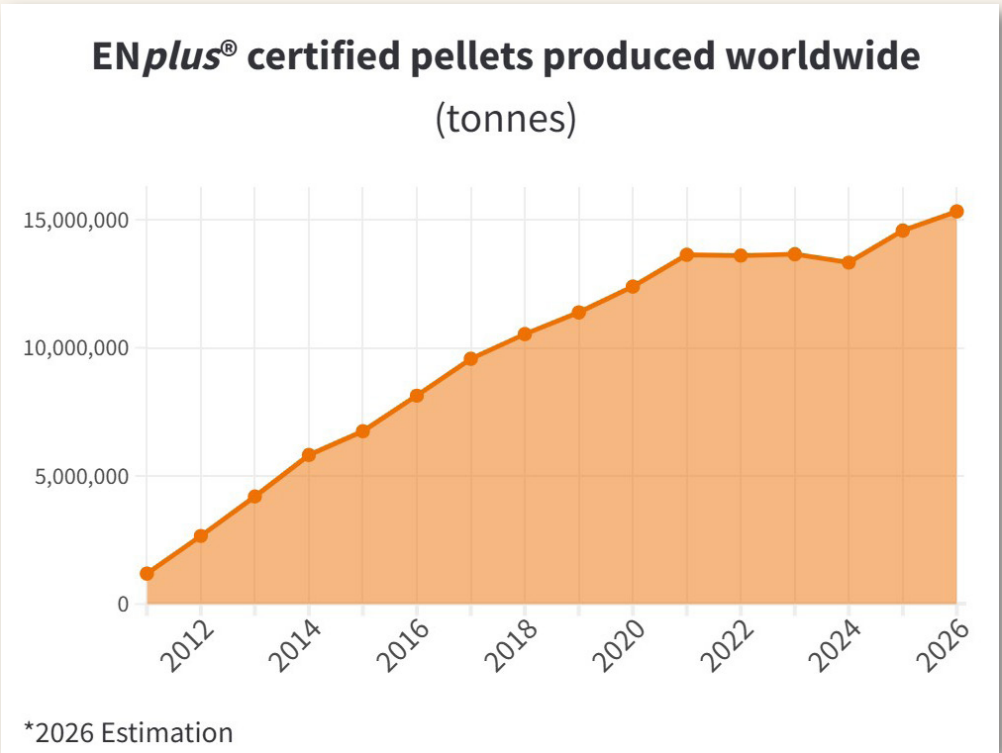
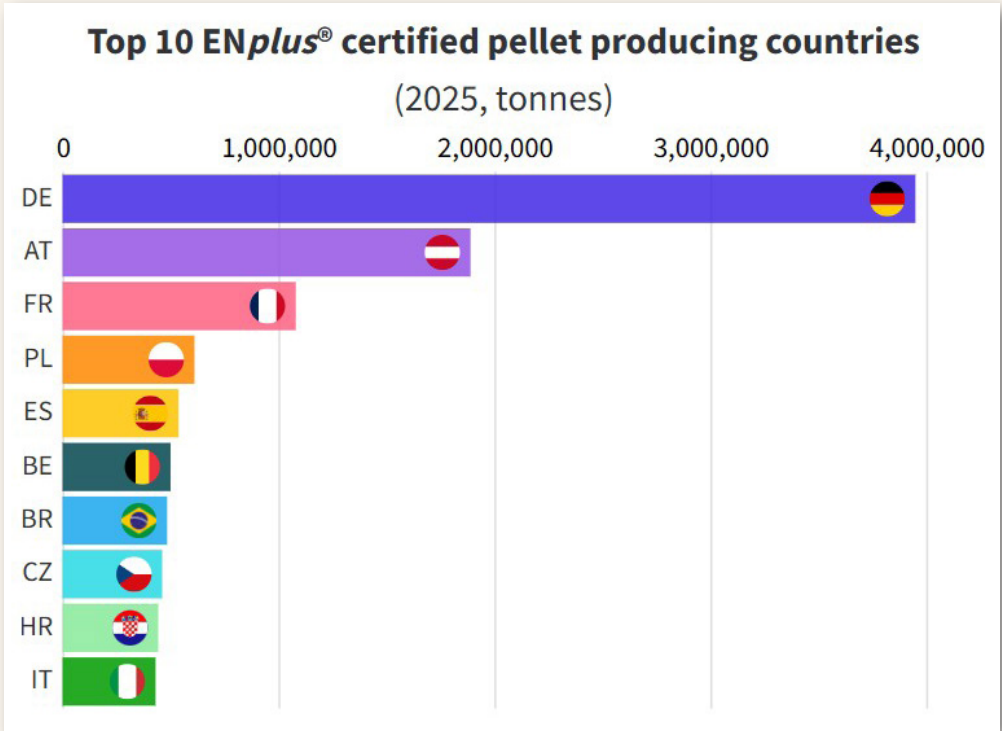
– This trend confirms the resilience of the pellet market and the continued demand for high-quality certified products, commented Elena Dumitru, Certification Director for ENplus.

Poland remains the country with the most ENplus-certified pellet producers, while Germany retains its position as the leader in certified pellet traders. There has been a notable increase in the number of Chilean producers seeking certification, with more than 10 joining the scheme in the past year.

Effective fraud management

The ENplus fraud management team has further strengthened the scheme’s blacklist database by identifying fraudulent entities, as well as misleading websites and contact details that users should avoid. To date, ENplus has successfully detected and resolved a total of 1,470 fraud cases – an achievement that underlines the scheme’s ongoing commitment to preserving its integrity and protecting its users.

In the past year, ENplus marked its 15th anniversary through a series of activities and events. The scheme management also published the second edition of the standards related to the

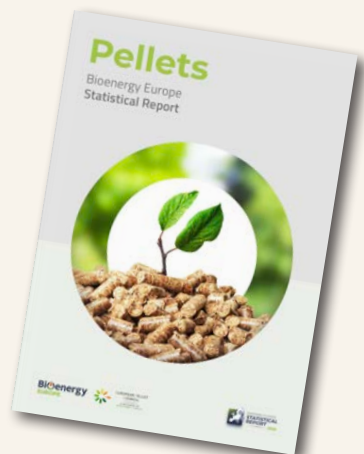


requirements for companies and the usage of the trademarks.

This, the EPC says, “represents a further step in the ongoing development of the ENplus certification scheme and reinforces its key role in the pellet market.”

Text: Alan Sherrard
Graphics: Bioenergy Europe
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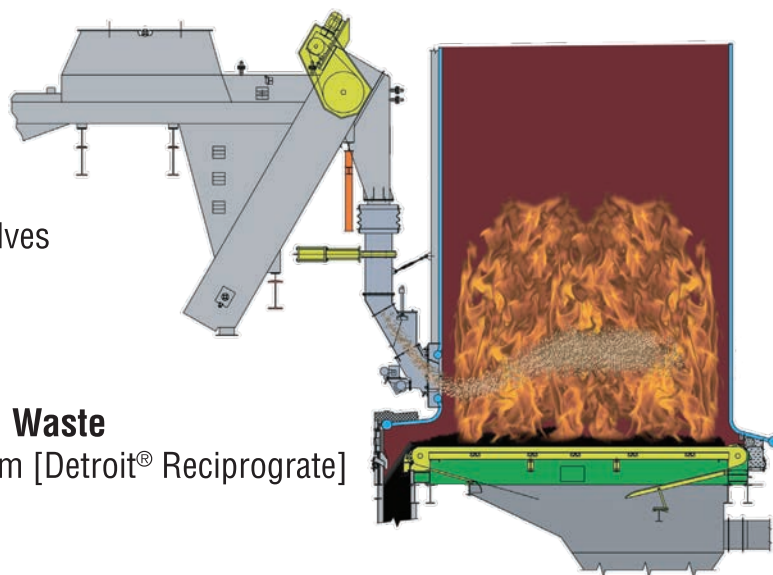


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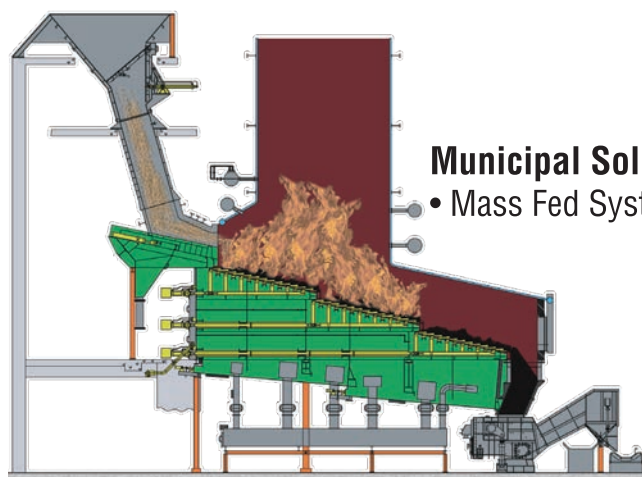
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BAVARIAN SAWMILL TURNS RESIDUES INTO RENEWABLE FUEL

In the solid wood processing industry, residues are unavoidable. Every sawn board, every milled beam and every sanded surface produces sawdust and wood chips. Across Europe's sawmills and woodworking plants, these by-products accumulate in large volumes every day.

For many companies, handling these materials represents a logistical challenge. They require storage space, transport and additional handling while often delivering only limited economic value in their loose form.

But for the Bavarian sawmill Weihele Holz GmbH, wood residues have become something entirely different: a renewable energy resource.

A typical sawmill industry challenge

Located in Görisried in southern Germany, the family-run company processes regional timber into construction wood and structural timber products for carpentry and building applications. Each year, around 15,000 to 20,000 m³ of wood pass through the production lines.

As in most sawmills, this production process inevitably generates large quantities of by-products – mainly sawdust and wood chips. Managing these residues efficiently is essential for smooth operations and cost control.

Loose wood residues require significant storage space and can be difficult to handle. At the same time, the company recognized that these materials still contain considerable energy potential.

Rather than viewing them simply as waste or a logistical burden, Weihele decided to integrate them into the company's internal renewable resource and energy cycle.

– Wood residues are no longer waste – they are a resource, stated Max Weihele, Managing Director at Weihele Holz.



Turning residues into a valuable fuel

To achieve this, the sawmill introduced briquetting technology developed by RUF Maschinenbau GmbH, a German manufacturer specializing in densification systems.

The briquetting system compresses loose wood residues under high pressure to produce compact briquettes. During the process, the natural lignin contained in the wood acts as a binding agent, eliminating the need for additives.

The result is a dense and uniform briquette with a high calorific value. Compared with loose residues, briquettes are significantly easier to handle, transport and store.

At the same time, they represent a renewable

energy carrier that can be used in biomass heating systems or marketed as a fuel product.

Efficiency gains in daily operation

Weihele recently upgraded its system to a RUF 1200 briquetting press, which has further improved operational efficiency. Compared with the previous system, the machine operates with around 25 percent lower electricity consumption while delivering approximately five percent higher throughput.

In a production environment where residues are generated continuously, such improvements can have a noticeable impact on operating costs and process efficiency.

Another important benefit lies in logistics. Briquetting dramatically reduces the volume of loose sawdust and chips, making storage and transport considerably easier. Instead of handling large volumes of loose material, the company can manage compact and uniform briquettes.

Part of the renewable energy cycle

For Weihele, the advantages extend beyond operational improvements. By converting wood residues into briquettes, the company transforms a by-product of timber processing into a valuable renewable energy source. This approach reflects a broader trend in the wood and bioenergy industries: increasing resource efficiency by keeping materials in productive use for as long as possible.

Instead of leaving the production cycle as waste, biomass residues become part of a closed material and energy loop – an important element of the modern circular bioeconomy.



BI144/7575/AS

ARCTIC PAPER GRYCKSBO IS WELL ON TRACK WITH TWIN TRACK

In late April this year, Arctic Paper Grycksbo held an official ribbon-cutting ceremony marking the completion of its BIO25 project. At the core of BIO25 is a new state-of-the-art 50,000 tonne-per-annum wood pellet plant comprising, amongst other things, two CPM pellet presses with Twin Track – the first such installation in Sweden.



Grycksbo, a small community in central Dalarna about 10 km from the city of Falun, has a long papermaking heritage with the Grycksbo AB papermill established already in 1740. As the name Arctic Paper Grycksbo suggests, it is part of the Swedish-Polish premium graphic paper and packaging products group Arctic Paper S.A. that operates two other papermills – Kostrzyn nad Odrą in Poland, and Munkedal in Sweden – as well as having majority ownership in the Swedish pulp producer Rottneros AB Group that supplies pulp to the Arctic Paper Group mills amongst others.

The Group specialises in producing numerous types of uncoated and coated wood-free paper, as well as wood-containing uncoated paper for printing houses, paper distributors, book and magazine publishing houses, advertising industry, and packaging producers, which, given the

overall decline in paper-based publishing due to increased digitalisation, would seem a particularly competitive market segment within the pulp and paper industry.

Nordic forest industry majors with wood pellets in their product portfolio are nothing new. However, what makes Arctic Paper unique in this regard is that, unlike Stora Enso, Södra, and SCA, which all have sawmills in addition to pulp and/or paper mills, Arctic Paper has no solid wood processing operations in its portfolio. Therefore, it has no “natural” internal access to sawdust or shavings. Furthermore, with baled pulp as its feedstock, there are few solid process residues for use as fuel.

Boiler retrofit and conversion

So, how did pellet production in Grycksbo come to fit the Arctic Paper portfolio bill? It is not as

far removed as one may initially think. As a continuous process, papermaking requires considerable amounts of energy in the form of steam for drying the paper and electricity to power various equipment and machines – motors, rotors, pulpers, grinders, conveyors, mixers, pumps, and valves. Therefore, the heart of any paper mill is its steam boiler, typically designed to operate over 8,000 hours annually. With its long heritage, the boiler house in Grycksbo reveals the progression of fuel preferences over the last century.

– The old coal-fired boilers from the 1940’s were replaced by an oil-fired boiler in 1973. For both economic and environmental reasons, this was retrofitted and converted to run on wood powder by Petrokraft (now PetroBio, part of Vyncke) in 2009, with oil as the back-up fuel, said Markus Westman, Project Engineer at Arctic Paper Grycksbo.



In other words, the company's first introduction to pellets was over fifteen years ago with the boiler and burner retrofit conversion, which included a pellet receiving station and storage silo, pellet grinding and milling equipment, pneumatic conveying, and intermediate powder storage.

4P Strategy

Annually, Arctic Paper Grycksbo produces around 200,000 tonnes of coated wood-free premium paper on two paper machines – PM 9 (50,000 tonnes) and PM 10 (150,000 tonnes). The energy side currently comprises a 49 MW dual-fuel (wood powder/bio-oil) steam boiler, two electric steam boilers (20 MW and 17 MW respectively), and the original 6.5 MWe back-pressure steam turbine. Commissioned in 1955 (!), and still going strong, the Svenska Turbinfabriks Aktiebolag Ljungström (STAL) unit

from Finspång is a working industrial museum showpiece, a predecessor of what is now part of Siemens Energy, where next-generation gas turbines are produced, in Finspång.

According to figures from its 2025 Environmental Report, the energy required to produce 1 tonne of paper averaged just over 1,800 kWh in 2025, of which electricity to power process equipment was under 700 kWh, the remainder for steam generation.

The company's target is 1,500 kWh per tonne average. Flexible fossil-free energy, one should add. With the boiler retrofit conversion in 2009 to wood powder and bio-oil, Grycksbo became fossil-free in its production, slashing roughly 75,000 tonnes per annum of fossil carbon dioxide (CO₂) emissions. Fossil oil backup fuel was replaced with tall pitch oil, a pulp industry by-product, while green electricity is purchased

from the grid to supplement its own power production. The electric boilers provide not only backup but also a degree of flexibility, depending on electricity and pellet prices, as is evident in the company's annual Environmental Reports.

In 2021, Arctic Paper Group launched a new "4P Strategy" to diversify revenue sources, boost long-term profitability, and increase resilience by 2030. The strategy comprises identifying and utilising synergies between its two existing business pillars, pulp and paper, and investing in packaging and renewable energy (power) such as bioenergy and photovoltaics (solar PV). The latter "P" includes not only achieving 100 percent energy self-sufficiency by 2030, but also generating revenues by selling renewable energy, energy products, and services to third parties.

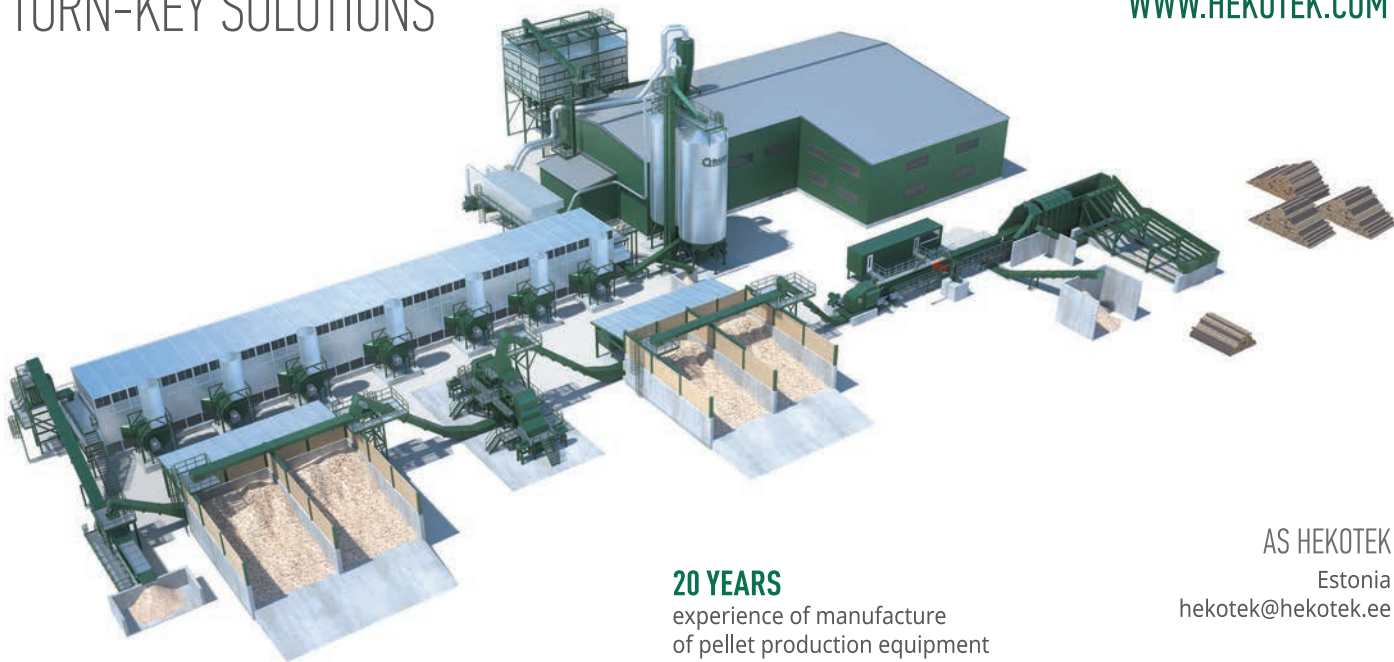
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From consumer to producer

In addition to providing power grid system services, for Arctic Paper Grycksbo, the 4P Strategy meant the launch of its BIO25 project – a SEK 285 million (c. EUR 24.3 million) investment moving from being a pellet consumer to becoming a pellet producer while increasing overall energy efficiency, fuel flexibility, and introducing a new revenue stream for the papermill. Announced in August 2023, the entire project began start-up in December 2025.

Comprising three components – modification of the boiler fuel line to receive dried sawdust; a complete pelleting line including feedstock receiving, handling, storage, and a belt-dryer; a heat recovery system from PM 9 to heat the belt dryer – the new pellet plant is the investment's largest lot.

– We have over 15 years of experience as an industrial buyer and consumer of pellets in Grycksbo, so we have learned a few things about pellet quality, pellet markets, regional feedstock supply, and availability. In light of the Group's strategy and our situation in Grycksbo, the shift from buyer to producer is a prudent future-proofing move that helps secure our operations, said Markus Westman.

Novel moisture measurement

Sourced directly from regional wood processors within a 190 km radius, the feedstock – pine (*Pinus sylvestris*) and spruce (*Picea abies*) sawdust and shavings – is delivered by truck. On arrival, the truck is scaled before self-unloading in a receiving pit, and rescaled on exit. What is novel at Grycksbo, certainly for a pellet plant, is that the truck driver takes a sample, logs and processes it in a Mantex Biomass Analyser unit – an X-ray-based method for measuring moisture content.

– It takes just a few minutes to perform and gives us the moisture content directly, instead of the 24-hour waiting time that the alternative oven method entails. Furthermore, we avoid ovens that run 24/7, requiring both energy and personnel, commented Markus Westman, adding that the entire feedstock receiving station is unmanned.

– Taking a sample is part of the delivery and unloading process for the driver; the rest is automated, so no dedicated staff is needed, Markus Westman said.

The converse, loading pellets for external delivery, is also handled by the truck driver – log in at the scales, self-load under the discharge silo, and log out at the scales. Considering that the receiving station normally handles 15 – 20 trucks per day or around 200,000 tonnes of sawdust and 50,000 tonnes of pellets annually, it is an impressive feat of operational efficiency.

Turnkey delivery from Hekotek

Following a tender process, Estonia's AS Hekotek, a global sawmill and pellet plant builder and technology provider, was tasked with providing the pellet plant. Local construction contractor ByggPartner provided site preparation and building construction works.



The project team – Johan Dunbäck (left), Hekotek; Stefan Gatu, Arctic Paper Grycksbo; Alari Roosi, Hekotek; Markus Westman, Arctic Paper Grycksbo; and Tönis Haldna, Hekotek have every reason to smile. With the new pellet plant, Arctic Paper Grycksbo has maximised its fuel and energy flexibility and redundancy.



The Stela belt-dryer with the infeed on the top left. The conveyor is fitted with an emergency wastegate.

– The Hekotek scope-of-supply begins with the dosing-bin at the dryer infeed. For feedstock receiving, handling, storage, and conveying to the dryer, we collaborated with BMH Technology, our first pellet plant project together, remarked Johan Dunbäck, Hekotek's representative in Sweden.

A household name in the pulp, large-scale biomass, and waste-to-energy world, BMH Technology is no stranger to supplying biomass receiving and handling equipment. From the receiving pit, the material is screened to remove oversized and large contaminants and transported to one of the two 3,000 m³ concrete storage silos, enough for approximately three days of production.

– We take deliveries species separated, and have one silo for pine, the other for spruce. This way, we have full control over the species blend and consistency for pellet production, explained Markus Westman.

The pine-spruce species split for the region is normally around 50/50; however, the effects of

cont. p. 16



A first at a pellet plant, the Mantex Biomass Analyzer is an X-ray based method for measuring moisture content of incoming feedstock samples, and conducted by the driver as part of the delivery process.



A Mogensen oscillating screener removes fines which are fed to the boiler.



Two CPM presses with Twin-Track configurations.



A CPM CounterFlow cooler serves both presses.



the winter storms Johan and Dave are beginning to show, pushing the split to around 70:30 in recent weeks.

Via a reclaiming screw on the bottom of each silo, material is released in the desired proportion onto a conveyor underneath, transported to a fine sieve, and passed through a magnetic separator before entering the belt-dryer supplied by German dryer specialists, Stela Laxhuber GmbH. Measuring 6.2 m in belt diameter and 52.5 m in length, the formidable dryer has an output capacity of 17 tonnes per hour of sawdust. Reducing the moisture content to 10 percent, the belt drying process takes 20 to 35 minutes, depending on the incoming moisture content of the sawdust and the ambient temperature.

— A deliberate decision was made to invest in a conventional type of belt-dryer without heat-recovery systems, as these require more frequent cleaning stops. The priority in this case was to ensure the highest possible availability of the dryer, commented Johan Dunbäck, pre-empting the follow-up question.

As previously mentioned, the heat source for

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the low-temperature Stela dryer is recovered heat from PM 10. In total, about 25 percent of the heat demand for the dryer at full load is recovered heat from PM 10, and the balance from the boiler. The reason for wanting the highest possible availability becomes apparent after the dryer. The dried material is conveyed to the next step, which, depending on the dryer output, is toward the boiler house, the pellet plant, or both.

— The priority here at all times is the boiler. The pellet plant is a secondary consideration. The main purpose of BIO25 is to ensure a more cost-effective and less price-sensitive fuel for our paper production. By utilizing our existing residual heat and fuel infrastructure, we can now use wet sawmill residuals, dry them, and grind them into powder. By having a drying overcapacity, we can produce pellets of the excess dried residuals, which we can store as a backup fuel for ourselves, supply to third parties, and generate income, or both. At the same time, should it for some reason ever become necessary, we can still buy in pellets or bio-oil as before, or run electric, explained Markus Westman.

First in Sweden with Twin Track

Dried sawdust for the pellet plant, housed in a new building tucked behind the existing pellet receiving silo (now the storage silo and bulk unloading bay), is directed to a day silo from which it is metered to the two CPM pellet presses. From the presses, the pellets are cooled in a CPM Counterflow Cooler and transported to a 2,000 m³ intermediate maturation silo. From here, the pellets are screened in a Mogensen oscillating screener to remove fines before being conveyed to the bulk storage silo for dispatch.

— Instead of looping the fines back to the presses and trying again to make pellets, the fines are fed into the boiler circuit, said Markus Westman, adding that there are no current plans for a big bag or a bagging and palletising line.

Apart from being compact in size and located at a paper mill, what makes the pellet plant itself a feature are the two CPM five-tonne-per-hour presses.

Conspicuous in that both are equipped with CPM's Oil Lubricated Rollers (OLR) system, a closed-loop oil circulation system that ensures the continuous lubrication and temperature monitoring of each roller bearing while preventing lubricant leakage to the rollers or pellets. The filtered oil flow removes any potential wear particles from the bearings, thereby reducing operating costs by extending the bearing lifetimes and the reuse of the oil lubricant.

However, the real novelty lies under the hood, so to speak — they are the first presses in Sweden to deploy CPM's proprietary "Twin-Track" die and roller configuration inside the press. As both presses were in full production, readers can refer to Pellets Special 8 2-2022, which has a full report on Twin Track at CPM Europe's HQ in the Netherlands.

In short, with Twin-Track, the die-roller working surface overlap has been removed, meaning that each part of the working surface of the die is passed over only once per cycle by the working surface of the roller, which translates into lower energy consumption. Press productivity, on the other hand, is increased by increasing the width of the die's working surface area, i.e., more holes compared to a conventional die within the existing dimensions of the press.

As it happens, Arctic Paper Grycksbo has used both and is in a position to compare a conventional die-roller setup for its presses with the Twin-Track setup.

– For administrative reasons, it was important for the BIO25 project to begin the start-up of the pellet plant already in 2025. As our Twin-Track dies and rollers were still in fabrication, we opted to start up with a conventional die-roller setup and then changed once the Twin-Track units were available, said Markus Westman.

With start-up in late 2025, and commissioning earlier this year, the first bulk pellet deliveries to clients have already commenced.

– While we are new to pellet production and learning as we go along, as papermakers, we know the value of finetuning processes systematically. We've had some technical issues, such as malfunctioning sensors and off-spec electric motors, but haven't encountered any real stumbling blocks. The major hurdle we had was during site preparation for the receiving pit. There, we came across some legacy foundations and contaminated soil masses, the latter of which had to be removed and dealt with appropriately, remarked Markus Westman.

Strict electrical classification

Being situated within the boundary of a paper mill that has been in operation since 1740, digging is bound to churn up an anthropogenic sin or two from the past. Today, given the nature of its business, the Swedish pulp- and paper industry has strict and specific construction standards, not least when it comes to electrical installations, switchgear, and connections, and which the pellet plant and ancillaries are subject to upholding.

These range from having to meet high Ingress Protection (IP) ratings on electrical equipment and components, such as dust-tight (e.g., IP6X) or waterproof (IP67), depending on where they are sited, having physical protection against collision with moving equipment or vehicles, and rodent-proof wiring, to mention a few.

A robust future-proof plant

While these non-negotiable industry criteria add CAPEX compared to a plant outside the boundary, it does mean having an exceptionally robust pellet plant.

– This project was the first time that we have supplied to these highly specified pulp and paper industry standards, and it has been a useful learning process and experience for us. There are aspects that we are keen to adopt in future pellet



(Top) The Svenska Turbinfabriks Aktiebolag Ljungström (STAL) unit is a working museum showpiece.

(Above) A magnetic separator removes any metal contaminants from the material before it enters the dryer.

plant design specifications, commented Johan Dunbäck, without divulging further details on which aspects.

The switchover from conventional die-roller to Twin-Track took place a few months ago, so what is the verdict? Does Twin-Track do what it says on the tin?

As it is early days and to avoid putting anyone in an uncomfortable position, the answer lies between the lines. The entire pellet plant – from feedstock receiving to pellet unloading – is in effect unmanned, operated from the boiler house. Arctic Paper Grycksbo has publicly declared an initial annual production of around 50,000 tonnes. With 17 tonnes-per-hour dryer output capacity and 10 tonnes-per-hour total press nameplate capacity – on a conventional die-roller configuration – there is ample capacity headroom.

There is a longer-term ambition, also stated by Arctic Paper, to double that annual production – subject no doubt to securing feedstock and pellet offtake agreements, and low-cost electricity (i.e., lower than the cost of dried sawdust). Yet, there is no obvious space prepared for a third press and ancillaries, suggesting that it is the Twin-Track configuration and operating hours that will fill the gap to doubling production to around 100,000 tonnes per annum.

While that all remains to be seen, what is clear is that Arctic Paper Grycksbo has, in accordance

with the Group's 4P Strategy, maximised its fuel and energy flexibility and redundancy with what it has, future-proofing the paper mill with its circa 330 employees for the years ahead.

In monetary terms, the value of internal energy savings in using recovered heat from PM 10 depends on the price of electricity and sawdust. According to Kent Blom, CEO, Arctic Paper Grycksbo, speaking at the official opening in April 2026, it is currently worth around SEK 50 million (c. EUR 4.51 million) annually, or SEK 1,000 (c. EUR 90.2) per tonne of pellets produced. That is a considerable sum of money in avoided energy costs.

Text & photos: Alan Sherrard
BI144/7632/AS

Fact box: Arctic Paper Grycksbo

MAIN PARTNERS

Construction works: ByggPartner
EPC: Hekotek

MAIN TECH SUPPLIERS

Receiving & handling: BMH Technology
Moisture measurement: Mantex
Dryer: Stela Laxhuber
Pellet presses & cooler: CPM
Sieve: Mogensen

A BULLINGER APPROACH TO PELLETS AND PRODUCTION

Founded in 1913, the fourth-generation family-held Holzwerke Bullinger Group has grown into one of Germany's largest producers of customised glulam (BSH), structural timber and laminated timber beams (KVH). Its Abtsgmünd site is home to a nocturnal pellet plant, all part of a bigger, future-proofing, circular economy and heritage picture.

Comprising four businesses operating on two wood processing sites; Abtsgmünd, Baden-Württemberg in southern Germany, and Neuruppin, Brandenburg in northeast Germany, respectively, the Group currently has over 200 employees and produces around 250,000 m³ of wood products annually.

Turning fully circular

It is the former site that installed a pelleting plant in 2022. The small town of Abtsgmünd is located at the confluence of two brooks, the Lein and the Kocher, the original energy source for the Bullinger story.

– It all started in nearby Hüttlingen, upstream the Kocher brook, when my great-grandfather acquired the water-powered village flour mill with a small sawmill, said Hans-Jörg Bullinger, fourth-generation Bullinger and CEO of Holzwerke Bullinger in Abtsgmünd.

Fast forward to 1976 when the current site in Abtsgmünd, which at the time was a sawmill, was acquired, and 1993, when a former house manufacturing facility in Werder near Neuruppin was acquired. Managed by another part of the Bullinger family, the Neuruppin operations today comprise a state-of-the-art sawmill, construction timber, glulam, along with dedicated production lines for export to Japan and North America.

Customised production

In Abtsgmünd, the company specialised in customised wood packaging, supplying the needs of heavy engineering industries in the region. The sawmill was closed in 1999 to facilitate an expansion of its packaging business, and an additional specialisation, KVH production.

The dry-kilns were retained and upgraded by Mühlbock in 2021, with additional energy efficient Mühlbock 1306 PRO kiln units added to increase overall drying



A turnkey delivery by Salmatec, the heart of the Bullinger pellet plant is a single Maxima 700 unit, which according to Salmatec, has a nominal production output of 2 to 3.5 tonnes per hour depending on the material used.



Branded as "Bulli Pellets", this A1 ENplus-certified pellets are delivered to clients using Bullinger's own bulk delivery truck.



The pellets are cooled and sieved in a Salmatec-Rematec combined cooling sieve and discharge with the fines recirculated back to the press.



Three Burkhardt V3.90S gasifiers with three CHP ECO 220 units provide 305 kWth and 190 kWe each, consuming c 370 kg of pellets per hour in total.



Since commissioning the pellet plant and gasifiers in 2023, the only "residue" leaving the Bullinger Abtsgmünd site is biochar.

capacity and maintain flexibility in sourcing sawn wood.

– At Holzwerke Bullinger Group, our strength is our customization ability and fast delivery times. We have two of Europe's most advanced KVH, structural timbers, and glulam manufacturing facilities, said Hans-Jörg Bullinger.

Like glulam, KVH is an engineered wood product (EWP), a solid timber construction material with precisely defined product characteristics. Made using kiln-dried, strength-graded softwoods, the timber is typically cross-cut and finger-jointed to remove any defects, and achieve lengths of up to 13 metres. It is typically supplied

as planed and chamfered.

Also produced at Abtsgmünd are so-called "Duobalken" and "Triobalken" construction beams. These are straight glulam-type beams comprising two (duo) or three to five (trio) laminated planks or square-sawn timber up to 85 mm thick and 280 mm wide. By using finger-jointed planks/square-sawn timber, these beams can be almost any length.

– Our minimum batch order size is one unit – less than one being very difficult to deliver on, mused Hans-Jörg Bullinger, illustrating the level of customisation.



The feedstock preparation, dry grinding, makes the best use of gravity and the compact space.



Inside the state-of-the-art KVH production hall supplied by Hundegger.

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Forth-generation Bullinger, Hans-Jörg Bullinger, and Salmatec's Timo Müller.

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Freeing up site constraints

Located on the western border of Abtsgmünd, the five-hectare (ha) Bullinger site is shaped like a horizontal "D", physically constrained by the bow-shaped Kocher brook and escarpment on one side and a main road on the other with no real room for expansion. Given the site disposition, another important consideration is truck movements and site logistics.

– We have a one-way system in place with dedicated unloading and loading areas to ensure site safety and avoid congestion, while keeping waiting times to a minimum, Hans-Jörg Bullinger said.

At Abtsgmünd, Norway spruce (*Picea abies*) is the main species used, but also some White fir (*Abies alba*), Douglas fir (*Pseudotsuga menziesii*), and European larch (*Larix decidua*). The sawn wood is delivered by truck to the wood yard – the timber package wraps revealing diverse sources, ranging from regional sawmills to Nordic majors. All outgoing KVH and structural timber goods are loaded onto trucks in reverse order of their unloading sequence to ensure maximum time efficiency at the client destination, typically a construction site.

– Since installing the pellet

plant in 2022, we have reduced the overall number of truck movements on site quite significantly as we no longer have to transport bulky residues off-site. This has freed up our logistical capacity, reduced costs, and improved local air quality, said Hans-Jörg Bullinger.

Residues into revenues and reduced OPEX

Supplied as a turnkey project by compatriot pelletising technology major Salmatec GmbH, the pellet plant is certainly unusual if not unique in a German context. Why? It operates at night-time only, five days a week. At face value, it would seem an oversized investment for pellet moonlighting, but as Hans-Jörg Bullinger reveals, it is part of a larger (c €10 million including the new kilns) renewable energy project for the site, and a pretty savvy one at that.

– We had three main issues we wanted to address simultaneously – traffic, residues, and energy. We need thermal energy for our dry kilns, space heating, and electricity to power our production. At the same time, we generate dry residues that cost to have removed off-site, along with all the truck movements it incurred. But we have very limited space to build on, said Hans-



Towering behind the Bullinger home office, the "Bulli Pellets" plant footprint comprises the two silos, with the plant housed below the concrete silo on the right, and bulk truck loading bay located at the rear of the lefthand silo.

Jörg Bullinger, explaining the background.

The solution – a vertical pellet plant to produce pellets that fuel three Burkhardt V3.90S gasifiers complete with three CHP ECO 220 units in cascade generating electricity, heat, and biochar. Each unit consumes c 122 kg of pellets per hour to provide 305 kWth and 190 kWe. Called "Bulli Pellets", the surplus pellets are sold to the local heating market, within a 25 km radius, and delivered by a Bullinger-branded bulk truck.

Thus, costly waste management has been converted into energy cost reductions, and three new revenue streams: green electricity, pellets, and biochar. Furthermore, Holzwerke Bullinger Abtsgmünd is prepared in terms of pellet capacity for a fourth future revenue possibility, bioheat.

Being on the edge of Abtsgmünd, this would mean the town council approving municipal investment into district heating infrastructure to connect the Holzwerke Bullinger site.

– We have space for additional gasifiers, and produce more than enough pellets to fuel them. However, we do not need more heat ourselves, so we need a heat offtake and infrastructure in place before moving further. Just producing electricity and some biochar while wasting the heat isn't resource efficient. It is better to sell the surplus pellets and displace fossil gas or heating oil, said Hans-Jörg Bullinger.

Compact integrated pellet plant

The entire pellet plant footprint essentially comprises the diameter of two silos, one of which already existed to store residues for previous

removal. The top part of a concrete silo houses the feedstock storage – residues from daily production – with the entire pellet plant located underneath; and a metal storage silo complete with bulk truck loading bay for pellet storage. A pellet feed line from the storage silo serves each of the three gasifiers located inside the adjoining building.

– Since the material comes directly from the production halls to the silo, and is already dry, there is no dryer step. Just a sieve to remove oversize, a dry grinder to mill oversized into the correct particle size, the press, and a cooler-sieve before transporting the pellets to the storage silo, said Timo Müller, Business Development Director at Salmatec.

Dust and fines from the combined pellet press discharge auger and cooling sieve, and the sieve at the truck loading bay are recirculated back to the press.

– The plant is fully automated and unmanned. It typically starts up at around 22.00 and switches off at about 06.00 the following morning. It is off at the weekends since we normally don't have any other weekend production, said Hans-Jörg Bullinger.

The pellets are A1 ENplus-certified, and a locally sourced starch binder is used, closing the circular loop most fittingly.

– My cousin operates the flour mill from which our common heritage and legacy is sprung. As you can understand, I'm not really inclined to use anything else, concluded Hans-Jörg Bullinger.

Text & photos: Alan Sherrard
B1144/7629/AS



AT THE START OF SOMETHING NEW

One of Europe's youngest countries, the Republic of Kosovo (Kosovo) has good potential for developing domestically available woody and agricultural biomass as a renewable and sustainable energy source, especially for space heating. By developing regional supply chains for woodchip and pellet production, towns and villages across the country can replace fossil fuels, reduce demand on the power grid, improve energy self-sufficiency and local air quality, provide rural jobs, and keep working forests as forests.

Formed in 2008 after declaring independence from Serbia, Kosovo is a small (c. 10,887 km²), landlocked country in Southeast Europe with a population of almost 1.6 million. Bordering Albania, Montenegro, Serbia, and North Macedonia, it is centrally located in the Balkans, and like Montenegro, the euro is the official currency, despite neither country being a member of the EU or the Eurozone – a legacy of having Germany's Deutsch mark as currency.

Like some of its neighbours, Kosovo was born in the aftermath of the 1990s Balkan Wars, a series of brutal and violent sectarian conflicts in 1991-1999 stemming from the implosion of Yugoslavia, a former Soviet Union territory. Today, much of the physical scars have faded into the landscape or been removed. Apart from roadside memorials, numerous ad-hoc graveyards and burial sites, commemorative plaques and installations, and random swathes of poppies in fields and waste grounds, there are few obvious tell-tale indications of recent bloody conflict. Rather, it is what is missing that speaks volumes of the ferocity – the general absence of old buildings, houses, and farmsteads, reflecting bygone

centuries of civilisation and inhabitation. In some parts, entire towns and villages were razed to the ground, replaced by 21st-century new builds. Indeed, Kosovo has perhaps Europe's most modern filling stations, with state-of-the-art structures, fuel dispensers, and electric chargers, irrespective of brand or oil major, but alas without B100 or E85 options.

Keeping Kosovo's forests as forests

Forests cover approximately 45 percent or c. 481,000 hectares (ha) of Kosovo's land territory, of which roughly half is state-owned, and the other half is privately held. Agricultural land covers 29 percent and grassland 15 percent, respectively. Oaks, beech and other broadleaved hardwoods account for almost 75 percent of the species mix, while coniferous softwoods – spruce, pines, and firs make up the remaining 25 percent. Kosovo has two National Parks located in high-elevation forested areas: "Sharri" in the south and "Bjeshket e Nemuna" in the west. These two National Parks contain about 90 percent of the total growing stock of coniferous forest and mixed coniferous

and broadleaved forest.

Operating under the Ministry of Agriculture, Forestry and Rural Development (MBPZHR), the Kosovo Forest Agency (KFA) is the primary government body responsible for the sustainable management, protection, and administration of Kosovo's public forest resources, handling reforestation, timber licensing, and forest fire prevention. The KFA plays a pivotal role in the Forestry Development Strategy 2022–2030, which aims to improve rural livelihoods, manage protected ecosystems, and address issues like illegal logging and climate change.

Kosovo's entire forest area was first assessed in 2003, and results of the second forest inventory in 2012 show that, since 2003, both the forest area and the growing stock have remained stable at 40 million m³. However, the annual harvest of 1.6 million m³ was 300,000 – 400,000 m³ above the assessors' recommended long-term annual harvest level of 1.2 – 1.3 million m³. Fire was identified as the single most important stand-level disturbance, affecting over 12,000 ha, or 2.5 percent of the total forest area. A third forest inventory is currently underway.



(Left) A memorial installation in central Prishtina.
(Above) Western outskirts of Prishtina with the Kosova B and Kosova A lignite-fired power plants on the horizon – centre and right respectively. Comprising two 339 MW units, Kosova B was fully commissioned in 1984 and fully operational. The older Kosova A" consists of five units; A1 (65 MW) commissioned in 1962, A2 (125 MW) commissioned in 1965, A3 (200 MW) commissioned in 1970, A4 (200 MW) commissioned in 1971, and A5 (210 MW) commissioned in 1975. According to the current plan, units A3, A4 and A5 are operational, two are used in production, while one of them is a "hot" reserve due to their low readiness, which is a consequence of their age. Units A1 and A2 are out of service, without a defined status,
(Top right) Fuelwood logs at a firewood producer.
(Centre right) Air-dried boards in the woodyard of a furniture manufacturer.
(Below right) Furniture production generates residues in the form of sawdust and off-cuts.



Developing sustainable forest biomass value chains

The 2012 inventory noted that almost 99 percent of the forests in Kosovo show traces of human activity with forest management practices implemented throughout the entire forest area, including remote, mountainous locations. The inventory also found that over 90 percent of the volume harvested was not harvested according to KFA regulations, which the inventory noted was “most likely a combination of poverty-driven, small-scale wood extraction by rural people, and more organized commercial logging. Often, only the most valuable parts of the log are used, leaving a perfectly good part to waste.” Thus, despite its availability, forest biomass remains underutilised due to fragmented value chains, limited coordination, and insufficient integration into national energy and forestry policies.

SUNREED project

Recent initiatives, including the Sustainable Use of Natural Resources and Economic Development (SUNREED) project, have begun to address these obstacles by developing the Wood Bio-



cont. p. 24

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mass Energy Roadmap, completing feasibility studies for biomass district heating for potential municipalities and private companies, establishing biomass collection points, and strengthening private forest owners and Small and Medium Enterprises (SMEs) in the biomass value chain.

Financed by the Embassy of Sweden/Swedish International Development Cooperation Agency (SIDA) office in Prishtina, the SUNREED project is a five-year (2022-2026) program that supports the development of sustainable forest-based market systems in Kosovo, with a particular focus on woodchips as a renewable energy source. Through a Market Systems Development (MSD) approach, the project works to improve linkages between forest owners, biomass producers, processors, technology providers, and end-users. It supports better coordination, quality standards, investment readiness, and policy dialogue to create a more efficient and inclusive woody biomass market for woodchips, briquettes, and pellets.

Feasibility studies for establishing wood biomass heating systems – with capacities ranging

from 0.5 MW to 6 MW – have been completed for twelve municipalities across the country. By facilitating these early interactions, the initiative aims to strengthen Kosovo's biomass value chain, attract sustainable investment, and position Kosovo as a credible partner for sustainable wood biomass solutions, paving the way for long-term Kosovo–Swedish/Nordic cooperation in the green energy transition in Kosovo and the Western Balkans.

A catalytic collaboration

An introductory workshop meeting that Bioenergy International, on behalf of and in collaboration with, Connecting Natural Values and People Foundation (CNVP), and the Embassy of the Republic of Kosovo in Sweden was held mid-April in Stockholm, Sweden to facilitate these initial interactions between Kosovar stakeholders and Swedish/Nordic bioenergy companies and stakeholders, creating opportunities for partnerships and investment opportunities in the Kosovo biomass sector, with relevant technologies and heating solutions.

This was followed up by a two-day whirlwind tour at the end of May to Kosovo with a group of Swedish/Nordic companies active in the biomass-to-energy value chain. The event, which comprised a B2B “Investment and Kosovo–Sweden (Nordic) Partnership Opportunities in the Bioenergy Sector” seminar in Prishtina, and site visits to a district heat plant, pellet boiler manufacturer, sawmill, furniture manufacturer, woodchip supplier and pellet producers, the latter of which are reported on in this issue.

By strengthening sustainable forest management and developing local and regional markets for low-grade fuelwood and pre-commercial thinning, income for Private Forest Owners (PFOS) is bolstered, helping to ensure that working forests are kept as forests while enabling feedstock to become available for regional pellet producers and heat plants, reducing dependence on fossil fuels – a circular bioeconomy, and the start of something new for all parties concerned.

Text & photos: Alan Sherrard
BI144/7644/AS

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HARNESSING THE POWER OF C4-GRASSES

While most biomass pellet producers use residuals from agriculture or wood processing industries, one Swedish company has taken a more holistic approach by using purpose-grown grasses as feedstock. Not just any grass but so-called C4-grasses grown on degraded lands, to produce biomass fuel pellets while improving soil quality.



ACCORDING TO BIOENERGY EUROPE'S MOST RECENT STATISTICAL REPORT, global pellet production reached 53.5 million tonnes in 2025, up 10 per cent year-on-year, with Europe accounting for around 70 per cent of consumption. The vast majority of that market is built on using forestry residues and wood processing by-products – woodchips, sawdust, and shavings – which is an efficient and circular use of existing resources.

However, as the global demand for biomass pellets continues to grow, expanding the pool of sustainable feedstocks for pellet production beyond forest and agricultural residues becomes more critical. Especially in the context of today's increasingly unpredictable and volatile geopolitical world impacting global trade, physically and fiscally, security of supply has become a key consideration along with pellet performance, quality, and price.

– The pellet market isn't facing a demand problem, it is starting to face a supply issue. If demand continues to grow, future supply cannot come from simply producing more of the same. It will depend on expanding the pool of sustainable feedstocks. That's one of the reasons we're working with fast-growing C4-grasses. Not to replace wood but to complement it. Different feedstocks. Different supply chains. More options for industrial users, remarked Peder Dagsánth, CEO and President of Jord.

Biofuel production, carbon reduction and land restoration

Founded in 2016, Jord AB (which translates as "soil" or "earth") has developed a holistic approach to biomass fuel production by utilising unused, marginal or degraded land to grow perennial C4-grasses that are used as feedstock. Using regenerative farming practices, Jord's strategy involves implementing a perennial (c. 10-year-cycle) farming system with C4-grasses as the primary crop, complemented by legume trees and other crops to combat monoculture and enhance biodiversity. This regenerative agroforestry model is designed to revitalize the soil and enhance biodiversity over time, provide local employment and additional farmer income, produce renewable biomass fuels and carbon credit opportunities.

According to Jord, a key advantage is that the feedstock is purposely grown on degraded land on a continuous-harvest basis, meaning that buyers can plan annual contracts, eliminating exposure to spot-market externalities.

Expanding the feedstock pool

Grasslands cover over 20 percent of the Earth's terrestrial surface, and as such, grass could become a significant feedstock pool for bioenergy. Biologically, grasses have two main photosynthetic pathways: the C3-pathway that is typical of most plants, and a specialized C4-pathway (Hatch-Slack pathway) that minimizes photorespiration and thus increases photosynthetic performance in high-temperature and arid environments. The grass family (*Poaceae*) includes most of the known C4 species – around 5,000.

Thus, C4-grasses dominate tropical and subtropical grasslands and savannas, while C3-grasses dominate the world's cooler temperate grassland and prairie regions. Examples of C4-grasses include familiar food crops such as maize (corn), sugarcane, millet, several species of sorghum, along

with non-food grasses such as switchgrass and Napier grass. A notable exception is bamboo, which, although it is a C3 grass, has evolved an adaptation to trap and refix photorespired carbon dioxide, enabling it to thrive in warm climates.

Production in West Africa and the Caribbean

Currently, Jord has two operational sites: in Senegal, West Africa, and the Dominican Republic in the Caribbean. The former comprises 300 hectares (ha) in the first step in a planned allocation of 1,000 ha in the Sédhiou region of southern Senegal.

Announced in May 2025, the allocation marked a major step in supporting Senegal's clean energy transition. The first pellet batches, using Bana grass, have been produced and are currently undergoing third-party lab testing. Bana grass is a fast-growing Napier x pearl millet hybrid that can be harvested up to four times a year. Fully ramped up, the goal is to produce up to 50,000 tonnes of pellets annually.

The latter comprises 500 ha of marginal and degraded lands in the central region of the Dominican Republic, in San Pedro de Macoris near Santo Domingo. A full-scale production line for the project was completed in early 2026, with the first pellet samples produced using energy cane as feedstock. Fully ramped up, the goal is to produce 30,000 tonnes per annum of pellets.

Growing product portfolio

Energy products in the Jord portfolio include cut and pressed (mechanically dewatered to reduce chlorine and moisture content) grass, briquettes, pellets, and torrefied pellets, engineered as drop-in fuels for industrial boilers already operating on woodchips or agricultural residues.

The liquid fraction produced during the mechanical pressing is captured, filtered, and stabilised as a stand-alone product — preserving the soluble organics, plant macronutrients, and biologically active compounds released during the press cycle. This biologically rich liquid has two clearly defined applications.

In anaerobic digestion (AD), it functions as a high-COD co-substrate that increases specific biogas yield, supports stable reactor conditions. In agriculture, it can be used as a liquid organic biofertiliser — delivering nitrogen, phosphorus, and a soluble carbon load that improves soil microbial activity and supports yield recovery on degraded land.

According to Jord, for every 1,000 ha cultivated with C4 pastures, 30,000 - 50,000 tonnes of biomass pellets can be produced annually, replacing fossil fuels and providing around 60 direct jobs. Atmospheric carbon is sequestered in the roots and soil, which, together with avoided emissions, generate a positive environmental balance. With ten-year cycles, soil fertility, water retention and biodiversity are improved. That is the potential power of C4 (grasses).

Text: Alan Sherrard

Photos: Jord

BI144/7647/AS

Dealing with feedstock availability and power constraints

As part of the Sustainable Use of Natural Resources and Economic Development (SUNREED) project, Bioenergy International had the opportunity to visit several pellet producers in Kosovo. While very different as companies, they all shared at least two constraints in common hampering production and expansion – feedstock availability and the cost of electricity.



Located in the wellness resort town of Istog, near Peja in western Kosovo, home to the country's single largest fish-farm and hotel complex, **BMB Trade is a small family-held sawmill, owned and operated by father and son duo Ali Haskaj and Burim Haskaj.** Comprising a bandsaw and headrig carriage of French origin, typically used for large diameter hardwoods, the company buys and processes logs to produce timber primarily for construction purposes – beams, joists and roof trusses. As such, the company serves as a reminder of the birth and first decades of Kosovo – rebuilding.



The equipment fleet also includes a delivery truck, a Jenz chipper truck, and a small pelleting line. The latter comprises a rotary drum dryer, cyclones, a flat-die press, and a manual bagging unit, all of Chinese origin. The company uses its own sawdust as feedstock, supplying bagged pellets to the local residential heating market. While taking into consideration the impending summer low season, a glance at the extensive but empty woodyard suggests shortages.



– Margins are tight, and we need to balance costs, cash flow, and credit to stay in business. Electricity and diesel fuel are expensive, and logs are not always available, at least not at the right price when transportation is factored in, commented **Burim Haskaj.**

Swiss serial entrepreneurship

In contrast, **TheS Ari Recycling Industries Sh.p.k. (TheS-Ari)** operates a dedicated pellet plant, and on a larger scale – 30,000 tonnes-per-annum capacity. Located in Kilokot, the company was established by serial entrepreneur Bashkim Zejnullahu, who returned from Switzerland and had successfully established the “Tina Petroll” service station, restaurant and retail chain in 2002. In 2008, TheS-Ari was formed, initially with briquette production before the flour mill in Kilokot was acquired.

Backed by a CHF 4.5 million SECO Suisse fund investment, a strategic financing instrument of the Swiss Government established via the State Secretariat for Economic Affairs (SECO), the wood pellet plant was set up by a Swiss engineering firm opposite the flour mill in 2010.

The company buys in sawdust, shavings, slabs, and off-cuts from local sawmills and wood processing companies as well as clean waste wood, firewood, pre-commercial, and pulpwood logs. Slabs and logs are chipped using a stationary chipper with a log deck, a more recent addition to the plant. Previously, a mobile chipper unit was deployed. Like at BMB Trade, the seemingly empty woodyard suggests feedstock constraints.

– We are surrounded by forest yet have difficulty in securing material. We have even imported pulpwood from neighbouring countries revealed Laurent Zejnullahu, son of the founder, adding that better coordination, collaboration and investment is needed along the forest-to-industry value chain.

Nocturnal production

Incoming sawdust is stored under a roof and a wheeled bucket loader is used to fill a receiving hopper for a rotary drum dryer. From the hopper located outside the building, the material is conveyed into the ground-floor to a screener to remove oversized material, which is discharged directly into the hot air furnace fuel conveyor, whereas the screened material is fed into the dryer, also located on the spacious ground floor.

The pelletiser, along with a maintenance workshop, is located on the upper floor of an extension to the original building. Comprising a single Salmatec four tonne-per-hour unit, the press was undergoing routine maintenance during the visit, seemingly without any undue hurry to get back into production.

– We run the pelletiser at night only. We have enough feedstock to run a single shift, and night-time electricity is much cheaper so we split our production. During the day, we prepare the feedstock; at night we pelletise, explained Laurent Zejnullahu, adding that being located on an industrial site without residential next-door neighbours has its advantages.

First ENplus-certified producer in Kosovo

In 2018, TheS-Ari became the first producer in Kosovo to achieve ENplus certification (XK 001) for A2 quality, and was recertified to A1 quality in 2022. This was due to a change in feedstock – imported softwood logs – during the Covid 19 pandemic, and requirements from export markets. Although its certification has since expired, the company says it maintains the A1 quality level, but is focusing on the domestic market.

– Transport costs are high, and exporting brings more variables to consider. We'd like to see a regional baseload demand for pellets develop, for example, processing industries. That would take the strain off dependence on the weather-driven, seasonal heating market, concluded Laurent Zejnullahu.

Text & photos: Alan Sherrard

B1144/7641/AS



(Top left) The bandsaw and headrig carriage sawmill at BMB Trade. (Centre left) Ali Haskaj, Founder of BMB Trade. (Bottom left) Burim Haskaj, owner of BMB Trade discussing pellet production. (Top) View of the stationary woodyard chipper at TheS Ari. (Centre left) The furnace conveyor with oversized and reject. (Centre) Dryer discharge, cyclone, and feed to the pelletiser day silo. (Centre right) The Salmatec four-tonne-per-hour pelleting unit undergoing maintenance. (Bottom left) TheS Ari CEO Laurent Zejnullahu (left) and Cristian Gandila, Firefly's Business Development Manager for Romania. (Bottom right) A TheS Ari branded delivery van.

A RUN-THROUGH OF KOSOVO'S FIRST GREENFIELD PELLET PLANT

2017 marked the founding of H&D Pellet Sh.p.k (H&D Pellet), which built the first greenfield pellet plant in Kosovo. Over the years, the company has carved out a reputation in the Balkans region for producing quality pellets for residential heating. A reputation that provides a foundation for possible future expansion, should the opportunity present itself.

Not to be confused with HD Pellet, a branded German cutting technology for uniform pellet production, H&D Pellet is a 30,000 tonnes-per-annum plant located outside Zahaq, east of Peje. The rectangular site on a gentle slope is designed as a conventional wood pellet plant based on sawmill slabs and roundwood – fuelwood, and pulpwood grades – delivered by own and third-party timber trucks. Indeed, “last mile” road upgrade and drainage works for the H&D site were ongoing at the end of May, and will improve truck access to the site considerably.

Hardwood pellets

The species mix used reflects the forests in the surrounding hinterland, predominantly hardwoods including various oak species (*Quercus sp.*) and beech (*Fagus sylvatica*), along with ashes (*Fraxinus sp.*), poplars (*Populus sp.*), alders (*Alnus sp.*), birches (*Betula sp.*), and maples (*Acer sp.*). Softwoods including pines (*Pinus sp.*), firs (*Abies sp.*), and spruces (*Picea sp.*) are a minor share. Logging residues are used as boiler fuel to heat the drum dryer and premises. On arrival, trucks are scaled and unloaded in the expansive woodyard. A towable trailer chassis-mounted Jenz HEM 582 chipper is used to chip the material, 180 to 270 m³ per hour depending on the material. Using a bucket loader, the woodchips are loaded into the feed bin, screened to remove contaminants such as stones, before entering the dryer. On exiting the dryer, the material passes a cyclone to separate the flue gases from the material, which then passes a hammer mill before being pneumatically conveyed together with the material to one of two conditioning bins inside the building. The flue gases pass a bag filter before being exhausted.

Modern automated plant

Inside the production hall is found a modern automated pelleting and bagging line of Italian OEM origin. The pelleting line comprises two two-tonne-per-hour pelletiser units, from General Dies unit and PSP Machinery (now IMALPAL), respectively. The pellets are cooled in a counter flow cooler to slightly above ambient temperature, sieved to remove fines, and conveyed to a maturation silo. From the maturation silo, the pellets are weighed and sacked in 12.5 kg bags using a fully automated Essegi unit, palletized and wrapped using a Render Technologies unit. There is no big bag, bulk storage, or bulk delivery.



Room for expansion

The current pelleting line occupies approximately one-third of available indoor production area, suggesting ample space for future pelleting lines, even when taking bagged pellet storage into consideration. Such an investment would likely require more drying capacity, and perhaps adding bulk pellet storage capability. And there is sufficient site space available to accommodate any or all such additional infrastructure. Instead, it's back to how the residential and other pellet markets in Kosovo and the Balkan region develop, whether there will be affordable feedstock and stable electricity supply available or not to build a business case on.

Text & photos: Alan Sherrard
BI144/7633/AS

Hysen Gashi, owner of H&D Pellets.



(Left) Pellets hot off the press heading for the cooler. (Above) A postcard view of the H&D Pellet facility. (Below left) The dryer cyclone, dust filter and flue exhaust. (Below right top) View of the woodyard with boiler fuel (left), the trailer chassis mounted Jenz HEM 582 chipper, and woodchips. (Below right below) Close-up of the dryer discharge, and dry grinder. (Bottom right) The two pelletisers, counterflow cooler and maturation silo. (Bottom centre) The Essegi F1000 automated weighing and bagging unit. (Bottom left) The automated Rendering Technologies palletising and wrapping unit.



RAINBOW PELLET STARTS UP WORLD'S FIRST COMMERCIAL-SCALE STEAM-EX PELLET PLANT



Paul Wong (left), Executive Director, Rainbow Pellet, and Maximilian Lehr, Technology Manager, ANDRITZ, showcase a world premiere, the first commercial-scale Steam-Ex pellet plant for empty fruit bunches.

Malaysian wood pellet producer Rainbow Pellet Sdn Bhd has successfully started up the world's first commercial-scale Steam-Ex pellet plant for empty fruit bunches (EFBs) at its site in Kuala Lipis, Pahang.

Malaysia is also the world's second largest palm oil producer. A residual from the primary palm oil extraction process, EFBs account for approximately 70 percent of palm oil mill residues yet are currently underutilized.

Focused on biomass pellet production and forest plantations, Rainbow Pellet is committed to advancing innovative processing technologies enabling sustainable and efficient resource utilization.

The fibrous EFB material has a high cellulose, hemi-cellulose, and lignin content. However, it also has a high ash content – up to 7 percent, of which potassium (K) can make up half – not good for combustion performance.

Leaching and steam explosion

Using technology supplied by Austrian technology major Andritz AG (ANDRITZ), Rainbow Pellet has overcome the ash challenge to produce “black pellets”, marking a major milestone in the industrial-scale processing of low-value EFB's into high-quality advanced solid biofuels with coal-like properties.

Utilizing steam explosion technology, the Steam-Ex line features ANDRITZ leaching pretreatment equipment to lower ash content. ANDRITZ also supplied automation and provided integration and start-up services to support reliable and efficient operation of the 20,000 tonnes-per-annum plant, which can also use wood as feedstock.

– This first-of-its-kind Steam-Ex pellet line represents a decisive step for our company and for the commercial-scale utilization of empty fruit bunches. ANDRITZ's support was essential in bringing this innovative concept into operation and laying the foundation for future expansion of this technology, said Paul Wong, Executive Director at Rainbow Pellet.

The technology is designed to process challenging biomass feedstocks and support the production of high-quality pellets for industrial energy applications.

The conversion of EFB's into advanced solid biofuels suitable for direct coal replacement at power plants opens a new pathway for converting abundant agricultural residues into commercially viable renewable fuels, creating value from a resource that would otherwise be underutilized or used in lower-value applications.

– This milestone highlights the potential of Steam-Ex technology to unlock the value of underutilized biomass residues and provides a solid foundation for future investments, commented Maximilian Lehr, Technology Manager at ANDRITZ.

*Text: Alan Sherrard
Photo: Rainbow Pellet
BI144/7638/AS*

ENERGY-EFFICIENT

As a supplier of complete pelleting plants, Amandus Kahl manufactures all machines for wood pellet production – from grinding and drying to pelleting and pellet cooling. By combining innovative technologies from a single supplier and optimising their integration, the company explains that significant energy savings throughout the entire pelleting process can be achieved.

Celebrating its 150th anniversary this year, Germany's Amandus Kahl, with its signature flat-die pelletisers, is a well-known supplier in the biomass pelleting sector. While demand for biomass pellets has risen again since the beginning of 2026, energy costs remain high. Energy-efficient processes throughout the entire production chain have therefore become essential for ensuring economic and sustainable production. This in turn calls for customized solutions that reduce energy consumption while increasing efficiency.

Precision technology is needed for each process step, and a production line as designed by Amandus Kahl illustrates the key factors involved in the efficient production of wood pellets. Comprising a pan grinder mill for wet grinding, a belt dryer, a pellet mill, and a belt cooler, the combination components enable wood pellet producers to make their manufacturing process more economical and sustainable.

The pellet mill can be optionally equipped with innovative efficiency-enhancing technologies such as Eco Roll and Distamat. The combination of all these plant components enables wood pellet producers to make their manufacturing process more economical and sustainable.

Efficient wet grinding with a pan grinder mill

The ability to process feedstock while it is still moist, e.g., raw sawdust or woodchips, is a key factor in reducing energy consumption. The pan grinder mill efficiently grinds raw materials with moisture content of up to 60 percent. The crushing and shearing action between the pan grinder rollers and the die optimally prepares the material for further processing.

According to the company, when producing wood pellets for energy use, the conventional dry grinding step can often be bypassed as the ground material, once dried, can be fed directly into the pelleting process. With typical energy requirements of approximately 40 kWh per tonne of material for dry grinding, considerable OPEX savings can be achieved.

WOOD PELLET PRODUCTION

Residual heat recovery with a low temperature belt dryer

The Amandus Kahl belt dryer uses a heat recovery system that reduces energy consumption without compromising product quality. Low inlet air temperatures, under 120 °C, ensure particularly efficient drying with residual heat. In addition, intelligent control technology and automated operation enable continuous monitoring and real-time adjustment of operating parameters, yielding a consistent output moisture content of 10–12 percent with minimal energy consumption.

Moreover, the close-meshed fabric belt ensures efficient filtering of the exhaust air, reducing the dust concentration to well under regulatory limits. This not only helps to comply with strict environmental regulations but also ensures a cleaner working environment.

Optimized pelleting increases efficiency

Pelleting significantly influences the energy efficiency of the entire production process. Several innovative technologies help to reduce the energy consumption of pellet mills before the warm pellets are gently and efficiently cooled to 5–10 °C above ambient temperature in the downstream belt cooler.

Launched in late 2024, Kahl's new Eco Roll marks a milestone in the development of pan grinder rollers. With the Eco Roll, the product is compacted in two steps instead of applying the total required pressing force in a single step. This reduces the pelletizer energy consumption to just 40–45 kWh per tonne.

With an annual production volume of 50,000 tonnes, this results in savings of up to 1,250 MWh of electricity. At an electricity price

of 20 cents per kWh, this equates to a cost reduction of approximately €250,000 per year. At the same time, production capacity increases by up to 25 percent.

Automatic roller gap control

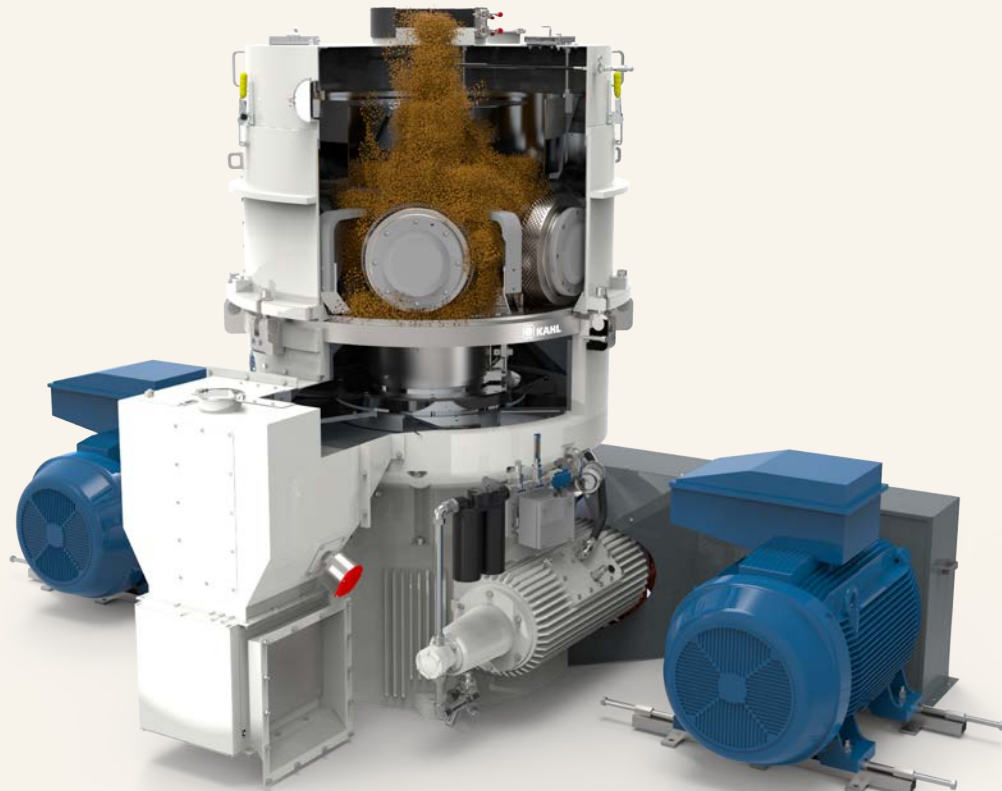
In addition, the Distamat system provides precise control of the roller gap. A constant gap between the roller and the die is crucial for uniform pellet quality. Automatic measurement and control mechanisms in the Distamat system

continuously adjust the gap to the current process conditions, thereby reducing mechanical wear, downtime, and energy consumption. The result is increased uptime, which in turn leads to higher annual production volumes.

The system can also be integrated into the Electronic Automatic Pellet mill Regulation system (EAPR) as an optional extra. In combination with the EAPR, the Distamat system enables fully automatic control of the entire pelleting process, reduces personnel costs and increases operational reliability.

Combined, the wet pan grinder mill, belt dryer, pellet mill with Eco Roll and Distamat technologies, as well as the belt cooler, offer a complete energy-efficient and cost-saving solution for wood pellet producers, Amandus Kahl concludes.

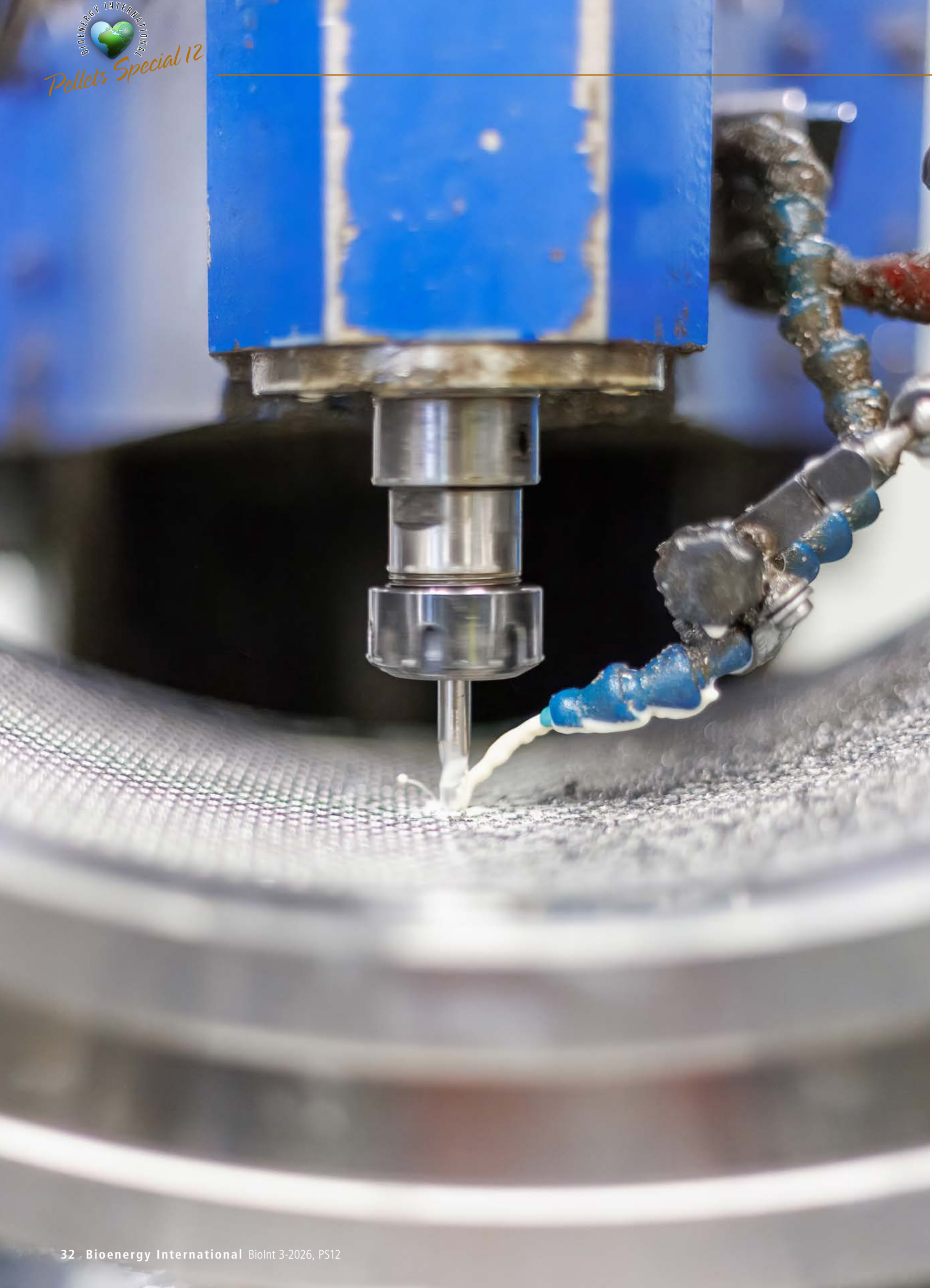
Text & photo: Alan Sherrard
BI144/7621/AS



The KAHL flat die pellet mill, in combination with Eco Roll and Distamat, enables a highly efficient pelleting process. The EAPR regulation system and Distamat technology keep the gap between pan grinder roller and die constant and thus prevent energy losses (image Amandus Kahl).



First unveiled by Amandus Kahl's Bernd Ottlinger (left), EVP, and Dr. Joachim Behrmann, CEO in November 2024 at USIPA's (now AWBA) annual conference in Miami Beach, and showcased at Ligna 2025 in Hanover, the Eco Roll reduces the energy consumption of the pellet mill to 40–45 kWh per tonne and increases the production capacity by up to 25 percent.



DRILLING DOWN INTO THE ART AND SCIENCE OF DIES

Rural Brittany is the site for one of Europe's leading independent third-party designers, manufacturers, and distributors of dies and wear parts for pelleting plants. Located in the scenic town of Grand Fougeray, Ille-et-Vilaine, in the heart of one of France's leading agricultural regions, Ferotec turns out over 2,800 units annually from its state-of-the-art facility.

Founded in 1992, Ferotec was originally initiated as a joint venture between Brittany entrepreneur Alain Glon, who at the time was the owner of several large-scale feed mills in France – long since divested to compatriot global vegetable oil and protein major Avril Group – and the late Peter Munch, from the well-known German pelleting technology firm MÜNCH-Edelstahl GmbH. This original decision to adopt a 'short-circuit' model had a positive impact on pricing to a major client, as transport costs were significantly reduced.

– By locating the production facility at Grand Fougeray, we can provide products that are 100 percent 'Made in France' and deliver service close at hand, thus ensuring flexibility, quick delivery times, and close familiarity with our clients' requirements, commented Maurice Magueur, Business Developer at Ferotec.

Fast forward to 2026, Ferotec is a company within the Groupe Alain Glon Holdings (AGH) sphere, a Brittany-based agro-industry group wholly owned by the Glon family. Groupe AGH focuses on Brittany-based food-stuffs, consumables, and allied businesses. It currently includes household food and confectionery brands such as Altho that produce "Brets" premium potato crisps; Coté Foods, a premium meat, poultry and vegetable trader, and Tiliz, a monchi cake and dessert producer. Downstream companies in the group include Écofeutre, a recyclable packaging producer, SOBER Bioénergie, and Socofag, a firewood, pellets and briquette trader.

On paper, Ferotec would seem to be the cuckoo in the AGH portfolio nest. Nonetheless, having earned a solid reputation and developed a strong platform in France, the company launched a proactive export development strategy in 2010. A testament to the success of that strategy is that the company currently provides dies – both ring die and flat die – and various wear parts to clients in over twenty countries, primarily in Eastern Europe, Latin America, East Africa and South East Asia. Indeed, exports have grown since 2010 to account for around 60 percent of annual turnover.

– Ferotec has supplied animal feed pelleting plants since its inception. While this output still accounts for almost 80 percent of our turnover, we also supply manufacturers of fertiliser, wood pellets, the waste and recycling industry, and other clients, said Maurice Magueur.

Focused on die design and production

Ferotec manufactures both ring dies and flat dies, from 250 mm to 1,500 mm in diameter, along with other pelletiser wear parts such as shells. There is, though, one very notable absence in the product portfolio: rollers.

– Rollers are an entirely different animal, perhaps best served by the OEMs. We deliberately chose to fully commit ourselves to the production of dies. This strategic choice enables us to provide our clients with very specific, tailored solutions while keeping us in tune with any changes to client products, Maurice Magueur said.

In layperson terms, a die is a metal ring, or disc in the case of a flat die, with an almost inordinate number of holes drilled through it at a regular spacing through which the material, e.g. wood particles, is pressed via rollers that rotate on the inside of the ring, or on the top of a flat die. The principle is deceptively simple; rollers press the incoming material into a bore hole, thereby compressing the material into a pellet that comes out on the exterior or bottom of the die.

In reality, it is of course far more sophisticated, as any (wood) pellet producer can attest to. Factors ranging from the type of material being pelletised, particle size, moisture content, material temperature, roller pressure, steel quality of the die, desired density of the end product, resi-

dence time in the die bore, compression ratio, the number of holes and their distribution on the die, the shape and the diameter of the bore hole, to mention a few.

All about the bore hole

Die production at Ferotec comprises three main stages – turning, drilling, and hardening. Starting with the former, a forged stainless steel alloy ring or disc blank is first turned into its final shape. Given the range and volume of dies produced, Ferotec keeps a large stock of blanks to ensure short manufacturing times.

As it turns out, pun intended, a key feature in every die is the bore hole – a fascinating field at the intersection of material science and mechanical engineering craftsmanship. While a stainless steel alloy enables a superior stress resistance in the die, it is the bore hole design that ultimately defines the produced pellet. With risk of stating the obvious, it is within the hole that the actual material compression or densification takes place.

Mathematically, the compression ratio is a result of the compression length, i.e. the thickness of the die, over the bore-hole diameter. Typical biomass pelleting bore hole diameters are 6, 8, 10, and 12 mm. Thus a 10 mm bore hole at a 1:5 L/D ratio translates into a 50 mm bore hole length – a die of 50 mm thickness. The same bore hole at a 1:8 L/D ratio results in an 80 mm thick die.

The higher the L/D ratio, the longer the material remains under pressure in the die. While this can improve pellet density, hardness, and mechanical strength, over doing it increases the force required by the press, thus increases power consumption, frictional heat, and die wear. Conversely, a too low L/D ratio for the material being pelletised can result in poor pellet density, crumble, and a high share of fines. Furthermore, the transectional shape of the bore, i.e. any changes in the diameter along the length of the bore hole, has a direct impact on the end quality of the pellet. Finding the optimum L/D ratio and bore hole design for a specific material is why pellet technology OEMs want material test samples from presumptive clients, and keep a closely guarded library of samples with records of various tested materials.

To illustrate bore hole design complexity, Ferotec has (at least) three main design principles for pelletising woody biomass, all adapted to different types of wood pellets, be it softwood, hardwood and other specific biomass types. These principles are conical counterboring, double conical counterboring, and cylindrical counterboring.

– Counterboring makes the die stronger and ensures that the pellets are properly discharged from the compression hole. Counterboring can be tailored to various requirements: it can be standard or stepped, as well as conical and/or cylindrical. Counterboring on a number of external rows allows the whole of the track to be used and provides optimum flow rates, Maurice Magueur explained.

As material passes from the narrow section to the wider section of a borehole in the die, the compression ratio is reduced, thus influencing the pellet quality.

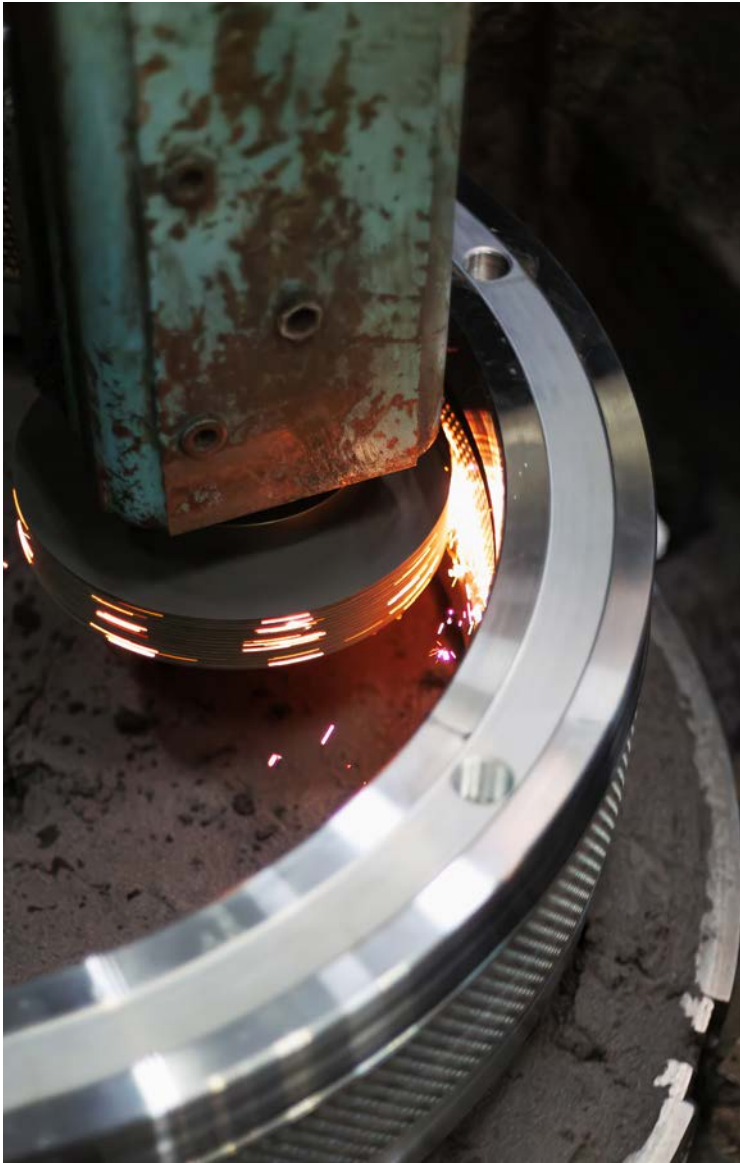
– The optimised die-hole design improves press efficiency, and the adjustment of mechanical characteristics also guarantees a consistent quality of the finished product, Maurice Magueur said.

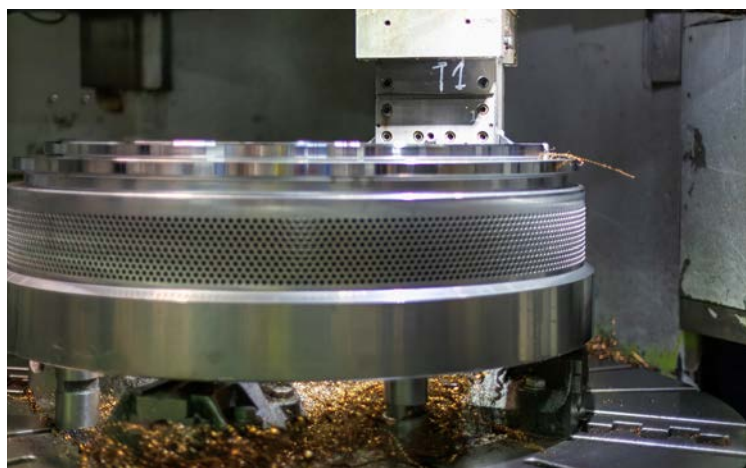
With basic maths, one can begin to appreciate the numerical variety produced by Ferotec. Furthermore, Ferotec's drilling process produces polished bore holes, enabling the die to be taken directly into production by the client.

cont. p. 35



The Ferotec team with Cédric Poirier (left), Production Manager, Philippe Grillot, Sales Manager, Christophe Ploteau, Director, Nathalie Boivent, and Maurice Magueur, Business Developer.





Post hardening machining and rebalancing removes any excess on the die.

cont. from p. 33

– We use carbide-tipped drill bits to ensure that the hole surfaces are as smooth as possible. This means that the start-up process for dies at the client's pellet plant is straightforward; the product passes through quickly; there is no need for running-in the die, Maurice Magueur added.

Hardening and post-hardening adjustments

Once the die has been drilled to the client's specification, the next stage is hardening it to between 53 and 55 Rockwell C (HRC). This takes place in one of the two vacuum furnaces at temperatures of up to 1,000 °C in a process cycle that can take up to 20 hours to complete. HRC is a standardised method for measuring the indentation hardness of materials such as hardened steel and is used in engineering and metallurgy.

– This thermal treatment is necessary to make the die more wear-resistant, yet suppler and resilient, Maurice Magueur said.

Post the hardening process, the die is remachined down to its exact dimensions, balanced and cleaned.

– In the first turning step, when the shape and dimensions are crafted, there is always a few millimetres margin. This margin is necessary because the hardening process can slightly alter the die form, which is impossible to know beforehand, Maurice Magueur explained.

A "center-of-excellence" workshop

The Ferotec workshop houses numerous state-of-the-art machining tools and metal process technologies. Along with the two vacuum furnaces, there are some 40 machine tools and 20 gun-drilling machines. These are operated around the clock by around thirty skilled mechanical engineers and technicians who craft the dies. Several of these machine tools are unique, developed and built by Ferotec specifically for die production. All machines are fully automated and digitally controlled.

– We invest in research and development to improve the quality, durability, and resistance of our dies to increase longevity and reduce maintenance costs for pellet manufacturers, said Maurice Magueur.

For example, Ferotec has a strong partnership with the French Technical Centre for Mechanical Industry (CETIM).

– Our partnership with CETIM helps us to improve the reliability of our products and optimise the drilling process. This is pursued on a regular basis, allowing us to be fully proficient in cutting-edge technology. CETIM also enables us to enlist the help of specialist engineers and researchers to work on other issues, such as die heat treatment, Maurice Magueur said.

A meticulous process

Inspections according to mechanical machining protocols and standards are carried out at every stage of the manufacturing process. After each machining or process step, the die has to pass an inspection and be signed off by the operator in charge before being released for the following step in the process.

– Strictly speaking, the "signing off" by the operator isn't necessary as the operator puts all the control checks on screen, and we, of course, know who worked where and when on a given shift. However, putting your name, or digital signature behind your work means you take ownership and pride in your craft. I believe that this is important, keeping a human



Detail of a fully automated and digitalised drilling machine.

accountability aspect in a world of automation and digitalisation, remarked Maurice Magueur.

Each and every die is given a unique ID, specifying the alloy, the hole diameter, the thickness, and the compression length. The die is tracked and traced, in real time, throughout the entire process – from the blank to the finished product – accumulating data with extraordinary granular detail on the work done on it at each step of the process, right down to production time and energy consumption. At an aggregated level, the data generated surely provides Ferotec with a valuable goldmine in terms of proactive production planning, potential bottlenecks, shortest possible manufacturing leadtimes, not to mention the ability to factor in ad-hoc and emergency production for a client in need.

Maintaining and replenishing such skilled and engaged personnel to operate all these machine tools at what surely deserves to be described as a "centre-of-excellence" is the other half of staying ahead, a challenge perhaps in a small rural town where agriculture dominates the labour market?

– It is a general challenge, especially the shift work. Our staff turnover is relatively low, but we do have employees nearing retirement, and we have grown over the last couple of years. We try to recruit locally. In particular, I would highlight a partnership that we have with the Marcel Callo vocational college in Redon. This school offers diploma courses for machining technicians and industrial equipment maintenance. We offer apprenticeships to train students in our processes, and an opportunity to be part of a global community that aims to help feed and fuel the world using renewable biomass, concluded Maurice Magueur.

Who knows what the future holds for Ferotec – a smart die with some form of embedded sensor monitoring actual die temperature in client operations, or perhaps a ceramic die that is precast in a mould? Be all that imaginative conjecture as it may, whatever any new developments in materials and technology might be, Ferotec is more than likely to be already on top of them.

Text & photos: Alan Sherrard

BI144/7625/AS

KlingMill launches novel single-pass grinder

KlingMill – a new generation of industrial mill that can grind roundwood directly into the desired particle size in a single step – has been officially launched. The novel size-reduction technology represents a step-change breakthrough for bio-mass processing. For pellet producers, several processing stages can be made redundant.

Having "officially" surfaced from under the radar, Swedish engineering company KlingMill AB (which translates as "sawblade mill") has several installations of its proprietary KlingMill grinder in different industries, including wood pellet production. Common to all installations, the biomass material, wet or dry, is reduced in a single step to a precise and uniform particle size directly suitable for further processing, such as pellet production or combustion in a powder burner.

Novel lamellar sawblade system

As the name suggests, the KlingMill grinder is a lamellar system of sawblades that can process both wet and dry material without compromising the quality of the final product. Raw material, such as logs, off-cuts, shredded wood, woodchips, or pellets, is fed in and 95 percent is pulverized directly into a fraction below the desired particle size "X" mm. Designed to handle logs up to 600 mm in diameter, the unit has a capacity of up to 15 tonnes of dry matter per hour, making it well suited for industrial facilities with high production demands.

For pellet producers using roundwood, or using sawdust and wanting to add a roundwood option, the KlingMill solution enables a significantly more efficient production process. Instead of multiple separate stages for chipping, grinding, and sieving roundwood to produce the desired particle size for the pelletiser, the correct raw material structure can be produced directly in a single processing step. This reduces both investment in auxiliary equipment and ongoing operating costs. At the same time, the simplified process contributes to lower total energy use throughout the entire production chain.



A woodyard demonstration of a KlingMill grinder awaiting installation at a wood pellet plant.

Text & photo: Alan Sherrard
BI144/7631/AS

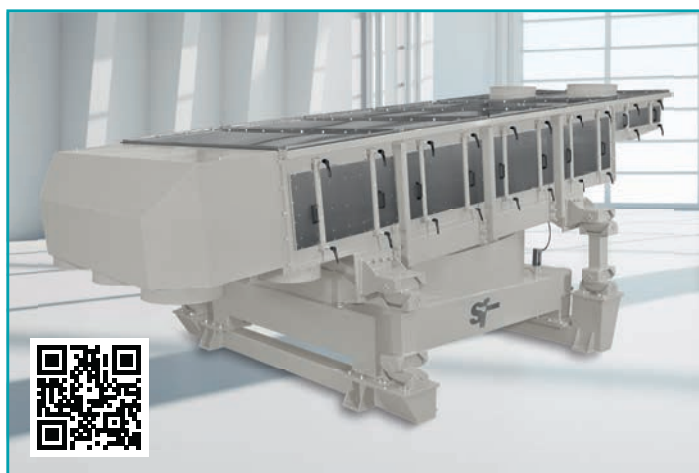
Burton Mill Solutions acquires East Coast Die

Burton Mill Solutions (Burton), a leading North American manufacturer and supplier of industrial saw blades, machine knives, filing room equipment, and sharpening services to the lumber, pulp, and wood biomass industries, announces the acquisition of Georgia-based East Coast Die Inc.'s business as a specialized provider of fuel and feed die refurbishment and roll shell rebuilding services for the pellet industry. East Coast Die brings more than 30 years of experience supporting pellet producers across the East Coast and Midwest, with additional reach into Canada and the ability to serve customers wherever freight networks operate. This acquisition, the value of which has not been disclosed, expands Burton's refurbishment capacity and broadens its overall product offering.

Strengthen portfolio and service capabilities

Along with strengthening its die and roll shell service capabilities, Burton will expand its offerings to include new fuel and feed dies, further positioning the company as a comprehensive, one-stop solution for pellet producers. East Coast Die's products and capabilities will be integrated into Burton's existing network of reconditioning and service centers across North America, further strengthening its ability to deliver reliable, high-quality support to the fuel and feed pellet industry, providing customers with greater technical expertise, enhanced operational support, and access to a wider range of products and services.

BI144/7635/AS



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Pellets Special Suppliers Directory 2026

The 12th edition of the Pellets Special Suppliers Directory gives overview of a large group of suppliers representing different industrial sectors. This listing, with 172 companies in alphabetical order, includes companies providing complete solutions for pellet plants, companies offering specific components such as solid fuel preparation, size reduction and densification units, drying, condensing, storage and handling solutions. Included also are suppliers of spark detection and fire prevention systems while insurance and finance are excluded. While comprehensive, the list is not exhaustive nor does it represent a recommendation or an endorsement.

Technologies, equipment and services are grouped into three categories – **A, B and C** respectively depending on where in the pelleting process and/or typical pellet plant they are usually found and how critical/specific they are to the process. Naturally a company can be found in one, two or all three categories. Companies that offer turnkey supply, EPC or EPCM services are by default in all three categories.



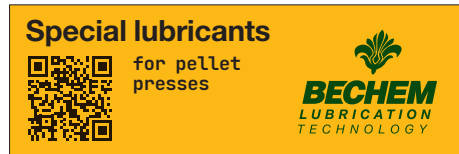
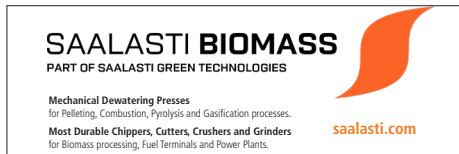
GROUP A – consists of core technologies, machinery and equipment for raw/green feedstock receiving and pre-treatment found in the log- and/or woodchip yard upstream of the dryer. This includes equipment such as log handling, debarkers, chippers, flakers, wet grinders, stack reclaimers, truck dumps, destingers, bale breakers and allied equipment.

GROUP B – consists of core technologies, machinery and equipment needed to convert a green woodchip or feedstock particle into a finished pellet such as dryers (belt- and/or drum), dry grinders, hammer mills, pellet presses, conditioners, mixers, coolers, dies, rollers, sieves, bagging machinery incl. palletisers.

GROUP C – consists of ancillary technologies, machinery, equipment and services found throughout the plant or project such as conveyors, pumps, scales and measurement equipment, silos and storage solutions, cyclones, bag filters, ship loaders/unloaders, bulk delivery systems, spark and fire detection and extinguishing systems, binders and additives, lubricants, plastic foil and other consumables, project consultancy, plant automation and certification systems.

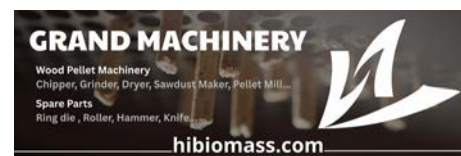
Company	Category	Website
ACO Automation Components	C	www.acoweb.de
Advanced Cyclone Systems, S.A.	C	www.acsystems.pt
Aimo Kortteen Konepaja Oy (Murska)	A, B, C	www.murskabiopacker.fi
Airex Energy Inc.	B	www.airex-energy.com
AJP	A	www.acierjp.com
Amandus Kahl GmbH & Co.KG	A, B, C	www.akahl.de/en/
Andritz Feed & Biofuel	A, B, C	www.andritz.com
Anyang Machinery	B	www.pelletmill.net/
Arjes GmbH	A, C	www.arjes.de
Asket	A	https://asket.pl/en/
Astec Industries Co.	A, B, C	www.astecinc.com
B. Maier Zerkleinerungstechnik GmbH	A, B, C	https://dieffenbacher.com/de
Bandit Industries, Inc	A	www.banditchippers.com

Company	Category	Website
Bathan Aktiengesellschaft	C	https://bathan.ch/en/
Bechem	C	www.bechem.de/de_en
Bioenergy Machinery Sdn Bhd.	A, B, C	www.greenbioenergy.net
Biomass Engineering&Equipment	A, C	www.BEandE.net
Blackwood Technology B.V.	B	www.blackwood-technology.com
Bliss Industries LLC/CPM	B	https://onecpm.com/brand/bliss
BMH Technology Oy	A, C	www.bmh.fi
Brikis Spol. s r.o.	B	www.brikis.cz
Brikol	A, B, C	www.brikol.pl
Bruks Siwertell Group AB	A, C	www.bruks-siwertell.com
Brunette Machinery Co.	A	www.brunetteinc.com
BS Bollareto Implants	A, B, C	www.bsbollaretoimpianti.it
BS&B Pressure Safety Management, L.L.C.	C	www.bsbjpd.com



Company	Category	Website
Buskirk Engineering	B	https://buskirkeng.com/
Bühler AG	B	www.buhlergroup.com
C.S.B. Waste Solution	A, B	www.csb-wastesolutions.be
Caravaggi S.r.l.	A	www.caravaggi.com
Caterpillar	A	www.cat.com
CBI Europe BV	A	www.texer.com/cbi
Cellwood Machinery AB	B	www.cellwood.se
Changzhou Grand Trading Co., LTD	A, B	www.hibiomass.com/
Cogent Industrial Technologies Ltd.	A, B, C	www.cogentind.com
Costruzioni Nazzareno	A, B, C	www.nazzareno.it
CPM Europe B.V.	B	www.cpm europe.nl
Crespel & Deiters GmbH&Co. KGC&D	C	www.crespel-deiters.com
Crowley Engineering	A, B, C	www.crowley.ie
Di Piu s.r.l	B	www.di-piu.com
Dome Technology	C	www.dometech.com
Doppstadt Calbe GmbH	A	www.doppstadt.com
Dorssers Inc	B	https://onecpm.com/brand/dorssers
Double Crane Machinery Manufacture	B	www.sdshuanghe.com
Dryer One	B	www.dryer-one.com
Dutch Milling Technology International B.V.	A, B, C	www.dmt-int.com
Ecostar srl	A	https://eco-star.it/
EDGE Innovation at Work	A	www.edgeinnovate.com
EUROMilling	C	https://euromilling.dk/contact/
Europe Forestry V.O.F	A	www.europeforestry.com
Fagus-GreCon Greten GmbH & Co. KG	C	www.fagus-grecon.com
Ferotec	B	www.ferotec.eu
Firefly AB	C	www.firefly.se
Fisker A/S	B	www.fisker.as
Five Continents Machinery Co. Ltd.	B, C	www.fcm-cn.com
Fredrik Mogensen AB	B	www.mogensen.se
Friedli AG Engineering und Anlagenbau	A, B, C	www.friedliag.ch
Gemco Energy Mashinery Co. Ltd	A, B, C	www.gemco-energy.com/
General Dies s.r.l.	B	www.generaldies.com
Gongyi Xiaoyi Mingyang Machinery Plant	B	www.mingyangmachinery.com
Graf-Equipment GmbH	B, C	https://onecpm.com/product/direct-drive-pellet-mill
Hekotek AS	A, B, C	www.hekotek.com
Henan Kingman M&E Complete Plant Co.,Ltd	B, C	www.woodpelletline.com
Henan Richi Machinery	A, B	www.cn-pellet.com
Henan Strongwin Machinery Equipment	B	www.strongwin.cn

Company	Category	Website
HRV Equipamentos de Processo SA	A, B, C	www.hrv.pt
IMAL s.r.l.	A, B, C	www.imalpal.com
Inadco Moisture Measurement BV	C	www.inadco.nl
Ingenjörsfirma J Mared AB		www.mared.se
Inray Oy	C	www.inray.fi
IQR Systems AB	A	www.iqr.se
IS Save Energy AG	C	www.saveenergy.ch
J.P. Carlton Company	A	www.stumpcutters.com
Jacobs Corporation	B	https://onecpm.com/spare-parts
JCB	A	www.jcb.com
Jenz GmbH Maschinen- und Fahrzeugbau	A	www.jenz.de
Jiangsu Zhengchang	A, B, C	www.zhengchang.com
Jinxiang Machinery Co., Ltd.	B	www.jnexttrade.com/
Katres spol.s r.o.	B	www.katres.cz/
Klingmill AB	B	www.klingmill.se
Klüber Lubrication Nordic A/S	C	www.klueber.com
Komptech GmbH	A	www.komptech.com
Konecranes AB	A	www.konecranes.com
La Meccanica srl di Reffo	B	www.lameccanica.it
Laitex OY	A, C	www.laitex.fi
Lasco Heuthechnik GmbH	A	www.lasco.at
Lindner-Recyclingtech GmbH	A, B	www.lindner.com
Liyang Tongfu Machinery Co., Ltd.	B	www.liyangtongfu.com
Liyang Xingxing Yongli Machinery Co., Ltd	A, B, C	www.yongli-machine.com
Mantex	C	www.mantex.se
Minimax Fire Solutions International GmbH	C	www.minimax.com/int/en/
Mion&Mosole I.A.I. Spa	A, B, C	www.mionmosole.it
MoistTech Corp.	C	www.moisttech.com
Molinari srl	B	www.molinari-recycling.com
Mondi Coatings GmbH	C	www.mondigroup.com
Morbark, Inc.	A	www.morbark.com
Morillon SAS	A, C	www.morillonsystems.com
MOW System AB	A	www.operjo.se
Mühlböck Holztrocknungsanlagen GmbH	B	www.muehlboeck.com
Münch-Edelstahl GmbH	B	www.muench-gmbh.net
N.M. Heilig B.V.	A, B	www.heiligbv.com
Navrocki Pelleting Technology LLC	A, B, C	www.granulatory.com/en
NEUERO Industrietechnik für Förderanlagen	C	https://neuro.de/en
Newtec Bag Palletizing	B	www.newtecbag.com

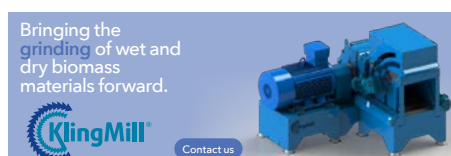


Company	Category	Website
O.M.A Impianti	B, C	www.omaimpanti.it/en
Ottevanger	B	www.ottevanger.com/
Pal s.r.l.	A, B, C	www.imalpal.com
Pawert - SPM AG	B	www.pawert-spm.ch
Peterson Pacific Corp.	A	www.petersoncorp.com
Petkus Technologie GmbH	B	www.petkus.de
Pezzolato Costruzioni Meccaniche S.p.A.	A	www.pezzolato.it
PKT Technology	B	www.pkt.it
Precision Husky Corp.	A	www.precisionhusky.com
Premier Tech Chronos	B	www.premiertechsystems.com
Prodesa Group	A, B, C	www.prodesa.net
Promill SAS	B	www.promill.fr
PST AB Plåt&Spiraltechnik i Torsås AB	C	www.pst.se
Radviliskis Machine Factory, JSC	A, B, C	www.factory.lt
Rani Plast OY	B	www.raniplast.com
Recalor S.A	B	www.recalor.com
Rematec GmbH&Co. KG	A B, C	www.rematec-maschinenbau.de
RevTech Process Systems	B	www.revtch.fr
Riela Karl-Heinz Knoop e.K.	A, B, C	www.riela.de
Rinke Engineering GmbH	A, B, C	www.rinke-engineering.de
Rongda Machinery Co., Ltd	B	https://rongdapelletmill.com/
Rosal S.A.	B	www.rosal-feedmills.com
Rotochopper, Inc	A	www.rotochopper.com
Rudnick & Enners GmbH	A, B, C	https://rudnick-enners.com
RUF Maschinenbau GmbH & Co KG	B	www.briquetting.com
S&F Siebmaschinen und Fördertechnik	B, C	www.sf-gmbh.de
Saalisti Biomass Oy	A	www.saalisti.fi
Sahut-Conreur	B	www.sahutconreur.com
Salsco inc	A	www.salsco.com
Salmatec GmbH	B, C	www.salmatec.com
Scheuch GmbH	C	www.scheuch.com
Seeger Engineering AG	B, C	www.seeger-engineering.eu
SEG Instrument AB	C	https://s-e-g.com/
Segem Macbo	A, B, C	www.segem.com
Siempelkamp Energy & Drying	B	www.buettner-energy-dryer.com
Siempelkamp Size Reduction Solutions	A, B, C	www.pallmann.eu
Simatek A/S	C	www.simatek.dk
Skako Vibracion	B	https://skako.com/
Stela Laxhuber GmbH	B	www.stela.de

Company	Category	Website
Stolz	A, B, C	www.stolz.fr
Supersilo	C	www.supersilo.at
Swedish Exergy AB	B, C	www.swedishexergy.com
Swiss Combi - W.Kunz dryTec AG	B	www.swisscombi.ch
Symaga	A	www.symaga.com
T&B electronic GmbH	C	https://tbelectronic.eu/en/
Tana Oy	A	www.tana.fi
Teccon Konstruktionen GmbH	B, C	www.teccon.at
Terex Environmental Equipment	B, C	www.terex.com
Testmer Warszawa S.A	B, C	www.testmer.pl
Tietjen Verfahrenstechnik GmbH	B	www.tietjen-original.com/en/
TSI Inc	B, C	www.tsi-inc.net
VAI Advanced Packaging Technology	B	www.vai-packaging.it
Walinga Inc	C	www.walinga.com
Valmet Corporation	A, B, C	www.valmet.com
Valmont SM	A, C	www.valmontsm.com
Vaptech Ltd.	A, B, C	www.vaptech.bg
Warren & Baerg Manufacturing, Inc.	B, C	www.warrenbaerg.com
Vecoplan AG	A, B, C	www.vecoplan.com
Weima Maschinenbau GmbH	B	www.weima.com
Vermeer Manufacturing Company	A	www.vermeer.com
West Salem Machinery Co	A, B, C	www.westsalem.com
Vibrafloor	B	www.vibrafloor.com
Vigan Engineering S.A.	A	www.vigan.com
Wuxi Beisier Precision Machinery Co., Ltd	A, B, C	www.bsrwood.com
Wuxi Teneng Power Machinery Co.	A, B, C	www.biowatt-energy.com/
Yemmak		www.yemmak.com
Yuda Machinery Co., Ltd	A, B, C	www.yudamachinery.com/
Yulong Machine Co., Ltd	B, C	www.woodpelletmill.net

Note that inclusion in the directory is based on Bioenergy International's knowledge of the companies and/or from their web pages. In many cases a company also can supply other equipment and/or services.

This is easy to check if needed; all web pages are presented in the table and the links are clickable on the online e-magazine version.



FIRST PROXIFLEX HITS THE ROAD



In June 2026, Proxipel SA officially inaugurated its first Proxiflex unit that went into commercial operation. Developed in Switzerland, this innovative technology enables pellet production at the biomass material source, paving the way for a new generation of local bioenergy supply chains.

THE CONCEPT OF MOBILE PELLETISING PLANTS

is not entirely new. Several pellet technology OEMs have semi-mobile “containerised” plug’n’play plants. One commercially successful and fully mobile unit is German agricultural machinery major Krone Group’s Premos 5000. First premiered at the Agritechnica trade show in Hanover back in 2015, Premos 5000 is the world’s first (and perhaps only?) mobile agri-pellet machine that picks up materials like straw, hay, or alfalfa directly in the field to produce high-density fiber pellets without prior size reduction or drying.

A tractor-drawn unit, the Premos 5000 has since been developed to handle baled material, and production capacity increased to up to five tonnes per hour of what has since been branded as “Strukturpellets” (structural pellets). Depending on the material, these 16 mm pellets are primarily used for animal bedding, animal feed, and bioenergy – the latter in a straw-fired boiler or as a substrate for biogas plants.

Innovative trailer-mounted plant

Proxipel’s innovative Proxiflex mobile pelleting unit is something very different – hence the company name, which can be interpreted as being pellets produced in proximity to the feedstock and end-user. The entire pellet plant – infeed hopper, wet grinders, dryer, pelletiser, cooling, and discharge – is housed on a conventional flat-bed truck trailer. This represents a new generation of short and mobile energy supply chains – bringing the pellet plant to the forest or sites of feedstock sources, and supplying the pellets to local communities that surround these sources.

Award-winning concept

In practical terms, Proxiflex operates as a fully integrated plant mounted on a semi-trailer: the material is prepared, stabilized, and then densified in a single process, producing pellets of consistent quality suitable for use as fuel, bedding, or soil

amendment, depending on the source material.

This “as close to the resource as possible” approach addresses a challenge well known to those in the biomass industry: volumes are often scattered, handling costs are high, and transporting low-density material quickly negatively impacts the economics and carbon footprint of projects.

Indeed, the Proxipel concept scooped the Gold Innovation Award (Biomass Energy Category) at the 2026 Bio360 Europe event in Nantes, France, earlier this year, as some readers may recall.

– This Gold Award at Bio360 Europe recognizes Proxiflex, our mobile, all-in-one pelletizing unit capable of processing biomass directly on-site. A solution designed to make use of scattered biomass sources, reduce transportation, and improve the logistical efficiency of local supply chains. Beyond technical performance, this award highlights the relevance of a model based on short supply chains and the circular economy: producing locally, using local resources, to meet local needs. The award recognizes the work of our teams and partners and reinforces our ambition: to accelerate the utilization of currently underutilized biomass by offering a mobile,

versatile, and results-oriented industrial solution, said Richard Pfister, CEO, Proxipel, during his address in Nantes.

Circular local bioeconomy

The award seems both well-deserved and well-timed, as the first Proxiflex unit is now being deployed in northwest Switzerland, the Lake Geneva area, by Lémanpellet in Gimel, Le Vaud.

Lémanpellet is a joint company formed in 2023 and represents a partnership comprising Proxipel and three regional entities: Société Electrique des Forces de l’Aubonne (SEFA), a local energy company; AGFORS (Association of the Serine Forestry Group), a public forest owners association representing 15 municipalities in the region; and the Saubrette Forestry Group, a local forestry entity. The two latter partners provide access to the raw materials.

Accessing sites with abundant forest residues with a mobile pelleting unit allows the utilization of often underutilized biomass. The pellets are produced on-site and delivered directly to the end-client. According to Lémanpellet, this local production and consumption concept can reduce the carbon footprint by up to a factor of three by minimizing travel and transportation of the feedstock and pellets.

– The Proxipel journey began in 2013. We initially started on the project part-time, before finding the right moment to commit to it fully. The road was long and full of valuable discoveries before we launched our prototype in 2018. This machine enabled us to learn a great deal about pellet production and the optimisation of mobile units. We continued to innovate, and today we can offer a range of services and solutions that meet the needs of the different players in the pellet sector, Richard Pfister recounted at the inauguration event.



Richard Pfister, CEO, Proxipel, receiving the Award at the 2026 Bio360 Europe event in Nantes, France.



(Left) Held on June 18, 2026, at a Lémanpellet site, the event gathered nearly 100 business, forestry, energy, institutional, and political stakeholders. (Right) Details of the drum dryer, pelletiser, and the double grinder units.

Novel technical features

As mentioned, the Proxiflex unit is mounted on a semi-trailer, yet it manages to combine the main stages of the pelleting process: grinding, drying, pelletizing, and cooling. Weighing in at 29 tonnes, the trailer measures 13.5 m in length, 2.55 m in width, and 4 m in height in transport mode, extending to 16 m in length and 5 m in width in operational mode.

– Our technology uses miniaturized components to fit into the dimensions of a road-going semi-trailer, Richard Pfister explained.

Compact and mobile, the Proxiflex unit is immediately operational once installed on site. It requires no permanent space allocation, no building permit, and no environmental impact assessment. This approach allows the material to be processed directly where it is located, minimizing the transport of raw materials and facilitating the local utilization of residues.

Drum dryer with flame separator

The material, such as woodchips, sawdust, or shredded logging residues, is loaded into a foldable receiving hopper at the rear of the trailer. Capable of loading 3–4 m³ of material, the hopper tips material into a screw auger that transports the material to the wet grinding step performed by using two 45 kW hammer mills in sequence – a coarse mill and a fine mill, that can grind up to a 50 mm particle down to a few mm.

From the fine grinder, the particles are conveyed to a patented high-performance indirect rotary drum dryer.

– Our dryer is a key component of our system, a result of extensive expertise and innovation. It combines advanced technologies with strict safety standards, enabling the development of the world's first fully integrated mobile pellet production unit. It operates by simultaneously



circulating the material and hot air inside a rotating drum, Richard Pfister said.

The heat required for drying is generated by a built-in 800 kW pellet burner that uses a portion of the pellets produced by the unit, eliminating the need for additional fuels. The dryer air temperature is automatically adjusted based on the moisture content of the incoming material, up to 50 percent moisture content. This optimizes the drying process, which the company says takes less than two minutes.

– To improve drying performance, we have integrated several key elements, including specific air flows optimized for uniform, efficient drying, very fine grinding that ensures maximum contact surface for rapid drying, and adapted material distribution within the drum, enhancing homogeneous movement through the drum, increasing process efficiency, Richard Pfister explained.

The burner feeding and cleaning are automatic, and fuel self-consumption is up to 10 percent of production. The flame separator plays a crucial role in ensuring safety. It extracts flaming particles from the air before they come into contact with the material being dried, minimizing the risk of fire.

With the option of 6–8–10, and 12 mm pellets, the 130-kW industrial ring die press has an average throughput of one tonne per hour depending on the material. Post-press, the pellets are conveyed to the discharge point via a vibrating screen conveyor to cool the pellets and separate fines that are automatically recirculated back to the press.



Major milestone

The pellets meet the requirements of the ISO 17225 standard. According to Proxipel, the inauguration of this first Proxiflex unit marks a major milestone for the company. With Proxiflex now operational at Lémanpellet, Proxipel has validated its business and industrial model and moving into its industrialization phase.

Two new units have already been ordered and will be built in 2026. The company plans to sell a total of six machines in 2026 and fifteen units in 2027, with a focus on expanding into the Swiss and French markets. Starting in 2028, Proxipel plans a gradual international expansion into Europe, North- and South America.

Finally, what sort of investment would a prospective truck owner be looking at to get into the mobile pelleting business with a one-tonne-per-hour Proxiflex unit?

– It is in the CHF 800,000 to CHF 1.2 million range, a worthwhile investment that can prove very profitable for professionals, concluded Richard Pfister.

Text & photo: Alan Sherrard

Photos: Proxipel

B1144/7646/AS

A TECHNICALLY SUCCESSFUL COMMERCIAL FAILURE

In May 2025, Joensuu Biocoal Oy, a Finnish industrial-scale biomass torrefaction plant, held its official opening at the Savon Voima combined heat and power (CHP) plant in Lixenvaara, Joensuu. Ten months later, the company filed for insolvency at the North Karelia District Court, citing technical issues and the high price of woodchips preventing the plant from reaching operational capacity.



"Trust your technology suppliers" was takeaway advice given by Michael Wild, President of the International Biomass Torrefaction and Carbonisation Council (IBTC), at the 2026 European Biochar Summit.

The insolvency filing of Joensuu Biocoal, a high-profile project, comes at a sensitive moment for the industrial biomass carbonisation industry, with momentum gathering for several projects with a variety of carbonised product end-uses.

Needless to say, the insolvency has sparked speculative discussions across the wider bioenergy and biocarbon communities, proponents and detractors alike. Amongst other things, concerns about technology risk and readiness for such industrial-scale torrefaction projects, which in this case would seem more of a deflection.

It is unfortunate that the owner, Taaleri Bioindustry, an investment fund within Helsinki-based specialist in private investments, private asset management, and non-life insurance Taaleri Group, had not provided any public details on what these technical issues might have been.

Understandable perhaps from an investment fund perspective to instinctively pass the buck with dismissive generalisations, but then that falls a bit flat in terms of project risk and investor due diligence. There are at least three well-known and respected international technology OEMs – with engineering, procurement, and construction (EPC) capabilities – that each brought proven technologies to the project. The novelty of the project lay in the integration of these technologies into an industrial-scale production process, not the individual technologies themselves.

According to the International Biomass Torrefaction and Carbonisation Council (IBTC), the trade body for biomass thermal treatment processes – torrefaction, pyrolysis, carbonisation, and steam explosion – to upgrade solid biomasses into substitutes for fossil carbon, the Joensuu facility "remains one of the most significant industrial torrefaction projects developed to

date and has provided valuable operational and engineering experience for the sector. The project demonstrated both the opportunities and the complexity involved in integrating torrefaction into established industrial value chains and large-scale energy systems."

IBTC highlights the importance of placing developments such as Joensuu Biocoal into the broader context of industrial innovation and scale-up.

– Industrial projects are rarely straightforward. This applies to almost every emerging energy technology as well as to torrefaction projects. New industrial systems require the expert coordination of multiple process steps, suppliers, engineering disciplines, financing structures and raw material supply chains. In these environments, even a single bottleneck can affect the performance of the entire plant, commented Michael Wild, President of IBTC.

According to currently available information, the core torrefaction process at Joensuu Biocoal was de facto successfully demonstrated during commissioning campaigns. Biomass was torrefied, densified and produced within the targeted quality specifications. Instead, the broader challenges appear to have originated primarily from project integration, raw material economics and operational coordination within a highly complex multi-vendor project structure.

– Torrefaction plants involve a series of technological steps that must be finely coordinated, and any single step can become a bottleneck affecting overall performance, just like in any other bioenergy project. Unfortunately, we repeatedly observe developers taking on the role of system integrator themselves in a bid to reduce investment costs, while unintentionally assuming significant interface risks. Combined with the

unforeseeable loss of low-cost Russian biomass following the geopolitical developments after the invasion of Ukraine, this created enormous pressure on the Joensuu project. However, from everything currently known, the torrefaction technology itself does not appear to have been the bottleneck, Michael Wild said.

In a statement on March 23, 2026, to YLE, the Finnish public service news agency, Iiro Tiilikainen, the Taaleri Bioindustry Project Manager for Joensuu Biocoal said that it was "likely that many of the challenges could have been resolved with sufficient further investments", but that the company was unable to raise further funding for the project within the timeframe.

Joensuu Biocoal is not the first nor will it be the last bioenergy project to fail commercially. While it may have ended sourly for Taaleri as an investment, Taaleri must be given credit for developing the first-of-its-kind industrial-scale project in the first place. Furthermore, all is not lost for the c. €20 million project as both Bioenergy International and IBTC understand that discussions regarding restructuring and future operation of the plant are ongoing.

– The technology installed in Joensuu is among the best currently available. This is also why we are currently seeing several initiatives aimed at bringing the plant back online and overcoming the existing bottlenecks in raw material processing. We therefore expect Joensuu to resume production in the near future, concluded Michael Wild.

Text & photo: Alan Sherrard
BI144/7637/AS



Located adjacent to the Savon Voima combined heat and power (CHP) plant, construction of the 60,000 tonnes-per-annum Joensuu Biocoal began in 2023, was completed at the end of 2024, with ramp-up and the first batches produced in 2025. The plant was officially opened in May 2025 before filing for insolvency in March 2026 (photo Joensuu Biocoal).

25 years of ACO moisture measurement

Founded in March 2001 by Johannes Mergl, Germany's ACO Automation Components (ACO) has grown from a small engineering workshop into an established international specialist for capacitive moisture measurement in industrial bulk material processes. ACO's real-time moisture measuring systems have become indispensable for the wood pellet industry throughout DACH.

From the onset, the company's focus has been on practical, application-oriented solutions – developed and manufactured entirely in-house. Today, ACO's moisture measurement sensor systems are used by pellet producers, biomass processors, and bulk material handlers worldwide, providing reliable real-time moisture data directly from the production process.



Capacitive measuring

ACO's moisture sensors work using the capacitive measuring principle. A capacitor creates an electric field between two conductive plates when the voltage is applied. The surface of the sensor is in direct contact with the measured biomass material. According to ACO, using this principle has significant advantages compared to other methods of moisture content, not least for various forms of biomass, as it is less affected by contamination, discoloration, particle size, and temperature of the material.

Robust and adaptable

Made from high-grade steel, the robust sensors are designed to cope with the toughest applications, including sensor variants for elevated process temperatures or with enhanced corrosion resistance, and ATEX-certified versions for potentially explosive areas with high dust exposure. The sensors can be integrated into existing PLC control systems via Profibus DP, Profinet, or analog signals with up to 16 sensors per system.

Proper placement is critical

A well-integrated moisture measurement system can not only significantly improve the quality of the end product, but also significantly reduce production costs. However, even the best moisture measurement delivers poor results if the sensor is installed in the wrong place. This is why the company places a strong emphasis on identifying suitable positions for the sensors in the product flow and production process together with the client. This includes specially developed installation kits such as sensor sleds or compactor units for sawdust, wood shavings, and woodchips to ensure a constant material height over the sensor surface.

Text: Alan Sherrard Photo: ACO
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