Introduction

This Data Brief on Wood Energy focusses on the production and trade in wood pellets. In 2022, worldwide, the value of exported wood pellets (HS 440131) totalled an estimated US$5.87 billion. This accounted for about 69% of the combined export value of energy-related wood products (wood briquettes, wood charcoal, coniferous and non-coniferous wood fuel, wood pellets). Nine of the ten top wood pellet exporters are located in the UNECE region. Viet Nam is the only country outside this region with a significant production of wood pellets (3.5 million tonnes). The total value of wood pellets exported by the top-10 producers from the UNECE region (Table 1) was over ten times that of wood fuel in 2022. UNECE/FAO annual data reliably track market trends in wood pellets using information collected through a survey which includes wood sources and users. Data from this survey (the Joint Wood Energy Enquiry) indicate that wood fibres used for wood pellet production were derived from wood processing co-products such as chips and particles (47.8%) and directly from forests (52.2%).

Europe

European wood pellet production increased marginally in 2022 (by 1.1% from 2021 levels). Longer trends show production growing by 22% since 2018, and by nearly 25% from 2015 levels (Graph 1). In 2022, the import of wood pellets into Europe declined by about 6% partly because of the conflict in Ukraine and subsequent EU sanctions. In 2021, the quantity of imported wood pellets equalled that of European regional production of about 21 million tonnes each. In 2022, the total imports of wood pellets amounted to about 90% of the regional production. The net consumption in Europe seems to have plateaued, although it might grow soon, possibly from greater demand by the residential sector. The annual average value of wood pellets imported into Europe grew by nearly 24% to 232 US$/tonne in 2022, from 188 US$/tonne in 2021.

Table 1: UNECE Top-10 exporters of wood fuel and wood pellets, 2022

<table>
<thead>
<tr>
<th>Country</th>
<th>Wood fuel 1,000 m³</th>
<th>Wood pellets 1,000 tonnes</th>
<th>Total $ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>71</td>
<td>8,989</td>
<td>1,555</td>
</tr>
<tr>
<td>Canada</td>
<td>101</td>
<td>3,651</td>
<td>576</td>
</tr>
<tr>
<td>Latvia</td>
<td>675</td>
<td>1,890</td>
<td>397</td>
</tr>
<tr>
<td>Estonia</td>
<td>196</td>
<td>1,418</td>
<td>313</td>
</tr>
<tr>
<td>Austria</td>
<td>12</td>
<td>760</td>
<td>293</td>
</tr>
<tr>
<td>Germany</td>
<td>247</td>
<td>882</td>
<td>293</td>
</tr>
<tr>
<td>Denmark</td>
<td>46</td>
<td>1,446</td>
<td>243</td>
</tr>
<tr>
<td>Russian Federation*</td>
<td>175</td>
<td>2,294</td>
<td>234</td>
</tr>
<tr>
<td>Croatia</td>
<td>547</td>
<td>433</td>
<td>133</td>
</tr>
<tr>
<td>Belgium</td>
<td>99</td>
<td>1,048</td>
<td>184</td>
</tr>
<tr>
<td><strong>UNECE top-10</strong></td>
<td><strong>2,168</strong></td>
<td><strong>22,811</strong></td>
<td><strong>4,221</strong></td>
</tr>
</tbody>
</table>

Note: * 2021 data. By decreasing total value.
Sources: UNECE/FAO database, 2023; FAOSTAT, 2023; UN Comtrade, 2023.
North America

The growth in wood pellet production (8.7% year-over-year) and exports (16.5% year-over-year) continued in 2022. The quantity of wood pellets exported in 2022 reached 12.47 million tonnes, nearly doubled from the quantities exported in 2015 (Graph 2). Net wood pellet consumption in North America continues its downward trend.

The total wood pellet exports from the United States were about nine million tonnes and had a traded value of over US$1.545 billion in 2022 exceeding the total value of exported sawnwood (coniferous) (see Graph 3). The UK remained the top export market for US wood pellets, albeit with a reduced market share (down to 59% of total exports, by weight, from 71% in 2021); followed by the Netherlands (20%) and Japan (7%). Wood pellet production in the United States (by weight), represents about 5% of all roundwood production in the country’s southern regions.

Highlights

- In Europe, total imports (by weight) of wood pellets in 2022 was equivalent to about 90% of European regional production. In recent years, these have been equal. Year-over-year value of wood pellets (US$/tonne) imported by the European region grew nearly 24% in 2022 from 2021.

- Wood pellet traded values grew exponentially in 2022. Despite price hikes (likewise in all energy sources), wood pellet consumption has remained unchanged in 2022.

Price trends

Wood pellet traded values have grown steadily in recent years, but exponentially in 2022. Upward trending global energy prices and bans on imports from Belarus and the Russian Federation (in 2021 European wood pellet imports from the Russian Federation exceeded 1.9 million tonnes) partly explain price spikes. Data on residential wood pellets prices (EUR/tonne, inclusive of value-added taxes) for 15kg bags from Croatia, Serbia and Slovenia exemplify dramatic price changes (Graph 4). In spite of price hikes, wood pellet consumption has remained largely unchanged as prices across all energy sources rose in 2022.
Important policy developments

The EU regulations 2022/355 and 2022/576 established restrictive measures on imports from Belarus and the Russian Federation. By Q4 2022 all imports of wood pellets into the EU stopped. Albeit in relatively small quantities, some of the volume previously exported by Belarus and the Russian Federation to the EU were re-directed to Türkiye.

The European Commission has proposed amendments to the current Renewable Energy Directive (2018/2001) to increase the EU’s target for the share in energy consumption from renewable sources from 32% to 42.5% by 2030. Amendments would also introduce the obligation to design national support schemes in accordance with the so-called “cascading principle” whereby wood is used according to its highest economic and environmental added value. This principle would introduce an order of six-level use priorities: (1) wood-based products, (2) extending their service life, (3) re-use, (4) recycling, (5) bioenergy, and (6) disposal.

The European Union Regulation on deforestation-free supply chains (EUDR) was launched in June 2023 with an implementation date of 30 December 2024. All companies will have to conduct strict due diligence and confirm that products have been produced on lands not subjected to deforestation or forest degradation. It remains unclear how the required geolocation data required by this regulation and the verification of a full chain of custody for products across the global supply chain will be implemented. Furthermore, the EU’s definition of forest degradation is not universally agreed. In preparation for compliance, certain Baltic countries have already taken initial steps. For instance, Lithuania introduced a national biomass sustainability scheme (RED BP) to be mandatory for all biomass whether produced in Lithuania or imported, if the buyer requests delivery of the biomass under the RED BP scheme. Certification under any sustainability scheme (such as FSC of PEFC) will not be sufficient to meet the RED BP.

Canada’s Clean Fuel Standard continues to be the primary policy influencing new energy developments. Published in July 2022, the Standard was designed to reduce carbon intensity of liquid fuels by 13% below the 2016 levels by 2030. The Standard focuses on liquid fuels and includes various pathways for wood to fuel but does not cover solid fuels such as wood pellets. The Clean Fuels Fund is meant to support the energy transition through a $1.1 billion investment for the development of innovative technologies. The Net Zero Accelerator Initiative, which will provide up to $8 billion to decarbonize large emitters, will support industrial transformation and develop clean technology and batteries. Bioenergy projects that meet these goals will be eligible for funding.

The EU established restrictive measures on imports from Belarus and the Russian Federation in 2022. By Q4/2022 all imports of wood pellets from these two countries stopped.

Led by the US, nine of the top-10 exporters of wood pellets (by value) worldwide are in the UNECE region. Value of wood pellets exports in these UNECE region members was over ten times that of wood fuels in 2022.

North American growth in wood pellet production (8.7% year-over-year) and exports (16.5% year-over-year) continued in 2022. Total value of US wood pellet exports amounted to nearly nine million tonnes in 2022, exceeding the value of exported sawnwood (coniferous).
The US Inflation Reduction Act which became a law on 16 August 2022 allocates US$369 billion to clean energy investments. The US Energy Information Administration’s outlook through 2024 foresees no changes in the national use of woody biomass to generate power in the electricity, industrial and commercial sectors. Tax credits provided to bioenergy producers who capture and store carbon dioxide could affect wood pellet production by increasing the demand for biomass feedstock in the future. But a declining pulp and paper industry in the US’s southern regions – which lost about 10% of installed capacity between 2012 and 2022 – might result in larger levels of available pulpwood, roundwood and mill residues. This could ease cost pressures on the wood pellet industry.

**Renewable energy markets for damaged wood**

Wood damaged by extreme weather (wildfire, windthrow), insects, and disease can be more readily used for energy than saw or pulp milling sectors because of wood quality requirements. Energy uses can preserve a substantial share of otherwise undamaged wood market value. But legal definitions for eligible biomass to generate renewable energy can limit its use.

In Portugal, wood damaged by diseases such as stress caused by the *Pinus pinaster* nematode, is required by legislative mandates to be burned. Salvaged timber after wildfires is another wood assortment used for energy generation. Energy use is the only remaining commercial alternative for such salvage wood. Legal definitions limit the use of forest biomass to generate electricity and thermal energy to “the residual biomass resulting from afforestation, management and forest exploitation (stumps, roots, leaves, branches, and pecks); woody materials resulting from phytosanitary cuts; as well as from fire prevention practices; and within the control of invasive species in rural areas. Excludes the residues of wood processing industries, namely bark, shavings, and sawdust.”

In Sweden, where an estimated five million m$^3$ of standing timber were killed by the European spruce bark beetle in 2022, there was a declining trend in 2023 in the use of bark beetle-damaged wood. Bark beetle-damaged wood is solely used as a biofuel if stored for too long; otherwise it can be sorted separately from non-damaged wood and used by the pulp and sawnwood industries. In southern Sweden, infested wood that is completely dry of unrestricted amount of blue stain and with limited amount of storage rot can still be used for pulp wood or sawn timber even if the bark has fallen off as per local rules. Local wood-using mills are learning to use damaged wood which might result in a declining share destined for energy purposes.

In France, the share of unplanned and sanitary fellings surged in the past four years, along with an increase in their shares of wood used for energy (0.4% in 2019 to over 5% in 2020 and 2021) about 10% of the unplanned fellings and sanitary cuts compared to 6% in 2018.

**Beyond the UNECE region**

Japan and the Republic of Korea are the largest importers of wood pellets (by value and weight) outside the ECE region with imports of 4.4 and 3.9 million tonnes, respectively.