HAWKINS WRIGHT

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Forest Energy monitor

BIOMASS & PELLETS — MARKETS — INVESTMENTS — LEGISLATION

Lack of supply prevents spot market activity

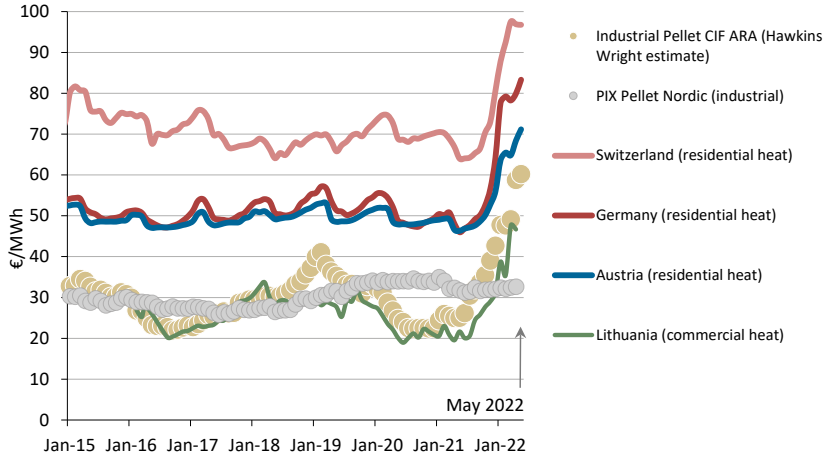
A shortage of wood pellets in the European industrial market has dried up spot market activity. Instead, the focus is on managing portfolios and swapping physical volumes. There may be a few deals being concluded under the radar, but details are scarce. Buyers and sellers are reluctant to share details because of the high prices and tight market. We estimate spot prices held steady in May at $290-310/t CIF ARA.

The end of the heating season has brought some relief to the market but has done little to support pellet availability. Extended outages at some major utilities has dampened pellet demand in recent weeks. However, most traders and utilities want to keep hold of any spare volumes in anticipation of further shortages this coming winter.

Higher production costs in all regions continue to plague wood pellet producers. Many are trying to renegotiate contract prices to better reflect their rising costs. However, it is challenging for many utilities to offer major concessions, despite higher power prices. For most utilities, once they secure a long-term supply contract, they hedge their future power sales and exchange rates.

There has been an uptick in interest between South East Asian sellers and European buyers for both heating grade and industrial grade pellets. It is not clear how much volume will be redirected from Asia to Europe this year, as the market remains tight in the Asia Pacific region. In addition, freight costs

Prices of wood pellets in selected European countries



Sources: See the footnotes beneath the price indications table, page 3.

Biomass market briefing (continued)

and sustainability credentials provide barriers to the trade flow. It is perhaps more likely we will see a continuation of North American producers replacing contracted obligations into Asia with SE Asian supply and instead sending their North American pellets to Europe. However, we understand there are more deliveries of US South pellets scheduled for Japan this year. In the first four months of 2022, the US sent over 70kt to Japan, compared to 26kt in the whole of 2021.

Despite the arrival of warmer weather in Europe, the tightness in the market continues to push up heating grade pellet prices. Heating grade pellet producers are reporting strong demand for their pellets as distributors and end-users build stocks.

Most pellet producers are operating at high rates to help fuflil demand. But there are reports that there are difficulties in obtaining equipment which is delaying maintenance work.

According to EUWID, the ex-works price of bulk wood pellets in Germany ranged from €300-340/t in May, up from €290-320/t in April. EUWID also reports many producers are raising their June prices in anticipation demand will stay strong all summer. Pellet producers are prioritising local customers, which is already evident in export numbers. Germany exported ~90kt in Q1 2022, almost half the volume sent abroad in Q1 2021. Markets reliant on imports such as Italy and UK are the most vulnerable to the shortages caused by the loss of Russian supply.

Russian pellet producers continue to look for markets for their pellets. We have heard rising speculation that some may try to export pellets to the European heating market via Turkey. However, we expect volumes using that trade route to be minimal. Even if sanctions are bypassed by using Turkey, exporting Russian pellets to the industrial market is essentially impossible because of a lack of sustainability certification. We have heard there remains some interest from South Korean industrial buyers in importing Russian wood pellets, but the challenging logistics in Russia means only volumes produced in eastern Russia are viable.

There are also rumours that pellet exports from Ukraine may have begun to resume. Unconfirmed reports say some producers in western Ukraine are able to produce pellets, which are then transported to neighbouring Poland and Romania. In 2021 Ukraine exported 435kt of wood pellets, with Poland taking the largest share (121kt), followed by Romania (63kt).

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Forest biomass and wood pellet price indications

		1Q21	1Q22	Mar-22	Apr-22	May-22*	*chg on May-21*
WOOD PELLET PRICES							
Industrial wood pellets[1] CIF Amsterdam, Rotterdam, Antwerp (ARA)	*US$/tonne*	143.67	255.00	250-260	290-310	290-310	*+151.50*
	US$/MWh	30.44	54.03	54.03	63.56	63.56	*+32.10*
	€/tonne	119.20	227.26	231.68	277.43	284.07	*+160.67*
	€/MWh	25.25	48.15	49.08	58.78	60.18	*+34.04*
Industrial wood pellets - PIX Pellet Nordic Index[2] CIF Baltic Sea or North Sea port	*Skr/MWh*	341.46	339.04	342.65	336.80	-	-
	€/tonne	162.03	155.30	155.95	156.72	-	-
	€/MWh	33.76	32.35	32.49	32.65	-	-
Heating wood pellets - Germany (residential heat)[3] delivered, bulk: <6 tonne, 100-200 km, incl. taxes	*€/tonne*	238.11	369.92	369.32	377.21	393.25	*+176.21*
	€/MWh	50.45	78.37	78.25	79.92	83.32	*+37.33*
Heating wood pellets - Austria (residential heat)[4] delivered, bulk: <6 tonne, incl. taxes	*€/tonne*	232.00	305.10	306.00	322.90	335.90	*+117.30*
	€/MWh	49.15	64.64	64.83	68.41	71.17	*+24.85*
Heating wood pellets - France (residential heat)[5] delivered, bulk: 5 tonnes, incl. taxes	*€/tonne*	286.70_{Q4}	304.00_{Q4}	-	-	-	-
	€/MWh	62.33_{Q4}	66.09_{Q4}	-	-	-	-
Heating wood pellets - Switzerland[6]	*CHF/tonne*	359.83	452.70	469.80	467.40	473.20	*+142.00*
	€/tonne	329.84	437.20	460.34	457.32	456.71	*+154.62*
	€/MWh	69.88	92.63	97.53	96.89	96.76	*+32.76*
Heating wood pellets - Lithuania (commercial heat)[7] delivered, bulk	*€/tonne*	101.31	191.77	225.07	220.28	-	-
	€/MWh	21.46	40.63	47.68	46.67	-	-
Heating wood pellets - Russia (residential heat)[8] FCA St Petersburg, ENplus certified	*€/tonne*	83.83	109.00	100.00	-	-	-
	€/MWh	17.76	23.09	21.19	-	-	-
Heating wood pellets - US, Maine[9]	*US$/tonne*	295.42	295.42	295.42	295.42	295.42	*0*
	US$/MWh	62.59	62.59	62.59	62.59	62.59	*0*
WOOD FIBRE / BIOMASS PRICES							
Pine pulpwood (Average US South)[10] delivered (Timber Mart-South)	*US$/s.ton*	28.41_{Q4}	31.86_{Q4}	-	-	-	-
	US$/MWh	6.22_{Q4}	7.46_{Q4}	-	-	-	-
In-woods pine chips (Average US South)[10] fob-woods (Timber Mart-South)	*US$/s.ton*	24.21	34.30	-	-	-	-
	US$/MWh	5.65	8.01	-	-	-	-
Pine process residuals (Average US South)[10] fob-woods (Timber Mart-South)	*US$/s.ton*	21 .28	25.91	-	-	-	-
	US$/MWh	4.97	6.05	-	-	-	-
Energy wood/biomass - Sweden[11] delivered to heating plant	*Skr/MWh*	198.00_{Q4}	192.00_{Q4}	-	-	-	-
	€/MWh	19.28_{Q4}	18.93_{Q4}	-	-	-	-
Forest biomass Finland - PIX[12] Industrial by-products and forest residues, delivered, excl. taxes	*€/MWh*	21.85	23.00	23.34	-	-	-
Wood chips - Lithuania[7] Baltpool SM2 specification, delivered	*€/tonne*	30.65	68.36	69.54	71.92	-	-
	€/MWh	11.30	25.20	25.63	26.51	-	-

Sources: 1. Hawkins Wright estimate; 2. FOEX; delivered within 50km in bulk, excluding taxes. Lot size: 26t Germany, 17t Austria 3. DEPI; 4. proPellets Austria; 5. proPellets France; 6. Pellet Preis; 7. BALTPOOL UAB; 8. Russia Pellet Council; 9. Maine Governor's Energy Office; 10.Timber Mart-South; 11. Swedish Energy Agency. 12. FOEX

*Notes: a) Where the original data is weekly or daily, the monthly and quarterly figures shown here are simple averages of the original. b) *May-22 averages are based on data available up to 30 May 2022. c) All wood pellets are assumed to have a calorific value of 4.72MWh/t (17 GJ/t), except the PIX Pellet Nordic Index where the assumption is 4.8MWh/t, and the France heating pellet index where the assumption is 4.6MWh/t.*

Wood fibre availability

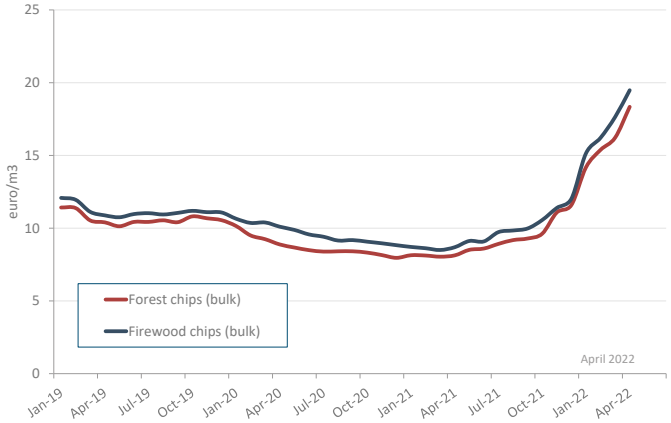
In late May participants in Bioenergy Europe's Wood Supply working group discussed the continuing tightness in the European wood chip market. As we have discussed previously, increasing demand from competing sectors such as panelboard, rising freight prices and reduced supply of beetle-damaged fibre has pushed European wood chip prices higher in recent months.

More and more wood chip deals are being concluded month-to-month, with suppliers reluctant to commit to long-term deals because of the volatility in the market. Although suppliers are able to commit volumes longer term they are reluctant to lock in prices because of the uncertainty over future costs. Many Baltic suppliers have been renegotiating existing contract prices to better reflect the rising spot prices.

Price reporting agency Argus assesses wood chip spot prices delivered into north west Europe at close to €11.5/GJ, almost double the price a year ago. Latvian trade association MeKA has noted similar price rises. It assessed bulk forest chips in Latvia ex-mill at €18.34/m³ in April, up +126% on the year (equivalent to ~€6/GJ if we assume 3GJ/m³). Wood chip trader Cleantek Trade expects prices to stay high over the summer months, contrary to the usual summer softening as heating demand wanes. Cleantek Trade CEO Krister Rosenqvist-Packalén believes prices will pick up once again in the autumn and could reach €13-14/GJ delivered NW Europe.

Some relief may come if demand from the panelboard industry starts to decline later in the year. The construction industry has boomed following the easing of the COVID pandemic, supporting demand for panelboards. In addition, tightness in the waste wood sector has pushed panelboard manufacturers to purchase increasing volumes of virgin wood chips, directly competing with energy users. However, there is rising speculation that an anticipated downturn in the construction industry could help reduce demand from the panelboard industry and release more supply for energy users. A downturn in the construction industry could also lead to reduced sawmill operating rates and therefore sawmill residues.

Latvian wood chip prices



Source: MeKA

In brief...

Canfor Corporation has announced the continuation of reduced operating schedules at its western Canadian sawmills due to the ongoing global supply chain challenges. Canfor has been operating at approximately 80% of production capacity since late March 2022. In addition, Canfor will implement two weeks of rotating downtime across its primary sawmills in July and August, which will help align production capacity with timber supply and transportation availability. British Columbia wood pellet mills are reliant on sawmill residues to produce wood pellets, meaning any sawmill downtime can impact fibre availability.

Swedish Biofuels and engineering consultancy **COWI** will partner to produce 400kt/y of sustainable aviation fuel in Sweden from biomass. The first 20kt/y production facility will be built close to Arlanda Airport, and the first SAF delivery is scheduled for 2025. Details on the feedstock to be used have not been revealed but Swedish Biofuel's technology converts grain or wood into alcohol which is then converted into fuel. The excess green heat from production will be delivered to the neighbouring combined heat and power plant of Stockholm Exergi. We estimate the first plant could use around 180kt/y of wood and up to 3.7Mt/y to produce 400kt/y of SAF.

Energy and carbon market

UK and European gas prices are divulging as the UK deals with a glut of gas due to increased LNG imports. In May the UK's natural gas index (NBPI) averaged €62.76/MWh – the lowest level since September 2021. In contrast the European benchmark Dutch TTF natural gas index averaged €98.57/MWh in May.

Europe's efforts to wean itself off Russian gas has led to increased demand for LNG, particularly from the US. However, the EU has limited LNG terminal capacity and its gas infrastructure is not designed for such a situation. LNG terminals in Iberia are of little worth to northern Europe with no infrastructure to pipe the gas to where it is needed. Meanwhile, the UK has three LNG terminals and two pipelines directly linking it to northern Europe. In the past the pipeline has primarily pumped gas into the UK from Europe but more recently the flows have reversed. However, LNG imports are exceeding the UK's demand and pipeline capacity, driving prices lower.

The UK's lower gas prices have in turn brought down UK power prices. UK Nordpool day ahead power prices averaged £120.87/MWh (€142.50/MWh) in May, down -32% on the month. In comparison Germany's Nordpool day ahead price averaged €177.90/MWh in May, up +7% on the month.

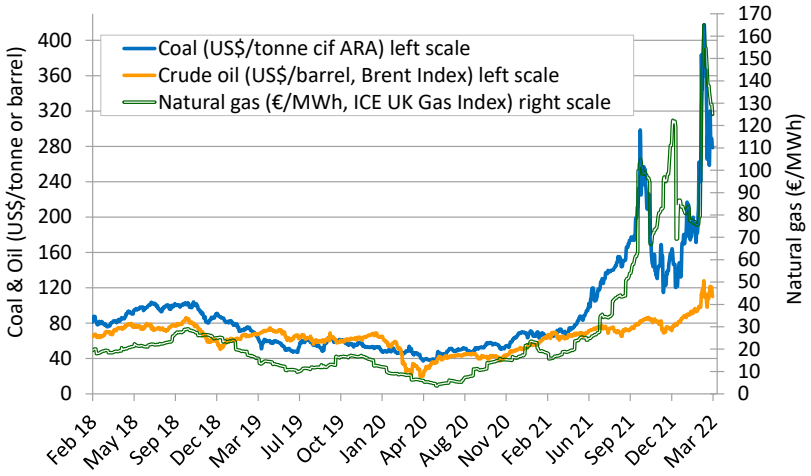
However, the UK's current abundance of gas is unlikely to do little to mitigate against high gas prices this coming winter. The UK's lack of gas storage capacity means the country has limited ability to build stocks ahead of an expected tight winter. Year ahead gas prices in the UK are much closer to those in Europe as bullish sentiment pushes prices up.

In brief...

Brent crude oil prices topped $120/barrel at the end of May, supported by anticipated increased demand. In particular China has announced the easing of COVID restrictions in its biggest cities. Meanwhile EU leaders agreed on a ban on the majority of Russian oil. The ban will only affect oil that arrives by sea but not pipeline oil, following opposition from Hungary. Around two thirds of Russian oil into the EU arrives by sea. Poland and Germany have also pledged to stop receiving Russian oil by pipeline by the end of the year.

The German government has drawn up plans to consider restarting idled coal-fired power plants this winter if gas supply from Russia dwindles. The government believes gas, which accounted for 15% of power production input last year, must be prioritised for industry and heating homes if a bottleneck arises, making it necessary to draw on idled coal capacity to fill the gaps in power generation. Participation in the scheme would be voluntary and operators would be compensated from public funds for holding feedstock ready, and for providing the necessary technical assistance. The UK has already made similar moves, reaching out to its remaining coal power plants to assess their ability to operate this coming winter (see FEM #133, p.5).

European commodity prices - oil, coal and natural gas



Sources: EEX, IHS and ICE

Developments in other forest product industries

Vietnam's Deputy Prime Minister has approved a project to develop a sustainable and effective wood processing industry in the 2021-2030 period. The goal is to encourage the wood processing industry to become an important economic sector, building a reputable Vietnamese wood product brand.

The specific objective of the scheme is that the export value of timber and wood products will reach USD20bn by 2025, of which the export turnover of wood products will reach over USD18.5bn. By 2030 the export of timber and wood products will reach USD25bn, of which USD20.4bn will come from wood products. In 2021 it was estimated the country's exports of timber and wood products in 2021 was USD15.6bn, up by +18% compared to 2020. In which, the exports of wood products reached USD14.5bn, up by +17.2% compared to 2020.

The project will seek to develop infrastructure and expand production capacities. It will form five forestry zones with high technology applications with the hope it will attract investment from wood processing activities. The project also aims to encourage the development of wood products with added value and high, stable demand, particularly noting the value of furniture production.

Wood pellet production in Vietnam is reliant on a thriving wood industry for feedstock. Waste residues from the furniture industry are an important feedstock for wood pellet producers in the south of the country, close to the furniture factories. Those pellets tend to be sold to Korean users because of difficulties in tracing the origin of the wood. Vietnamese wood pellets which are sold to the Japanese market tend to be produced in the north of the country and use wood chips with better traceability and therefore stronger sustainability credentials.

Vietnamese pellet producers have been faced with higher raw material prices in recent months. The COVID pandemic led to the closure of many sawmills and furniture manufacturers. In addition, supply chain disruptions, higher logistic costs, labour shortages because of illness and log prices have impacted the sector.

In brief...

According to media reports, major Indonesian pulp producer **Asia Pulp and Paper (APP)** has pledged to reduce its GHG emissions to net-zero by 2060, inline with the Indonesian government's target. It also plans to reduce its GHG emissions by 30% by 2030, slightly ahead of Indonesia's target to reduce emissions by 29% versus business as usual levels by then. APP has pulp production facilities in Indonesia and China.

Nomura and **Mitsui** will acquire global forestry investment manager **New Forests**. The agreement, which is subject to regulatory approval and expected to be completed by December 2022, will see Mitsui become a 49% shareholder and Nomura a 41% shareholder, with the remaining 10% shareholding retained by New Forests' staff. Assets include sustainable timber plantations, rural land, and conservation investments. Its subsidiary New Forests Timber Products supplies plantation forest products, specialising in the supply of hardwood and softwood wood chips and logs.

Investment & technology

EDF partners with Paprec to revive black pellet project

French utility EDF has confirmed it has teamed up with waste processor Paprec to potentially develop heat-treated biomass pellets to replace coal. The two have responded to the French government's call for expressions of interest (AMI) to identify projects relating to the use of black pellets to replace coal in boilers and industry (see FEM#131, p.11).

The application revives hopes that EDF will develop its Ecocombust project which was abandoned last year (see FEM#124, p.8). EDF had planned to produce black pellets from waste wood for use at its 1.2GW Cordemais coal-fired power plant. At the time of cancellation, EDF had said that if another partner was ready to invest and support the development of the technology, it would consider a project. EDF had originally partnered with French waste company Suez who subsequently pulled out. EDF has been working with Paprec for several months which led to them applying to the AMI.

At the launch of the AMI, France's Minister for Ecological Transition Barbara Pompili specifically mentioned the Cordemais project when giving an example of how black pellets could replace coal in the short term. The French government wants to support the production of heat-treated (torrefied or steam exploded) pellets from wood or the lignocellulosic fraction of green waste (wood residues from composting waste) in France.

According to trade union CGT, if the government approves the project, construction could begin in 2023 and black pellets could be produced from 2025. CGT also reports EDF will cofire 20% black pellets at the Cordemais power plant during winter 2022/23.

EDF was unable to confirm volumes but said it has been carrying out tests. It is unclear the motivation behind cofiring this winter but higher coal and carbon prices in recent months have improved the economic case of burning wood pellets. EDF is also exploring future options because the power plant must stop using coal by 2026.

CGT has said the power plant will use Européenne de Biomasse's HPCI green pellets (formerly known as HPCI black pellets prior to a rebrand). Européenne de Biomasse operates a 120kt/y black pellet (steam-exploded) mill in the Champagne-Ardennes region of France. Européenne de Biomasse was only able to confirm "a large quantity" of their HPCI green pellets had been used for successful tests by EDF.

Aymium signs biocarbon (black pellet) offtake contract with Japanese buyer

US biocarbon producer Aymium (formerly known as National Biocarbon) has signed an offtake contract with Japan's Hokuriku Electric Power Company and Nippon Steel Trading. Details such as the term and volume of the agreement have not been made public.

Aymium produces biocarbon using its patented pyrolysis technology, converting woody biomass into a coal replacement fuel. Aymium can tailor make the product specifications to fit the end-use. It has a particular focus on developing fuels which can be used to replace coal and coking coal in the metallurgical industry. Since 2012 it has operated a 75kt/y production plant in Michigan, which produces biocarbon for use in agricultural, water and air purification as well as for energy.

Aymium is planning two new biocarbon pellet production facilities—one in Williams, California, and another in the Pacific Northwest. Both new sites are scheduled to be operational in 2023. Production from both plants is contracted through 2037.

Aymium anticipates investing over USD350M to construct the new facilities on the US west coast. Hokuriku plans to make an equity investment in the project. Aymium has already raised USD200M from investments by energy and metals companies, including Nippon Steel, Rio Tinto and Steel Dynamics.

Enviva plans first wind-powered wood pellet vessel

US pellet producer Enviva will partner with Japanese shipping company MOL Drybulk to deploy an "environmentally friendly bulk carrier". The vessel will use rotor sail technology developed by Anemoi Marine Technologies and MOL's wind challenger technology. The sails provide auxiliary propulsion alongside energy from a traditional bunker fuel engine.

Enviva and MOL Drybulk, a subsidiary of Mitsui O.S.K. Line, have signed a memorandum of understanding to develop the ship, with a launch date expected in 2024, subject to completion of an initial study phase. The two have recently completed a joint study on the project.

The 62,900dwt vessel will help reduce the greenhouse gas (GHG) emissions of transporting wood pellets. Ocean transportation is the largest contributor to wood pellet GHG emissions. The new vessel is expected to reduce GHG emissions from shipping by an average 20%.

As part of Enviva's goal to achieve net-zero GHG emissions from its operations by 2030, the company has committed to addressing scope 3 emissions. Shipping pellets across the Atlantic Ocean currently comprises one third of Enviva's supply chain emissions. Once it begins shipping pellets in larger volumes to Japan, the route will also contribute significantly to its GHG emissions.

Drax announced in late 2018 it was exploring a sail technology with bulk cargo transporter Ultrabulk (see FEM#92, p.9). The study examined the potential of fitting an innovative sail technology called Fastrig onto Ultrabulk's vessels carrying wood pellets to the UK. The study, carried out in partnership with Smart Green Shipping, found the sail technology could save at least 20% fuel and GHGs every year on the route from Baton Rouge to Liverpool.

The GHG emissions of shipping will become more important in Europe as the EU edges closer to adopting shipping into the EU ETS. In May the EU Parliament approved the Fit for 55 climate package which includes plans to include shipping in the EU ETS. MEPs want to cover 100% of emissions from intra-European routes as of 2024 and 50% of emissions from extra-European routes from and to the EU as of 2024. From 2027, emissions from all trips should be covered 100% with possible derogations for non-EU countries where coverage could be reduced to 50% subject to certain conditions. MEPs also want other GHG emissions than CO_2 to be included, such as methane nitrous oxides.

New German opportunities

Meanwhile, Enviva has also announced it has partnered with two potential German offtakers. It has signed a memorandum of understanding (MOU) for 1Mt/y of fuel for 10-15 years with a German utility customer. Enviva believes the MOU could become a firm contract in the next 12 months, with deliveries beginning as early as 2024.

Enviva has also signed a letter of intent for a 100kt/y 10-year supply contract with a seperate German company. Enviva describes the offtaker as serving a new industrial sector. Enviva expects the contract to become firm in the second half of 2022 and says deliveries could begin as early as 2023.

In addition, Enviva has teamed up with German logistics company Rhenus Group to develop a supply chain from European port terminals to industrial corridors throughout Germany.

Enviva's Q1 2022 results revealed a net loss of USD45.3M for the first quarter of 2022, compared to USD23.2M for the first quarter of 2021. Enviva's production was impacted during the quarter because of Omicron-related absenteeism and labor-related and other pressures experienced by its rail and trucking providers. Enviva was also delayed in bringing online its new Lucedale pellet mill because of labor-related and supply chain issues faced by its construction contractors.

Investment and technology in brief...

AUSTRIA

Austrian forestry company **Andreas Wiesbauer** has brought online a new 50kt/y wood pellet mill at its site in Hohenburg, lower Austria. The pellet mill will produce ENplus certified wood pellets for sale into the local heating market. The mill will primarily use externally sourced sawmill residues, but also has the equipment to process wood chips. The mill includes a $6MW_{th}$ heating plant.

SWEDEN

Swedish forest products company **Svenska Cellulosa Aktiebolaget (SCA)** will invest SEK70m (€7M) in a new sawmill and wood pellet mill at the SCA Rundvik sawmill in Nordmaling municipality. The new pellet mill will have a nameplate capacity of between 25k-30kt/y. The pellets will be sold into the local heating market and used at SCA's packaging paper mill in Obbola. The new development is expected to be completed during winter 2022/23. The pellet mill will use shavings from the onsite sawmill as well as from other nearby sawmills.

UNITED KINGDOM

UK utility **Drax** has announced it is piloting a new carbon capture technology as part of its development of Bioenergy and Carbon Capture (BECCS) project at the Selby power plant. Drax has partnered with the **University of Nottingham** and technology developer **Promethean Particles**. The new process uses a type of solid sorbent called metal-organic frameworks (MOFs). So far CCS technologies have largely relied on liquid solvents. MOFs can be tailored to separate and soak up specific molecules making them good for CCS. Less energy is needed to release the CO_2 from MOFs compared to liquid solvents. The trial will last for two months and will allow all three organisations to understand if this new carbon capture process performs well in real conditions on large-scale projects.

The UK government has introduced a windfall tax on oil and gas companies as a result of the high energy prices. The Energy Profits Levy imposes a new 25% surcharge on the extraordinary profits, but businesses will overall get a 91p tax saving for every £1 they invest. Drax's share price dropped ahead of the tax announcement as investors were unsure which companies would be affected. However, the levy does not apply to power generating companies such as EPH or Drax. The Chancellor has noted those companies have also "seen extraordinary profits". The government is consulting on further market reforms and to "ensure that the price paid for electricity is more reflective of the costs of production", perhaps indicating further action will be taken.

GERMANY

Holzwerk Schneider has begun commissioning the first components of its new integrated site in Messkirch, which will include a 50kt/y wood pellet mill. Commissioning of parts of the new $350,000m^3$/y sawmill have started and it should begin operating in the second half of 2022. The wood pellet mill is due to start commissioning in July or August. The project has been delayed by issues with architectural planning equipment supply.

Germany utility **LEAG** Group will acquire Stabos Group's shares in **Holzkontor und Pelletierwerk Schwedt GmbH (HPS).** HPS operates a 120kt/y wood pellet mill in Schwedt since 2006. The mill primarily produces heating grade wood pellets but also has SBP certification meaning it can sell to the industrial market. The LEAG group is a mining and utility company, providing heat and power in the eastern region of Lusatia. LEAG is the joint brand of two companies Lausitz Energie Bergbau AG and Lausitz Energie Kraftwerke AG. Both companies are each held 50% by Energetický a Průmyslový Holding (EPH) and by PPF Investments.

SPAIN

Junta de Castilla y León and the Valladolid City Council will develop a biomass district heating network for the neighbourhoods of Parquesol, Villa de Prado and Huerta del Rey. A tender for the work has been issued and construction is due to begin summer 2022. The network will consist of four biomass CHP plants totalling $48.8MW_e$. The new boilers are expected to begin operating ahead of the 2023/24 heating season. They will use forest residues from the nearby mountains of Castilla y León, around 50kt/y. The budget for the project is €30M. The city is already home to two heat networks, one at the campus of the University of Valladolid and the hospital, and the other in the northern area, east of Huerta del Rey. They use around 38,500t of forest chips and 1,250t of pellets annually.

SWEDEN

Sumitomo SHI FW will supply the bubbling fluidized boiler for Jämtkraft's $77MW_{th}$ biomass CHP plant in Lugnvik in Östersund. Construction is due to start this year and be completed in 2025. The plant will use a mix of forest residues, sawmill residues and recycled wood. It will work alongside the existing biomass unit at the site and provide heat to Jämtkraft's district heating network. The old heavy fuel oil boilers will remain in situ as back-up boilers in the event of unforeseen circumstances.

Policy & legislation

New sustainability rules approved by EU ENVI Committee pose a huge risk to biomass sector

The European Parliament's environmental committee (ENVI) has voted in favour of wide-ranging amendments to the Renewable Energy Directive (RED III). Many of the approved changes pose a significant risk to the biomass industry, particularly those which relate to the sustainability criteria in article 29 of the legislation.

The biggest change is a proposed ban on the use of 'primary woody biomass' for energy, which it defines as any wood obtained directly from the forest, including roundwood, harvest residues, stumps etc. An exception to this ban would apply for wood harvested due to pests, disease or for wildfire prevention. 'Secondary woody biomass' such as sawmill residues would not be affected by the proposals. The only applications where primary woody biomass are proposed to be permitted are in facilities with a capacity below 7.5MW_{th} input.

For obvious reasons, given the prevalence of biomass sourced directly from the forest, such a ban would have huge implications for the sector. Data from SBP shows that 'primary feedstock' accounted for 51% of the woody biomass used by SBP-certified suppliers in Europe and 57% of the feedstock used by US suppliers in 2021.

The proposal would not only make the use of primary woody biomass ineligible for financial subsidies, but it would also cease to be counted as a source of renewable energy. This would make it far more difficult for Member States to achieve their mandatory renewable energy targets, and thus the proposals may ultimately be rejected when they reach the European Council. However the fact that such sweeping changes have reached this stage in the regulatory process is a significant concern, and could impact investor confidence in the industry.

Further constraints on the use of biomass are proposed in the regulations covering cascading. Here, the ENVI committee voted in favour of requiring Member States to implement the waste hierarchy, stating they should take measures to ensure that even secondary woody biomass is only used for energy if a material use (pulp, panelboard etc) cannot be found.

Additionally, the proposals include a retrospective introduction of GHG emission reduction thresholds for all biomass plants, irrespective of when they began operating. This is a significant change from the current REDII regulations, which impose GHG thresholds only on plants which begin operating after the regulations were introduced in 2021. The proposed thresholds are a 70% reduction until end-2025, rising to an 80% GHG reduction from 2026.

One positive change in the proposals is to increase the renewable energy target to 45% by 2030, from 40% currently.

ENVI's opinion will now be sent to the ITRE committee, where a vote is scheduled for 13 July. The next step will then be plenary: a three way debate between the Commission, Parliament and Council.

Finland locks carbon negativity target into law

Finland has become the first country in the world to make its commitment to carbon negativity legally binding. The Finnish Parliament approved the new Climate Change Act which commits the country to carbon neutrality by 2035 and carbon negativity by 2040.

The new law also updates emissions reduction targets, requiring at least a 60% reduction by 2030 and 80% by 2040, versus 1990 levels. Finland had previously committed to an 80% reduction by 2050.

Finland's new commitments will prove challenging for the country. Although biomass is a major source of renewable energy in the country, it is still heavily reliant on fossil fuels. Fossil fuels and peat accounted for 34% of energy consumption in 2021.

Finland plans to rely on its carbon sink from forests to help achieve carbon neutrality and negativity. However, worryingly for Finland, preliminary data from Statistics Finland (Luke) found the country's land use sector emitted more

greenhouse gas emissions than it absorbed in 2021, totaling 2.1Mt of CO_2eq. That is, the sector's emissions exceeded the amount of carbon sequestrated to various stocks during the year. Luke's press release cited high levels of fellings and a falling trend for annual increment of growing stock for the increased emissions. According to Hannes Tuohiniitty from Finnish trade association Bioenergia, the higher levels of logging have been largely to supply the pulp and paper and sawmill industries. This also means there has been less capacity and available equipment to ramp up harvesting of energy wood, for example through pre-commercial thinnings. Changes to incentives and ownerships of forests has also discouraged proper forest management in recent years. He estimates there is around 800,000ha of commercial forest in Finland which has delayed forest management. The government is looking to incentivize better management of forests, which in turn should boost wood available for energy. The government recently increased the payment for the collection of small diameter wood to €450/ha, part of the Act on Financing Sustainable Forestry (Kemera Act).

Wood for energy is an important source of renewable energy in Finland. It already provides almost 30% of total energy consumption (2021). Finland will have to increase its domestic wood production, especially given the loss of Russian wood imports, while ensuring its forests act as a carbon sink. The EU's proposed ban on the use of 'primary woody biomass' for energy in RED III will prove particularly difficult (see page 10). It is very likely Finland will be a vocal opposer to the amendments within the EU Council.

EC launches REPower EU to reduce reliance on Russian gas, lacks biomass ambitions

The European Commission has launched its REPower EU strategy to achieve full energy independence from Russia well before 2030. As part of its plans the EC proposes diversifying energy supply and ramping up renewable energy. It has highlighted the need to replace fossil fuels in industry, buildings and the transport sector. The Commission is proposing to increase the EU's 2030 target for renewables from the current 40% to 45%.

The report highlights the importance of bioenergy in the current mix, contributing 60% of renewable energy in the EU. It envisages there will be a moderate but steady increase of biomass use until 2030. The EC believes the use of non-recyclable biomass waste and agricultural and forest residues will ensure biomass can contribute to the REPower EU objectives. However, the plan lacks any proposals for specific policies to support the deployment of biomass. In addition, the ENVI committee's passing of new RED III requirements could severely limit biomass use in the EU (see page 10).

Trade association Bioenergy Europe welcomes the plan but says that it still lacks "the needed vision to recognize sustainable bioenergy as one of the key solutions to increase EU energy security."

The decarbonisation of industry is of particular importance. Although the plan does not specifically mention solid biomass, it is one of the few technologies available now at scale. In relation to industry, the plan focuses on electrification, energy efficiency and renewables. It believes scaling up biogas and biomethane could allow industry to save 35 bcm of natural gas by 2030 beyond Fit for 55 targets. The largest reductions in gas, almost 22 bcm, could be made from non-metallic minerals, cement, glass and ceramics, chemicals production and refineries. Around 30% of EU primary steel production is expected to be decarbonized through the use of renewable hydrogen by 2030.

The EC says additional investments of €210 billion are needed between now and 2027 to phase out Russian fossil fuel imports. The Recovery and Resilience Facility (RRF) is at the heart of the REPowerEU Plan implementation, providing additional EU funding. Member States can use the remaining RRF loans (currently €225 billion) and new RRF grants funded by the auctioning of Emission Trading System allowances, currently held in the Market Stability Reserve, worth €20 billion.

Policy & legislation in brief...

GERMANY

The German government is considering delaying the introduction of new sustainability requirements for biomass use under the biomass electricity ordinance act (BioSt-NachV). As it stands biomass generators will need to prove the biomass is certified from June as Germany introduces new rules as part of RED II. However, the federal ministry for the environment has presented a draft amendment to its BioSt-NachV to delay the implementation until January 2023. The four German bioenergy trade associations (HBB) have supported the move, citing a lack of auditors for the delay. The HBB also highlights there is still a lack of clarity as to which specifications biomass must comply with and asks for more time to allow further clarification.

AUSTRALIA

The election of the centre-left labor government in Australia could signal a significant change in climate change policy. New prime minister Anthony Albanese was unable to secure a majority, meaning he will have to team up with some independents and Greens. Albanese has promised to adopt more ambitious emission targets but so far has stopped short of proposing a coal phase out date. He has pledged to reduce greenhouse gas emissions by 43% by 2030 compared to 2005 levels. The current target stands at a 26-28% reduction by 2030. The independents and Greens want even stronger climate action than Albanese. The Greens have proposed to reduce Australia's emissions by 75% by 2030 and fully phase out coal and gas. Under Australia's previous centre-right Liberal-National coalition government, the country has come under heavy criticism for not taking strong enough action against climate change.

SPAIN

Asturias's Commission for Environmental Affairs (CAMA) has approved the environmental impact statement for the conversion of the 50MW La Pereda thermal power plant in Mieres. Plant owner **HUNOSA** plans to replace coal with biomass at the plant. It will use up to 100% biomass, but can also use up to 25% solid recovered fuel. HUNOSA will invest €41M in the project. The forest residues, around 400kt/y, will be sourced locally from Cogersa.

G7

The G7 energy and climate ministers have pledged to largely stop generating electricity from fossil fuels by 2035 at their latest summit in Germany. Germany had been pushing its fellow members to bring forward their coal phase out dates to 2030 but the final wording of the agreement fell short. Instead the group agreed to take "concrete and timely steps towards the goal of an eventual phase-out of domestic unabated coal power generation." It is thought the US and Japan were reluctant to support the 2030 date. The agreement also noted the importance of decarbonising heavy industry and welcomed the report by the International Energy Agency on "Achieving Net Zero Heavy Industry Sectors in G7 Members".

UNITED KINGDOM

Drax is among 23 projects which have made it through the UK government's "phase 1" of its direct air capture and greenhouse gas removal innovation programme. Drax's project focuses on developing biomass gasification as a "future carbon negative technology". The project will use gasification to break down biomass into a gaseous mixture which can be processed and purified to produce a range of useful energy vectors, in particular hydrogen. A feasibility and FEED study was carried out to design a first of a kind innovative negative emission c.1.4 MW_{th} gasification system to consider the technical requirements and costs to produce negative emission hydrogen.

UNITED STATES

Vermont governor Phil Scott has vetoed the state's planned Clean Heat Standard. The Standard would obligate heat providers to prove that they are contributing to the reduction of GHG emissions by a set amount each year, starting in 2024 (see FEM#131, p.12). They could do that by selling cleaner heating fuels or by paying for work done by others that helps Vermonters use clean heating options (such as heat pumps or wood pellets) through a credit system (clean heat credits). The state's House of Representatives and the Senate had already passed the bill. Governor Scott rejected the bill because of concerns over the unknown costs and impacts of the Standard.

Hawaii's Public Utility Commission (PUC) has rejected an amended power purchase agreement (PPA) between **Hawaii Electric Light (HELCO)** and **Hu Honua Bioenergy,** the developer of a 21.5MW biomass power plant. The PUC had waivered competitive bidding for the project's power purchase agreement with Hawaii Electric Light but then in 2020 rescinded the waiver (see FEM#114, p.13). The project was granted a PPA in 2017 which allowed it to make an investment decision but the PPA has now essentially been nullified. The project is nearly finished but cannot operate without a PPA. The 21.5MW biomass plant was planning to use eucalyptus wood chips. Hawaii's Supreme Court ruled PUC must reconsider the PPA but this rejection once again looks like the end of this project.

Wood pellet trade statistics

EU27 + UK total wood pellet imports, Jan-Feb 2022 vs 2021

tonnes

Importer	Jan-Feb 2022			Jan-Feb 2021			Change	% Change
	Extra EU	Intra EU	TOTAL	Extra EU	Intra EU	TOTAL		
United Kingdom	1,059,218	241,525	**1,300,743**	1,270,582	125,337	**1,395,919**	*-95,176*	*-7%*
Denmark	245,023	255,384	**500,407**	210,282	412,189	**622,471**	*-122,063*	*-20%*
Netherlands	312,801	221,375	**534,175**	285,141	156,096	**441,238**	*+92,938*	*+21%*
Italy	49,600	234,039	**283,639**	66,863	215,897	**282,760**	*+879*	*+0%*
Belgium	123,326	70,374	**193,700**	67,479	59,441	**126,920**	*+66,780*	*+53%*
France	57,506	53,463	**110,969**	44,172	53,032	**97,204**	*+13,765*	*+14%*
Latvia	42,760	25,532	**68,292**	72,859	28,204	**101,063**	*-32,771*	*-32%*
Austria	48	47,137	**47,185**	391	54,082	**54,473**	*-7,288*	*-13%*
Germany	23,132	19,579	**42,711**	8,409	44,066	**52,475**	*-9,764*	*-19%*
Poland	40,527	2,445	**42,972**	27,792	505	**28,297**	*+14,674*	*+52%*
Slovenia	11,763	15,913	**27,676**	22,139	14,534	**36,674**	*-8,998*	*-25%*
Lithuania	29,478	744	**30,222**	26,384	195	**26,580**	*+3,642*	*+14%*
Finland	26,734	12,442	**39,176**	19,281	7,548	**26,828**	*+12,348*	*+46%*
Sweden	6,577	66,657	**73,234**	6,640	52,695	**59,335**	*+13,899*	*+23%*
Bulgaria	17,607	8,134	**25,741**	6,486	4,154	**10,640**	*+15,101*	*+142%*
Romania	15,539	454	**15,993**	6,651	100	**6,751**	*+9,242*	*+137%*
Spain	65	14,782	**14,848**	0	11,917	**11,917**	*+2,930*	*+25%*
Czechia	1,791	5,991	**7,782**	2,784	960	**3,744**	*+4,038*	*+108%*
Ireland	-	455	**455**	9,979	1,000	**10,979**	*-10,524*	*-96%*
Greece	2,997	5,456	**8,453**	1,574	3,402	**4,976**	*+3,477*	*+70%*
Croatia	951	3,495	**4,446**	2,719	4,029	**6,748**	*-2,303*	*-34%*
Slovakia	4,344	312	**4,656**	2,599	660	**3,259**	*+1,397*	*+43%*
Estonia	335	5,431	**5,766**	282	3,159	**3,441**	*+2,325*	*+68%*
Hungary	2,332	176	**2,509**	2,477	306	**2,783**	*-274*	*-10%*
Luxembourg	0	3,532	**3,532**	-	2,958	**2,958**	*+574*	*+19%*
Cyprus	471	2,402	**2,874**	52	234	**286**	*+2,588*	*+905%*
Portugal	28	842	**870**	57	285	**342**	*+528*	*+154%*
Malta	42	8	**49**	-	129	**129**	*-80*	*-62%*
TOTAL Jan-Feb 2022	2,074,995	1,318,080	**3,393,075**	2,164,076	1,257,116	**3,421,192**	*-28,117*	*-1%*
TOTAL Jan-Feb 2021	2,164,076	1,257,116	3,421,192					
Change	*-89,081*	*+60,964*	*-28,117*					
% change	*-4%*	*+5%*	*-1%*					

Source: Eurostat, adapted by Hawkins Wright

Wood pellet imports by Korea and Japan, Jan-Apr 2022 vs 2021

tonnes	Vietnam	Canada	Malaysia	Indonesia	Russia	US	Other	**TOTAL Jan-Apr 2022**	TOTAL Jan-Apr 2021	*y/y %*
Korea	734,586	91,886	162,523	104,777	65,087	18	30,213	**1,189,090**	1,145,691	*4%*
Japan	718400	346116	32029	17046	34826	71317	14263	**1,233,997**	932,286	*32%*
TOTAL Jan-Apr 2022	**1,452,986**	**438,002**	**194,552**	**121,823**	**99,913**	**71,335**	**20,159**	**2,423,087**	2,077,977	*17%*

Source: Customs data

Fossil energy and carbon prices

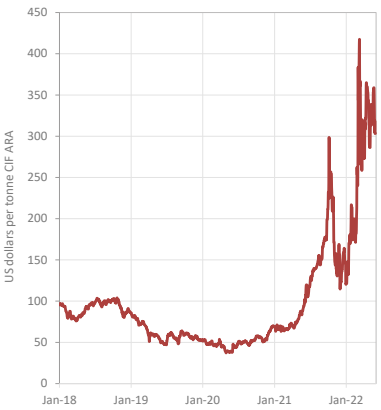
Europe

		May-21	Mar-22	Apr-22	May-22*	change	
						month-on-month	*year-on-year*
Crude oil (Brent)	US$/barrel	67.89	112.91	105.93	111.64	*5.71*	*43.75*
Natural gas (UK marker)	£/MWh	21.21	116.63	79.58	53.27	*-26.31*	*32.06*
Coal (CIF ARA)	US$/tonne	86.32	322.33	325.93	326.09	*0.16*	*239.77*
Carbon (EU ETS, Dec 2022)	€/tCO_2e	52.20	74.97	81.46	85.96	*4.50*	*33.76*
Carbon (UK ETS, Dec 2022)	£/tCO_2e	N/A	76.02	78.13	83.91	*5.79*	*N/A*

United States

		May-21	Mar-22	Apr-22	May-22*	change	
						month-on-month	*year-on-year*
Crude oil (WTI)	US$/barrel	65.17	108.50	101.78	109.19	*7.41*	*44.02*
Natural gas (Henry Hub)	US$/MWh	10.03	16.90	22.72	27.26	*4.54*	*17.23*
Coal (Central Appalachian)	US$/tonne	65.81	107.49	126.64	136.28	*9.64*	*70.47*

Coal prices, CIF ARA



Electricity generation economics

Clean Dark, Clean Spark and Wood Pellet Spreads – United Kingdom, May 2022*

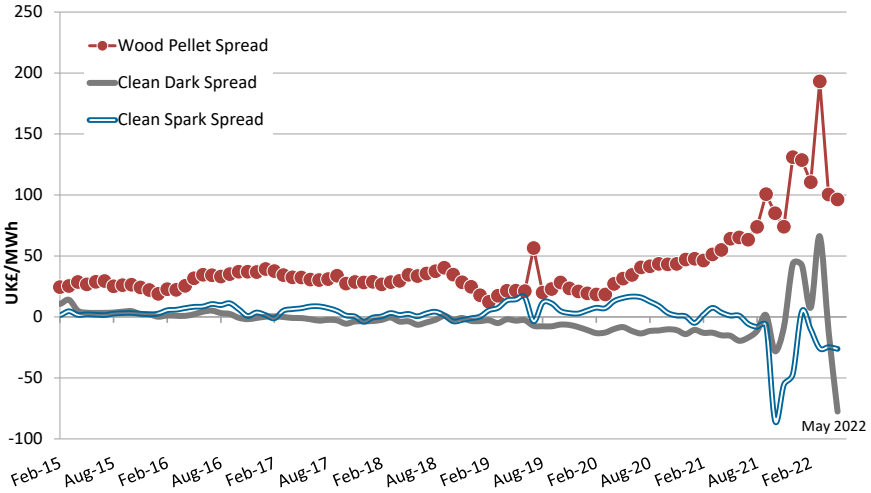
		Wood pellets (ROC)	Coal	Natural gas
Plant conversion efficiency		*38%*	*38%*	*49%*
Electricity price (baseload)	£/MWhe	120.87	120.87	120.87
Fuel price (output energy)	£/MWhe	-134.44	-98.87	-108.43
Total carbon cost (per unit output)	£/MWhe	-	-99.04	-41.92
ROC price (1xROC/MWhe)	£/MWhe	52.88	-	-
CLEAN SPREADS *(electricity price, minus fuel, minus carbon, plus renewable electricity incentives)*		**39.32**	**-77.03**	**-29.48**

Source: Hawkins Wright research

The Wood Pellet Spread (aka Bark Spread) is the difference between the price of base load electricity and the cost of wood pellet fuel. The result is adjusted by the value of the UK's renewable energy incentive. In the case of a converted biomass station this is one Renewable Obligation Certificate (ROC).

Also shown are comparable indicators of the economics of coal and natural gas-fired generation in the UK. The principles are the same: the cost of fuel is deducted from the price of baseload electricity. Also deducted is the cost of carbon emissions which, in the UK, comprises two elements, the variable price of the UK emission allowance (replaced the EU ETS in June 2021) and the UK's Carbon Price Support (CPS) rate which is fixed at £18/tCO_2e.

Generation economics in the UK: Clean Dark, Clean Spark and Wood Pellet spreads, 2015-2022

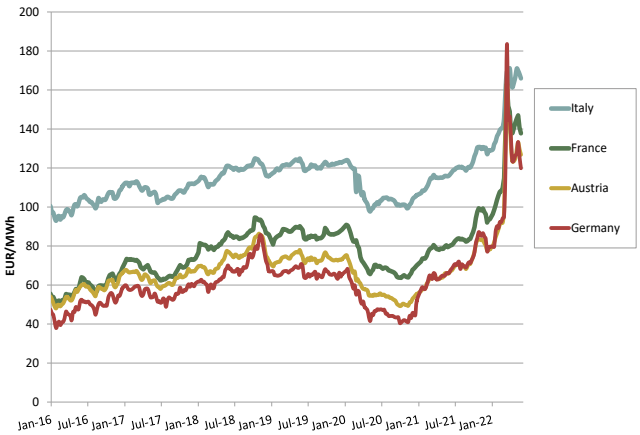


*Notes: a) the calculation of the Wood Pellet Spread is based on a 100% coal-to biomass converted unit that receives support – in the form of 1xROC/MWh – under the Renewables Obligation. Source: Hawkins Wright. b) *May 22 averages are based on data available up to 30 May 2022.*

Source: Hawkins Wright research

European pellet heating economics

Retail heating oil prices (including taxes)



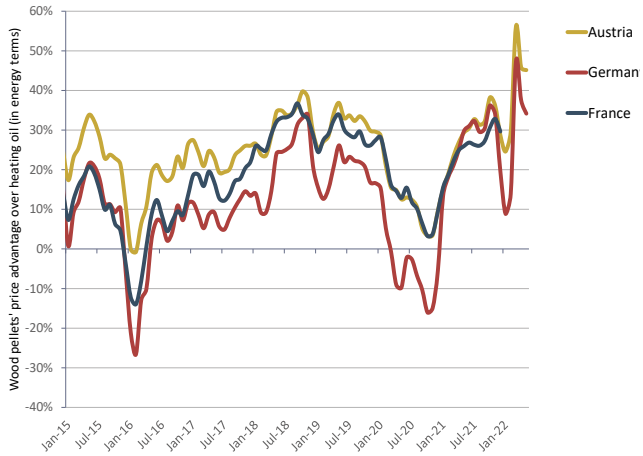
Heating oil prices

	Units	May-21	Apr-22	May-22*	M/M	Y/Y
Austria	€/litre	0.70	1.35	1.38	0.04	0.65
Germany	€/litre	0.70	1.36	1.35	-0.01	0.67
Netherlands	€/litre	1.25	1.76	1.88	0.12	0.50
France	€/litre	0.85	1.49	1.52	0.03	0.64
Sweden	€/litre	1.10	1.66	1.70	0.05	0.56
Denmark	€/litre	1.40	2.00	2.09	0.09	0.60
Italy	€/litre	1.23	1.75	1.80	0.05	0.51
New England, USA	$/litre	-	-	-	-	-

Source: Eurostat, Weekly Oil Bulletin, EIA

Notes: Prices for New England are only published from October-March

Differential between heating oil and pellet prices



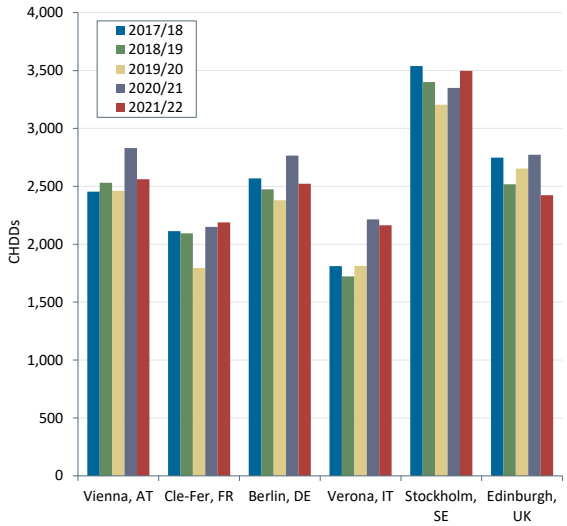
Heating oil versus pellet price differential

	May-21	Apr-22	May-22*	M/M	Y/Y
Austria	29.3%	45.8%	45.2%	-0.6%	15.8%
France	26.0%	-	-	-	-
Germany	29.7%	37.5%	34.2%	-3.3%	4.4%

Source: ProPellets Austria, ProPellets France, DEPI, Weekly Oil Bulletin

Notes: There is a lag in the publication of the French pellet data, which is only published once per quarter.

Heating degree days (cHDDs) in the current season v. previous years



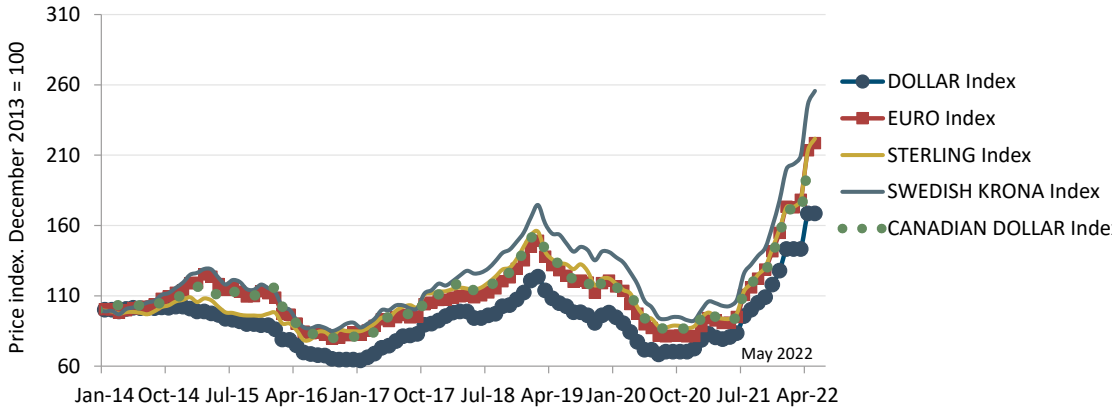
Source: MDA EarthSat

Notes: The chart shows the cumulative heating degree days (cHDD) that have accrued over the 2021/22 heating season, compared to the same period in previous years. The heating season runs from October-May each year. HDD calculations are based on a base temperature of 18°C (65°F for US locations, which are then converted back to °C using a conversion factor of 1.8)

*Note: *May 22 averages are based on data available up to 30 May 2022.*

Exchange rates

Indices of industrial wood pellet prices CIF ARA, in US dollars and in other selected currencies



Exchange rates against the US dollar

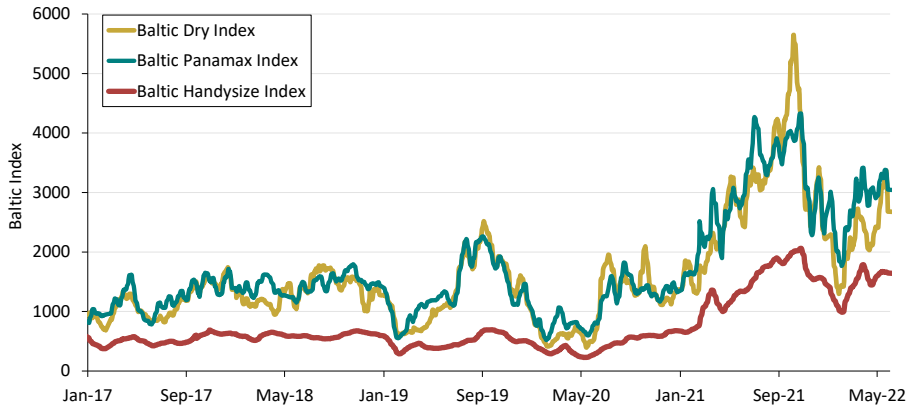
				% change	
	May-21	Apri-22	May-22*	month-on-month	year-on-year
US dollar	1.00	1.00	1.00	-	-
Euro	0.823	0.925	0.947	+2.4%	+15.0%
Canadian dollar	1.213	1.263	1.286	+1.8%	+6.0%
UK pound	0.710	0.773	0.804	+4.0%	+13.1%
Swedish krona	8.347	9.557	9.933	+3.9%	+19.0%

Pellet prices in US dollars and other currencies

	local currency per tonne CIF ARA			% change	
	May-21	Apr-22	May-22*	month-on-month	year-on-year
US dollar	144	300	300	-	-
Euro	118	277	284	+2.4%	+140.4%
Canadian dollar	174	379	386	+1.8%	+121.7%
UK pound	102	232	241	+4.0%	+136.5%
Swedish krona	1198	2867	2980	+3.9%	+148.8%

Freight rates

Baltic Freight Indices



Baltic Freight Indices

				% change	
	May-21	Apr-22	May-22*	month-on-month	year-on-year
Baltic Dry Index	2965	2220	3045	37%	3%
Baltic Capesize Index	4282	1690	3763	123%	-12%
Baltic Panamax Index	2886	2946	3258	11%	13%
Baltic Handysize Index	1265	1548	1658	7%	31%

*Note: *May 22 averages are based on data available up to 30 May 2022.*

New biomass power projects under development over 75MW$_e$

Name/location	Country	Plant type	Capacity, MWe	Fuel type	Fuel demand, Mt/y	Status	Online
MGT Power Teesport	UK	Biomass CHP	299	Pellets	1.0	Under construction	2022
Chubu Taketoyo	Japan	Cofiring	1070	Pellets	0.5	Under construction	2022
Aioi Energy	Japan	Conversion	200	Pellets	0.6	Under construction	2023
Sumitomo, Sendai	Japan	Dedicated	112	Pellets, chips	0.4	Under construction	2025
Chubu, Tahara	Japan	Dedicated	112	Pellets	0.4	Financed	2025
Suzukawa Energy	Japan	Conversion	85	Pellets	0.3	Under construction	2022
Kansai Elec, Kanda	Japan	Dedicated	75	Pellets	0.3	Under construction	2023
Ene Vision Kumamoto	Japan	Dedicated	75	Pellets, chips	0.3	Under construction	2024
Tokushima Tsuda	Japan	Dedicated	75	Pellets, PKS	0.3	Under construction	2023
Shimonoseki Biomass	Japan	Dedicated	75	Pellets	0.3	Under construction	2022
Osaka Gas Sodegaura	Japan	Dedicated	75	Pellets	0.3	Under construction	2022
Oji Green Tokushima	Japan	Dedicated	75	Chips, PKS	0.3	Under construction	2022
Osaka Gas Hirohata	Japan	Dedicated	75	Chips, PKS	0.3	Under construction	2023
Nippon Paper Yufutsu	Japan	Dedicated	75	Chips, PKS	0.3	Under construction	2023
Renova, Tokushima Tsuda	Japan	Dedicated	75	Pellets, PKS	0.3	Under construction	2023
Renova, Omaezakikou	Japan	Dedicated	75	Pellets, PKS	0.3	Under construction	2023
Renova, Sendai	Japan	Dedicated	75	Pellets, PKS	0.3	Under construction	2023
Renova, Ishinomaki	Japan	Dedicated	75	Pellets, PKS	0.3	Under construction	2023
Tokyo Gas Ichihara	Japan	Dedicated	75	Pellets	0.3	Under construction	2024
Osaka Gas Tahara	Japan	Dedicated	75	Pellets	0.3	Financed	2024
eREX, Sakaide	Japan	Dedicated	75	Pellets	0.3	Financed	2025
Chofu Biopower	Japan	Dedicated	75	Pellets	0.3	Financed	2024

Source: Hawkins Wright research

Notes: Due to the large pipeline of Japanese projects we have updated this list to include only projects >75MW under construction. For a more detailed list of Asian projects please refer to our multi-client report Biomass Demand in Japan and South Korea.

Capacity refers to the total capacity of the plant, not just the unit(s) which use biomass or the equivalent cofiring capacity. Fuel demand refers to estimated annual consumption once a plant is fully operational. Some of the plants above use a combination of biomass fuels, where this is the case we have specified only the tonnage of wood chips/pellets. 'Chips' includes low quality forest residues, as well as de-barked/processed wood chips.

Recent additions and/or changes are marked in red text.

Industrial pellet mill projects (>100kt/y) under development

Company	Location	State	Region / Country	Expected online	Production capacity, t/y
UNDER CONSTRUCTION / FINANCED					
Enviva (expansion)	Greenwood (Colombo)	SC	US South Central	2022	100,000
Enviva	Epes	AL	US South Central	2023	750,000
Enviva	Bond	MS	US South Central	2023	1,100,000
ULK	Arkhangelsk		Russia	2023	600,000
Drax (expansion)	Amite		US South Central	2022	100,000
Drax	2 satelite mills		US South Central	2022	80,000
Coega Biomass Centre	Port Elizabeth		South Africa	2022?	120,000
Groupe Lebel	Quebec		Canada	2023	100,000
Indef (expansion)	Chile		Chile	?	125,000
Monpellet	Buryatia		Russia	?	120,000
FINANCING / CONTRACTING					
Highland Pellets	Stephens	AR	US South Central		600,000
Biogren	Skjerøya		Norway		150,000
Northern Energy Solutions	Miramichi	NB	Canada		275,000
Segezha Group	Karelia		Russia	2023	100,000
Siam Biomass Product, Siam Steel	South Phrasaeng		Thailand		100,000
Gitxsan Forests	Hazelton	BC	Canada		100,000

Source: Hawkins Wright research

Note: Recent additions and/or changes are marked in red text. Pellet mill projects at earlier stages of development (e.g. site selection) are not included.

For a complete database of all operating and planned pellet mills, please get in touch to learn more about our Outlook for Pellets service.