



Food and Agriculture
Organization of the
United Nations

UNECE

Forest Products

Annual Market Review 2021-2022



UNITED NATIONS



Food and Agriculture
Organization of the
United Nations

UNECE

Forest Products

Annual Market Review 2021-2022



UNITED NATIONS

Geneva, 2022

COPYRIGHT AND DISCLAIMER

Copyright © 2022 United Nations and the Food and Agriculture Organization of the United Nations.

All rights reserved worldwide.

The designations employed in publications of the United Nations Economic Commission for Europe (UNECE) and the Food and Agriculture Organization of the United Nations (FAO), which are in conformity with United Nations practice, and the presentation of material therein do not imply the expression of any opinion whatsoever on the part of the UNECE or FAO concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers. The responsibility for opinions expressed in studies and other contributions rests solely with their authors, and publication does not constitute an endorsement by the UNECE or FAO of the opinions expressed. Reference to names of firms and commercial products and processes, whether or not these have been patented, does not imply their endorsement by UNECE or FAO, and any failure to mention a particular firm, commercial product or process is not a sign of disapproval.

This work is copublished by the United Nations (UNECE) and FAO.

Photo credits: Adobe Stock (cover page, 27, 28, 34, 37, 62), www.pexels.com (pages ix, 4, 6, 24, 39, 40, 41, 48)

ABSTRACT

The *Forest Products Annual Market Review 2021-2022* provides a comprehensive analysis of markets in the UNECE region and reports on the main market influences beyond the region. It covers products from the forest to the end user and from roundwood and primary processed products to value-added, housing and wood energy. Statistics-based chapters analyse the markets for wood raw materials, sawnwood, wood-based panels, paper, paperboard and woodpulp. Underlying the analysis is a comprehensive collection of data. The *Review* highlights the role of sustainable forest products in international markets, discusses policies concerning forests and forest products, assesses the main trends and drivers, and analyses the effects of the current economic situation on forest product markets.

ECE/TIM/SP/54

UNITED NATIONS PUBLICATION

Sales No. E.22.II.E.33

ISBN 978-92-1-117318-5

eISBN 978-92-1-002367-2

ISSN 1020-2269

eISSN 2518-6450

FOREWORD

While 2021 was still marked by the COVID-19 pandemic, which changed the way we work and live together and led to a rediscovery of our forests and green spaces, 2021 was also the year when the world started to recover from the pandemic's effects. Economies bounced back – in many cases even stronger than expected – and jump-started demand for all kinds of products, including those derived from wood. 2021 was also a very good year for the forest-based industries, with high demand for semi-finished and finished wood products for building, fashion, furniture and packaging.

This lasted only until mid-2022, when the global market situation worsened rapidly, leading to widespread and enormous effects on many sectors and areas in the wake of the war in Ukraine. Energy security, in light of sky-rocketing natural gas and electricity prices in almost all ECE countries, became one of the hottest topics by mid-2022. Many consumers, particularly in Eastern Europe and the western Balkans, did not hesitate to turn to traditional firewood for heating and cooking.

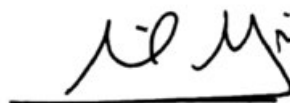
Forests therefore witnessed three highly differentiated demands in 2021 and the first half of 2022: recreation, wood products and wood energy. Thanks to the multi-functional management of the forests, the same sustainably managed forests of the UNECE region that we visit for recreation also provide us with sustainable products or affordable and available sources of energy. Forests in the UNECE are well equipped to face the new challenges.

Indeed, our sustainably managed forests of today are the result of centuries of wise tree management from their beginnings as small seedlings – like the white fir seedling on the cover of this publication. This image symbolizes not only the positive attitude of the forest sector towards an uncertain future, but also the many opportunities still to explore to satisfy the multiple demands. This multifunctionality of forests in the UNECE region is its strength and the strength of its entire forest sector. The Forest Products Annual Market Review plays an important part in monitoring and analysing the impact of changing trends on our forests. It highlights how the forest sector reacts to new realities and new demands for the benefit of people and the planet.



Olga ALGAYEROVA

Under-Secretary-General of the United Nations,
Executive Secretary of the United Nations
Economic Commission for Europe



Nabil GANGI

Deputy Regional Representative
for Europe and Central Asia of the Food and Agriculture
Organization of the United Nations

ACKNOWLEDGEMENTS

The UNECE/FAO Forestry and Timber Section expresses its deep gratitude to everyone who contributed to this edition of the *Forest Products Annual Market Review*.

The *Forest Products Annual Market Review* is the result of a cooperative effort involving a network of official country correspondents, authors, reviewers, editors, the UNECE/FAO Team of Specialists on Sustainable Forest Products, and teams at the Forestry and Timber Section in Geneva and at FAO in Rome. In combination, this network provides an unrivalled source of expertise and knowledge, which is the hallmark of the *Review*.

The Review benefited greatly from the in-kind contribution by the Forest Service staff of the United States of America Department of Agriculture who were allowed to volunteer their time and expertise as well as the following industry associations: the European Panel Federation (EPF), European Organisation of the Sawmill Industry (EOS) and the Confederation of European Paper Industries (CEPI). We also express our deep gratitude for the in-kind contributions and information to the chapter on pulp and paper from the State Technological University of Plant Polymers, St Petersburg, Russian Federation and the University of British Columbia (UBC), Vancouver, Canada, provided scholarships for two junior publications assistants.

Without this collective and collaborative effort, it would not be possible to produce this annual publication.

We acknowledge the authors who wrote the chapters and, in so doing, shared their expertise and knowledge. You can find contact details and affiliations of all authors in the Annex.

The authors are as follows:

Orifjon Abidov	Ivan Eastin	José Palacín
Francisco Aguilar	Kathryn Fernholz	Russ Taylor
Eduard Akim	Branko Glavonjić	Michel Valois
Delton Alderman	Antti Koskinen	Johan Vinterbäck
Diego Benedetti	Bernard Lombard	Jeremy Wall
Matthew Bumgardner	Warren Mabee	

The UNECE/FAO Forestry and Timber Section expresses its appreciation for the information and assistance received from the following contributors in preparing the *Forest Products Annual Market Review 2021-2022*.

Yngve Abrahamsen, Euroconstruct, Swiss Economic Institute, Switzerland

Ariane Crevecoeur, Confederation of European Paper Industries, Belgium

William Luppold, former staff member of the USDA Forest Service, Delaware, Ohio, United States of America

The publication was managed by Florian Steierer of the UNECE/FAO Forestry and Timber Section. It was peer-reviewed by members of the UNECE/FAO Forestry and Timber Section. The chapters were reviewed at FAO Forestry Division by Iana Arkhipova, Lyndall Bull, Thais Juvenal, Ashley Steel, Sven Walter and Xia Zuzhang.

The final draft of the publication was proofread and checked for consistency by Eoin O'Driscoll, Marketing Consultant, Drima Marketing Research, edited by the secretariat of the UNECE/FAO Forestry and Timber Section.

The manuscript was completed on 28 October 2022.

CONTENTS

FOREWORD	iii
ACKNOWLEDGEMENTS	iv
EXPLANATORY NOTES.....	vii
ACRONYMS, ABBREVIATIONS AND SYMBOLS.....	viii
1 Economic overview and policies	1
Introduction and overview	2
Economic developments UNECE region.....	2
Construction in the UNECE region, with a focus on housing.....	4
Policy and regulatory developments.....	7
Certified forests and products.....	9
2 Sawn Softwood.....	10
Introduction and overview	12
Europe	12
Eastern Europe, Caucasus and Central Asia	14
North America.....	15
3 Sawn Hardwood	18
Europe	20
Eastern Europe, Caucasus and Central Asia	22
North America.....	23
4 Wood-based panels	26
Europe	28
Eastern Europe, Caucasus and Central Asia	29
North America.....	30
5 Pulp and paper.....	32
Introduction and overview	34
Europe	34
Eastern Europe, Caucasus and Central Asia	36
North America.....	37
Extraregional influences on the UNECE	38
6 Wood energy	40
Introduction and overview	42
Europe	42
Western Balkans	43
Eastern Europe, Caucasus and Central Asia	44
North America.....	44
Extraregional influences on the UNECE	45
References.....	46
Annexes	54

LIST OF GRAPHS

GRAPH 1.1	Major currencies used to trade forest products, indexed against the US dollar, January 2021-June 2022	4
GRAPH 1.2	Building permits, starts and completions, Euroconstruct region, 2002-2024	5
GRAPH 1.3	United States housing permits, starts and completions, 2011-2022	7
GRAPH 1.4	FSC- and PEFC-certified forest area available for wood supply, 2014-2022	9
GRAPH 2.1	Finland: Quarterly average sawn softwood prices, 2014 - June 2022	13
GRAPH 2.2	Quarterly prices for sawn softwood in China, Europe, Japan and the United States, 2014-June 2022	15
GRAPH 2.3	North America: Sawn softwood production, trade and consumption, 2015-2022	16
GRAPH 3.1	Top five sawn hardwood producers, Europe (2017-2021)	20
GRAPH 3.2	Top five sawn hardwood consumers, Europe	21
GRAPH 3.3	Top 5 importers of EU27 sawn hardwood, 2020-2021	22
GRAPH 3.4	Top three sawn hardwood exports from the Russian Federation (2017-2021)	22
GRAPH 3.5	Sawn hardwood consumption in the United States by major user groups, 2000 and 2020	23
GRAPH 3.6	Single family housing starts and employment in the cabinet and millwork industries in the United States, 2000 to 2021 ..	24
GRAPH 3.7	Annual inflation-adjusted sawn hardwood price index and average in the United States, 1982 to 2021	24
GRAPH 4.1	Europe: Structural panels production, trade and consumption, 2017-2021	28
GRAPH 4.2	Europe: Non-structural panels production, trade and consumption, 2017-2021	28
GRAPH 4.3	Europe: Traded wood-based panels unit values, 2017-2021	29
GRAPH 4.4	North America: Wood-based panel prices, 2017-2021	30
GRAPH 4.5	North America: Structural panels production, trade and consumption, 2017-2021	31
GRAPH 4.6	North America: Non-structural panels production, trade and consumption, 2017-2021	31
GRAPH 6.1	Wood pellets average domestic market prices in Croatia, Serbia and Slovenia	44

LIST OF TABLES

TABLE 1.1	Construction spending forecast, Euroconstruct region, 2022-2024	5
TABLE 1.2	Construction of new dwellings and floor area in some member States of the EECCA, 2019-2021	6
TABLE 2.1	Top ten destinations of sawn softwood exports from the Russian Federation in 2020 and 2021	14
TABLE 3.1	Sawn hardwood balance, United States, 2017-2021 (million m ³)	23

EXPLANATORY NOTES

The Food and Agriculture Organization of the United Nations and the United Nations Economic Commission for Europe agreed to use the term “war in Ukraine”.

“Apparent consumption” is calculated by adding imports to a country’s production and subtracting exports. Apparent consumption volumes are not adjusted for levels of stock. “Apparent consumption” is synonymous with “demand” and “use” and is often referred to as “consumption”. Consumption is the sum of a country’s (or subregion’s) production, imports and exports.

For ease of reading, the publication mostly provides value data in United States dollars (indicated by the sign “\$” or as “dollars”). Unless specific for a given period, the applied exchange rate for the euro in 2021 is €0.8454 = \$1 and for the Russian rouble is RUB 73.65 = \$1. Both these exchange rates are based on the annual average rate provided by the UNECE (<http://w3.unece.org/PXWeb/en>).

Trade data for the 27 European Union (EU) countries include intra-EU trade, which is often estimated by the countries themselves. Export data usually include re-exports. Subregional trade aggregates in tables include trade occurring between countries in the subregion. Declared unit values shown in tables and graphs are included as an indicator of price trends and are derived by dividing the declared monetary value of imported and exported products by the volume of these products.

See the list of countries in the annex for a breakdown of the region into its subregions. References to EU27 refer collectively to the 27 country members of the European Union. The term Eastern Europe, Caucasus and Central Asia (EECCA) is used for reasons of geographic proximity and similarities in economic structure and refers collectively to 12 countries: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. It is used solely for the reader’s convenience.

The term industrial roundwood is used interchangeably with logs. The term softwood is used synonymously with coniferous. Hardwood is used synonymously with non-coniferous and broadleaved. Lumber is used synonymously with sawnwood.

All references to tons or tonnes in this text represent the metric unit of 1,000 kilograms unless otherwise indicated.

A billion refers to a thousand million (10^9). One trillion refers to one million million, or 10^{12} .

Please note that all volumes of United States and Canadian sawn softwood production and trade are given in actual m^3 , converted from nominal m^3 .

All data and statistics in this publication are derived from the UNECE/FAO timber database unless otherwise noted. Tables based on the database are available in the statistical annex at www.unece.org/forests/fpamr2022-annex.

ACRONYMS, ABBREVIATIONS AND SYMBOLS

(Infrequently used abbreviations spelled out in the text may not be listed here)

...	unavailable
\$	United States dollar(s) unless otherwise specified
€	euro(s)
BPS	basis points
BIS	Bank of International Settlements
C&F	cost and freight (Incoterm)
CEPI	Confederation of European Paper Industries
CLT	cross-laminated timber
COVID-19	coronavirus disease of 2019
EECCA	Eastern Europe, Caucasus and Central Asia
EIA	Energy Information Administration
EPF	European Panel Federation
EU	European Union
EWP	engineered wood product
FOB	free on board (Incoterm)
FSC	Forest Stewardship Council
GDP	gross domestic product
ha	hectare(s)
HDF	high-density fibreboard
IMF	International Monetary Fund

ITTO	International Tropical Timber Organization
LIRA	Leading Indicator of Remodelling Activity
LVL	laminated veneer lumber
m ²	square metre(s)
m ³	cubic metre(s)
MBF	million board feet
MDF	medium-density fibreboard
MENA	Middle East North Africa
MW	megawatt(s)
PEFC	Programme for the Endorsement of Forest Certification
SDG	Sustainable Development Goal
SFI	Sustainable Forestry Initiative
SPF	spruce-pine-fir assortment
UK	United Kingdom of Great Britain and Northern Ireland
USDA	United States Department of Agriculture
USFS	United States Forest Service
USITC	United States International Trade Commission
WTO	World Trade Organization





Chapter **1**

ECONOMIC OVERVIEW
AND POLICIES

Lead author: Kathryn Fernholz

Contributing authors: Delton Alderman, José Palacín, Jeremy Wall

Highlights

Economies of the UNECE region bounced back from the large contractions observed in most countries in 2020. Growth accelerated in the second half of 2021, as the gradual relaxation of COVID-19 containment measures unfolded.

Momentum from the reopening of the economies carried over into early 2022, when signs of a slowdown began to emerge and inflation started to pick up. The war in Ukraine exacerbated supply disruptions, fuelled inflationary pressures and eroded consumer confidence at global level.

Housing construction and sales in the UNECE region were strong in 2021. Investor interest in the European residential sector remains strong and a substantial percentage of office and retail buildings could be repurposed into residential space in the next five-years.

The Biodiversity Strategy of the European Union aims to classify 30 % of its forests as high biodiversity status reserves by 2030, which may have significant impact on the subregional and global availability of wood and wood products.

Inflation and prices of sawn softwood continued to be a concern in North America with inflation hitting 40-year highs. In the United States total wood fibre costs increased by 15% from 2000 to 2021 while consumer inflation increased 50% and wood pulp prices increased 33%.

Forestry, forest products and five other biobased sectors under the BioPreferred Program of the United States reduced oil consumption by 9.4 million barrels in 2017.

The area of certified forests worldwide increased by 1.85% (8.4 million ha) reaching a new all-time high of 463 million ha. Global forest area under third-party certification schemes is estimated to have dropped by almost 20% to 372 million ha in the second half of 2022 after the two main schemes suspended certificates from the Russian Federation and Belarus.

Introduction and overview

The 2022 edition of the UNECE/FAO Forest Products Annual Market Review reviews market developments in the UNECE region in 2021 and the first half of 2022 as well as the policies driving those developments. The UNECE region has three subregions: Europe; Eastern Europe, Caucasus and Central Asia (EECCA) and North America. It encompasses about 1.7 billion ha of forest, which is more than 40% of the world's total forest area.

The subchapters on economic developments, and construction and housing, describe the broad macroeconomic situation affecting demand in the UNECE region. Subchapters on policy and regulatory developments and forest certification address other factors affecting forests and forest product markets in the region in 2021 and beyond.

In contrast to previous years, the publication exceptionally based its analysis on externally available information because official data were not available at the time of writing. The Review will be complemented by the data collected by the Joint UNECE/FAO Forestry and Timber Section obtained from official national statistical correspondents. The data will be published separately on <https://unece.org/forests/data-forest-products-production-and-trade> in late 2022.

Belarus and the Russian Federation are two major countries in the subregion of the EECCA but obtaining market information from these two and the entire subregion was particularly challenging in 2022. The information about the impact of various measures taken in reaction to the war in Ukraine, as well as the countermeasures taken by Belarus and the Russian Federation are taken into account as anecdotal information in the market assessment in Europe and the North American sub-region where possible. Most of the analysis focuses on the trade of commodities and not production and consumption.

References to "Europe", "EECCA" and "North America" in this publication always pertain to the subregions listed in, "Countries in the UNECE region, and its subregions" (annex of this publication).

Economic developments UNECE region

In 2021, the economies of the UNECE region bounced back from the large contractions observed in most countries in 2020. Growth accelerated in the second half of the year, as the gradual relaxation of COVID-19 containment measures unfolded, and vaccination campaigns progressed. Output returned to pre-pandemic levels in more than half of the UNECE countries. Differences in performance reflected the diversity of economic structures and capacity to implement anti-crisis measures. The recovery, however, was accompanied

by lingering supply constraints, reflecting the distortions created by the COVID-19 pandemic.

While momentum from the reopening of the economies carried over into early 2022, signs of a slowdown began to emerge, and inflation started to pick up. The war in Ukraine, which began in late February 2022, has exacerbated supply disruptions, fuelled inflationary pressures and eroded consumer confidence at global level. Large output contractions are expected in countries directly affected by the war in Ukraine, while negative spill-overs are expected to lead to a generalized economic slowdown. Strong labour markets and the accumulation of savings during the pandemic have boosted consumption, but growing inflation is eroding real incomes while higher uncertainty is deterring investment. The dampening effect on output dynamics will likely be more strongly felt in the second half of 2022, as the COVID-19 recovery loses further steam, amid a difficult external environment and more restrictive policies. Variable government actions and economic policies throughout the UNECE region may result in different outcomes at the national level.

In the European Union, the implementation of investments under the Recovery and Resilience Facility and further support to address the impact of the war in Ukraine will likely continue to underpin economic activity in 2022. Large refugee inflows from Ukraine are boosting demand but also creating fiscal pressures in countries close to the war in Ukraine. In the United States, fiscal policy being tightened, as COVID-19 assistance programmes are discontinued, implying a particularly negative effect on household incomes. The Inflation Reduction Act being considered in the Congress of the United States, with nearly \$40 billion in investments for agriculture conservation, forestry, and renewable energy, may affect economic outcomes in late 2022 (CRS, 2022).

Labour markets showed favourable dynamics throughout 2021 and remained stable in the first half of 2022, despite growing concerns on the economic outlook. The recovery led to labour shortages in some sectors, with growing shares of companies reporting difficulties in filling vacancies, given skill mismatches. In the European Union, the number of employed persons in the last quarter of 2021 was 0.2% below the level observed two years earlier, before the beginning of the pandemic. In the euro-zone, dynamics were more favourable, and employment had already made a full recovery. The unemployment rate peaked in the first quarter of 2021 and declined afterwards in both the euro-zone and the EU at large to levels below those observed before the pandemic.

Unlike in the EU, where labour retention schemes prevented the destruction of employment markets at the height of the pandemic, in the United States the rate of unemployment still remained elevated in early 2021, after soaring in March 2020, but after continuous decline reached 3.6% in June 2022, the

same level as two years earlier. Payrolls also hovered around pre-pandemic levels. By contrast, as of mid-2022 the labour force participation rate had recovered slowly and remained around 1 percentage point below the level observed before the pandemic.

In the Russian Federation, labour markets improved rapidly in 2021, with labour participation increasing and the unemployment rate falling to pre-pandemic levels. As in other member States, job creation has been concentrated in sectors that were most affected by COVID-19 and then performed better in the recovery. Lower migrant flows contributed to the tightness of labour markets, in particular in sectors such as construction, where foreign labour is important. The expected contraction of the Russian economy in 2022 is expected to take its toll on the labour market, but data in the first half of the year showed some resilience.

The reopening of the economies, as COVID-19 restrictions were eased or removed, together with lingering supply constraints, started to drive up the price of energy and other commodities in the second half of 2021. These increases have spread to other sectors, pushing headline inflation further. The growth of energy prices, which has been fuelled further by the war in Ukraine in 2022, has particularly negative implications for transport, construction and other energy-intensive sectors. While in the EU cost pressures have dominated dynamics in the first half of 2022, strong demand also played a role in driving inflation in the United States, where core inflation, which excludes food and energy, started to increase rapidly in early 2022, reaching 6.5% in March 2022, against 3.6% in the EU. This gap, however, has narrowed as core inflation has continued to increase in the EU. Inflation dynamics have been comparatively more benign in the euro-zone than in the rest of the EU. In the Russian Federation, headline inflation had been steadily increasing through 2021 and soared after the beginning of the war in Ukraine. After peaking at 17.8% in April 2022, it started to decline, amid softer demand and a stronger ruble.

Growing inflation has prompted the tightening of monetary policies across the region, with housing affordability deteriorating as mortgage payments increase. The Federal Open Market Committee of the United States started to raise the Federal Funds Rate in March 2022, with a total 225 basis points¹ (bps) tightening up to July 2022. The aggressive pace of hikes and clear guidance of monetary authorities have translated into a rapid tightening of financial conditions, with mortgage rates almost doubling by June 2022. The euro-zone

deposit benchmark rate, which had been in negative territory since 2014, was brought to zero following a 50 bps increase by the European Central Bank in July 2022. Further hikes are expected but a deteriorating economic outlook will temper the pace of tightening. This monetary policy shift, which was initiated by the discontinuation of a bond purchase programme in June, has been accompanied by a widening of sovereign bond spreads. In EU member countries outside the euro-zone, where inflation has been running higher, monetary authorities initiated policy tightening earlier. The Central Bank of the Russian Federation started to hike rates in March 2021, with increases totalling 425 bps by the end that year. In February 2022, it raised its benchmark policy rate by 10.5 percentage points to 20% to stave off the depreciating pressures over the rouble and shore up the financial system. As capital controls contributed to stabilize the situation, a series of cuts followed. By the end of July 2022, the rate was 150 bps below the level before the beginning of the war in Ukraine, amid high but declining inflation.

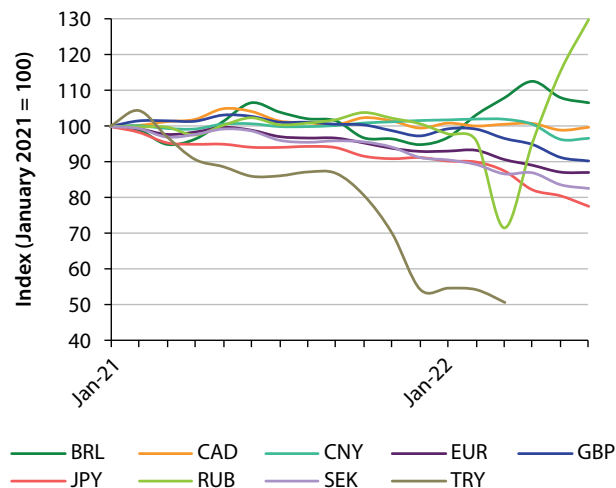
Interest rates differentials, geopolitical drivers and concerns on the economic outlook in Europe have strengthened the US dollar vis-à-vis the euro, which has declined steadily since early 2021, when it traded at around \$1.20/EUR, to reach parity, a level not seen in two decades. The appreciation of the US dollar has been generalized, with a broad trade-weighted index increasing by 7.5% in the year to the end of June 2022. The Russian rouble depreciated sharply in the weeks following the beginning of the war in Ukraine, but a combination of capital controls and large current account surplus brought the exchange rate back to levels not seen since early 2018 when it averaged less than 60 roubles per dollar for the first quarter of the year (graph 1.1).

Geopolitical concerns and further disruptions in energy markets could keep prices elevated and result in additional supply shocks with a negative impact on economic activity. The dampening effects of more restrictive policies will be more strongly felt in 2023. Monetary authorities face a challenging task, seeking to rein in inflationary expectations while facing growing economic headwinds. After years of loose monetary policy, tightening could lead to disorderly adjustments in financial markets. COVID-19 is no longer as critical a policy concern but the potential to create further dislocations cannot be dismissed.

¹ A basis point is a standard measure for interest rates and other percentages in finance. One basis point equals 1/100th of 1%, or 0.01% (and .0001 in decimal form). The word basis comes from the base move between two percentages, or the spread between two interest rates (Investopedia, 2022).

GRAPH 1.1

Major currencies used to trade forest products, indexed against the US dollar, January 2021-June 2022



Notes: BRL: Brazilian Real, CAD: Canadian Dollar; CNY: Yuan Renminbi; EUR: Euro; GBP: Pound Sterling; JPY: Yen; RUB: Russian Rouble; SEK: Swedish Krona; TRY: Turkish Lira; A diminishing index value indicates a weakening of the currency value against the US dollar; an increasing index value indicates a strengthening of the currency value against the US dollar. Data for Türkiye only available until March 2022.

Source: IMF, 2022.



Construction in the UNECE region, with a focus on housing

Housing construction (Euroconstruct, 2022a) and sales (Eurostat, 2022a) in the UNECE region were strong in 2021. In the Euroconstruct region², construction activity rebounded strongly in 2021, exceeding pre-pandemic levels. In the United States, residential construction and investment increased robustly in 2021 (Census, 2022a, b), though permitting and spending will likely decrease in the second-half of 2022 due to monetary policies.

In 2021, housing prices increased more than the gross domestic product in most member States in the UNECE region (BIS, 2022). In the EU, house price increases were substantial in many member States but stable in others. House price growth accelerated in Canada and the United States in 2021, supported by historically low interest rates, eased access to finance, and limited inventory of new and existing houses for sale. Real residential house prices (adjusted for inflation)

2 The Euroconstruct region comprises 19 countries: Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

increased by 4.6% globally year-on-year in 2021, by 18.4% in Canada, by 3.5% in the euro area and by 12.3% in the United States of America. Global real residential prices exceed (in real terms) their immediate post-global financial crisis (2007-2009) average by 29.0% (BIS, 2022).

■ EUROPE

In 2021, residential construction (output) and remodelling improved in the Euroconstruct region. Residential output increased 6.7% and remodelling improved 8.1% in 2021 (Euroconstruct, 2022). However, housing construction in the EU appears to be languishing in the first half of 2022. Year-on-year construction remained stable in the EU and month-on-month a decline of 1.2% was reported (Eurostat, 2022b). Total construction investment in Euroconstruct countries is projected to moderate to 1.4% in 2023, a downgrade from previous estimates (table 1.1) (Euroconstruct, 2022a).

In the short term, the negative consequences of the war in Ukraine, and both supply and labour constraints are expected to constrain housing construction and remodelling. Business survey data by the European Central Bank for the second quarter of 2022 indicate that near-term turnover expectations remain strong, but firms are increasingly concerned about material costs, discovering customers and access to finance. Their consumer survey discerned a significant decline in housing demand in the near-term, as households' intentions to buy or build a house recorded the largest ever single-quarter decline in the second quarter of 2022 (ECB, 2022).

TABLE 1.1

Construction spending forecast, Euroconstruct region, 2022-2024

	2022e	2023f	2024o	2021-2022	2022-2023	2023-2024
	BILLION (€)			CHANGE (%)		
New residential construction	388	393	399	1.6	1.4	1.5
Residential remodelling	534	545	552	2.6	2.0	1.2
Non-residential – new	294	299	304	2.6	1.9	1.5
Non-residential – remodelling	268	275	278	2.0	2.6	1.1
Civil engineering – new	235	245	250	3.2	4.6	2.1
Civil engineering – remodelling	178	183	185	1.3	3.0	1.1
Total	1,896	1,940	1,967	2.3	2.3	1.4

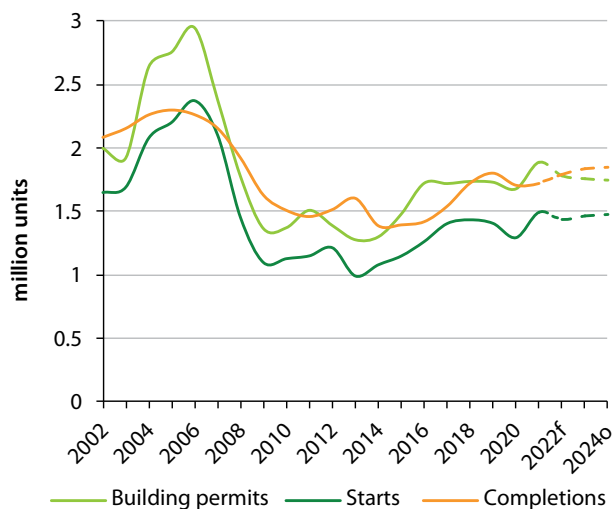
Note: In 2021 prices; e = estimate; f = forecast; o = outlook.

Source: Euroconstruct, 2022a.

New residential building and remodelling are value drivers in the Euroconstruct region. New residential building accounted for nearly 21% (€398 billion) of the construction market value in 2021, with residential remodelling comprising 28% (€531 billion) (Euroconstruct, 2022a).

Housing construction projections and estimates have moderated; investor interest in the residential sector remains strong. A survey covering respondents from 20 European member States indicates that 75% of buyers responded that development or redevelopment was the best means to acquire prime property instead of turnkey solution. Respondents also reported that 30% of office and 23% of retail buildings will be repurposed into residential space in the next five-years. Residential real estate investment matches many environmental, and social and corporate governance plans. The residential subsectors include retirement and assisted living; affordable housing; rented residential; student accommodation; co-living; and serviced apartments. All are attracting significant interest from investors – they are perceived as having solid demographic demand, and residential real estate also fits within many environmental, social and corporate governance plans (PwC, 2022).

GRAPH 1.2

Building permits, starts and completions, Euroconstruct region, 2002-2024

Note: f = forecast; o = outlook.

Sources: Euroconstruct, 2004-2022.

Building-permit forecasts for the years 2022-2024 indicate a reduction in applications – although nowhere near the low-levels reported in 2009-2014 (when the annual average was slightly below 1.4 million). Total housing starts and completions forecasts indicate a modest improvement through 2023 (graph 1.2) (Euroconstruct, 2022a).

■ EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA

The housing markets in the eastern Europe, Caucasus, and Central Asia (EECCA) other than the Russian Federation, are mainly dominated by Ukraine and Uzbekistan. The outlook is extremely uncertain given the war in Ukraine and the after-effects of COVID-19. Kyrgyzstan and Kazakhstan, in 2021, reported increases in floor space put in place, year-on-year. In 2020, Armenia, Ukraine, and Uzbekistan also registered increases in the floor space put in place, year-on-year. In sum, it appears that this region had declines in the number of dwelling units and floor space put in place, year-on-year in 2020 and 2021 (table 1.2).

■ NORTH AMERICA

The housing market in Canada is being affected by the increase in interest rates and 2022 total housing sales are projected to decrease by 14.7 per cent from 2021 (CREA, 2022a). Canada's housing markets may encounter a downturn by mid-2023 due to increasing interest rates and material costs, labour

TABLE 1.2
Construction of new dwellings and floor area in some member States of the EECCA, 2019-2021

	2019	2020	2021	2019	2020	2021
	New dwellings (units)			New floor space (1,000 m ²)		
Armenia	1,015	14,197	...	288	2,792	2,100
Azerbaijan	87,400	50,400	16,700	9,469	5,224	2,077
Georgia	2,508	2,134	...	2,548	1,694	...
Kazakhstan	2,096	2,391	2,448	7,900	9,000	14,400
Kyrgyzstan	...	9,311	...	1,380	1,063	1,182
Republic of Moldova	9,995	7,549	...	763	603	...
Ukraine	9,182	9,164	...	11,029	5,750	...
Uzbekistan	79,200	79,800	76,649	14,483	11,443	13,643

Note: The member States have been selected based on data availability.

Sources: Statistical Committee of the Republic of Armenia, 2022; State Statistical Committee of the Republic of Azerbaijan, 2022; National Statistical Committee of the Republic of Belarus, 2022; Ministry of the National Economy of the Republic of Kazakhstan Committee on Statistics, 2022; National Statistical Committee of the Kyrgyz Republic, 2022; National Bureau of Statistics of the Republic of Moldova, 2022; State Statistics Service of Ukraine, 2022; State Committee of the Republic of Uzbekistan on Statistics, 2022.



shortages, reduced wage growth and greater unemployment (Dugan, 2022). House prices could decrease by around 12% by early 2023 from the recent nationwide high (Hogue, 2022).

Canadian housing starts are projected at 248,000 units in 2022 and 216,000 units in 2023 (averaged from BMO, 2022; Scotia Bank, 2022; TD Bank, 2022 projections). The forecast for 2024 is 207,000 starts (TD Bank, 2022).

The housing construction market in the United States grew robustly in 2021 and through the first half of 2022 (US Census Bureau, 2022a, b), notwithstanding pandemic effects, poor product availability and record high construction product prices. In the second half of 2022, housing began to decline with the implementation of increasing interest rates. Forest products such as framing lumber, structural panels and appearance-based hardwood species were available, but all cost substantially more than historical averages, even when adjusted for inflation (see chapters 2 and 4). House sales and new house construction are interest-rate sensitive components of the economy and housing tends to get battered by a recession, as potential home buyers delay purchases due to employment and income being less certain. Currently the deceleration appears to be driven primarily by rising interest rates and reduced housing affordability. The current forecast

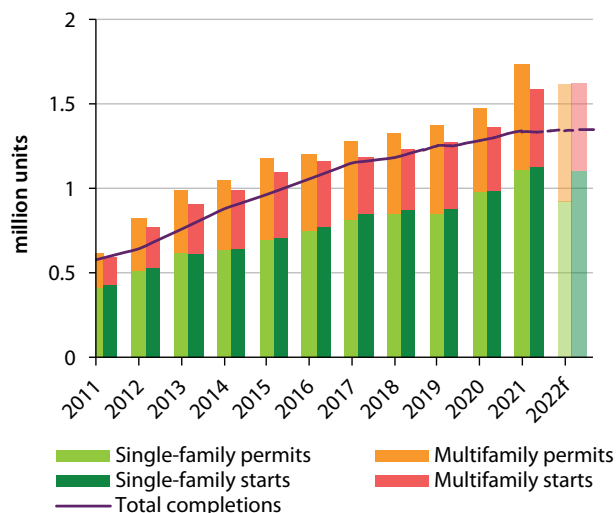
calls for housing to have a soft landing, with risks mostly less than a soft landing (Vitner, Dougherty, and Barley, 2022).

Housing starts in the United States continued to increase in 2021 with total starts rising 16.0%. This increase resulted from single-family starts increasing by 13.8%, two to four multifamily units decreasing by 4.9%, and multifamily five units and larger increasing by 22.6% (US Census Bureau, 2022c). Furthermore, the value of private residential construction put in place in the United States increased by 25.0% in 2021, driven by a 37.0% increase in single-family housing and a 15.2% increase in residential improvements (US Census Bureau, 2022c).

Total housing starts in the United States were estimated at 1.575 million units in 2022, an increase of 1.9% from 2021 (US Census Bureau, 2022c); even greater than the historical average of 1.429 million units. The Mortgage Bankers Association (MBA, 2022a and b) projected total starts at 1.537 million units in 2023 (707,000 single family) and 1.674 million units (787,000 single family) in 2024 (graph 1.3).

GRAPH 1.3

United States housing permits, starts and completions, 2011-2022



Note: f = forecast; January-June 2022 data; seasonally annualized adjusted rate.

Sources: US Census Bureau, 2022 a, b; MBA, 2022a and b.

Policy and regulatory developments

■ EUROPE

Since the publication of the EU's Forest Strategy 2021-2030 in (European Commission, 2021a), its implementation has exposed competing policy goals for the use or conservation of forest resources in the European Union. Launched within the broader context of the EU's Green Deal (European Commission, 2022a) and, more specifically, its revised Biodiversity Strategy (European Commission, 2021b), the Forest Strategy has multiple goals:

- promoting the sustainable forest bioeconomy for long-lived wood products;
- ensuring the sustainable use of wood-based resources for bioenergy;
- promoting a non-wood forest-based bioeconomy, including ecotourism;
- developing skills and empowering people for a sustainable forest-based bioeconomy;
- protecting EU's last remaining primary and old-growth forests;

- ensuring forest restoration and reinforced sustainable forest management for climate adaptation and forest resilience;
- reforestation and afforestation of biodiverse forests, including planting 3 billion additional trees by 2030;
- providing financial incentives for forest owners and managers for improving the quantity and quality of EU forests.

Although mutually supportive in principle, the reality of the post-COVID-19 economic situation, as promoted by the EU's Recovery Plan (European Commission, 2022b) expresses itself in higher industrial wood demand facing off against several supply-side challenges, the degree of which varies across member States.

Short- and long-term wood supply constraints may be driven by several factors. A leading factor is the need to retain forest carbon stocks under the EU's Land Use, Land Use Change and Forestry (LULUCF) scheme (European Commission, 2021c). This has been strengthened with the publication of the EU member States' forest carbon stock reference levels (Joint Research Centre, 2021).

Some member countries of the European Union have seen these as over-cautious and several as restricting wood supplies, either immediately or in the longer term. Wood supply is also anticipated to be impacted by the continuing bark beetle infestation and aggravating climate-change impacts to forest ecosystems (from e.g. drought, species structure). Furthermore, the ambitious targets of the Biodiversity Strategy (European Commission, 2021b) include classifying 30 % of EU forests as high biodiversity status reserves by 2030. Although this aim does not preclude continuing some wood production per se, it does challenge most member countries of the European Union to balance wood production against demand for closer-to-nature forestry and nature conservation needs. Local and regional impacts are likely to be significant.

While the above factors have the potential to condition long-term wood supply, there are also the various short-term effects of the war in Ukraine. The EU's economic sanctions against the Russian Federation and Belarus (European Council, 2022) have progressively reduced flows to the EU of both roundwood and processed forest products, such as sawn wood and wood-based panels. Although the volume reductions may not be large overall, they are focused disproportionately on the formerly importing member States. More generally, the impact on the prices of such commodities has been very marked, compounding the pressure on stocks which were already at very low levels from low production during the early COVID-19 lock-downs and the subsequent surge in demands.

On top of this, the full effect of the EU's own measures to reduce its dependence on Russian oil and, moreover, natural

gas are yet to be seen (European Commission, 2022c). Despite EU forest-based industries having a generally high level of heat and energy autonomy, largely from forest and processing residues, certain sub-sectors, notably paper recycling, are heavily reliant on imported gas for process heat and steam production or electricity generated from it (CEPI, 2022a). Although the EU's electricity grid offers significant connectivity between its member countries, interconnections for gas delivery are much less developed. Even under a best-case scenario, it will take several years before EU energy autonomy can be achieved. Meanwhile, Central European countries will inevitably suffer significantly, with Germany and Austria in particular likely to serve as bellwethers for the wider continent.

Though its Competition Policy, the EU has traditionally held a neutral stance on the pros and cons of different materials which compete in the marketplace. Nonetheless, some recent EU policy initiatives, such as the EU Renovation Wave, retain the neutrality principle but with criteria which are de facto favourable to renewable, biotic materials, among which wood-based materials feature strongly (European Commission, 2020). The EU Renovation Wave aims at renovating both public and private buildings has been singled out in the European Green Deal as a key initiative to drive energy efficiency in the sector and deliver on climate objectives (European Commission, 2022d). More recently, The New European BauHaus initiative (European Union, 2022) has been actively seeking to promote wood-based materials at the highest levels

■ NORTH AMERICA

Inflation, together with sawn softwood and all other construction material prices, continued to be of concern in North America, with inflation hitting 40-year highs (NAHB, 2022). Total wood fibre costs in the United States increased 15% from 2000 to 2021, while consumer inflation increased 50% and wood pulp prices increased 33% (Forisk, 2022). Pulp and paper production increased in the United States by 2% in Q2 2021 and was up 0.6% year-on-year; however, wood-using pulping capacity in North America is poised to decrease by 1% from 2020 to 2022 (Lang, 2021). Changes contributing to this trend include mills using more recycled fibre and related infrastructure investments, including new mill capacity that will exclusively utilize recycled fibre. Sawmill expansion in the United States is concentrated in the south-eastern region owing to lower wood costs and ample timber supplies and regional proximity to end markets. A total of 7.6 million m³ in additional capacity is expected by 2024, representing an increase of 17% above current capacity in the region (Lang, 2022).

Sawmill capacity investments in North America are driven in part by the impacts being achieved by the Softwood Lumber Board (SLB). The SLB reported its marketing efforts generated 823,000 m³ (487 million board feet) of demand in

Q1 2022 (SLB, 2022). The SLB, in partnership with its funded programs — the American Wood Council (AWC), Think Wood, and WoodWorks — provide education and advance wood as an economic, biophilic, and sustainable material, based on credible environmental, social, and governance (ESG) data and reporting. The AWC advanced 18 wood-friendly building code change proposals that were recommended for approval during the International Code Council Group B Code Development Hearings. WoodWorks directly supported the expanded use of wood in 119 construction projects, which resulted in 2.1 million m² (23 million square feet) of building space and the utilization of 358,000 m³ (212 million board feet) of sawn softwood. Recent SLB-commissioned research conducted by Forest Economic Advisors in 2021 identified a potential of more than 4.07 million m³ (2.41 billion board feet) of opportunity for mass timber construction by 2035.

Circular economy efforts in North America include the use of paper as an alternative to plastic packaging and materials. This trend is supported in part by high recycling rates. The recycling rate of 68% makes paper the most recycled material in the United States and that number jumps to a remarkable 91.4% for cardboard packaging (TwoSides, 2022). A report from the BioPreferred Program of the United States Department of Agriculture (USDA) estimates that new sustainable products and practices within seven biobased industry sectors reduced oil consumption by 9.4 million barrels in 2017. Those vanguard sectors are agriculture and forestry, biorefining, biobased chemicals, enzymes, bioplastic bottles and packaging, forest products and textiles. The report explains that this reduction was likely due to two main mechanisms: the use of biobased chemical feedstocks in place of crude oil derived chemicals, and the use of biobased materials as substitutes for traditionally petroleum-based products (Forest2Market, 2022).

The Softwood Lumber Agreement between Canada and the United States expired on 12 October 2015. In place since 2006, this agreement addressed tariffs on sawn softwood traded between the two member States as part of a decades-long trade dispute covered in earlier editions of the Review. In the latest instalment of the dispute, in July 2022, the World Trade Organization (WTO) determined that Canada has the right to impose tariffs on imports from the United States in the future to ward off the threat of the United States penalizing Canadian manufacturers for alleged unfair subsidies (Reuters, 2022). On 4 August 2022, the United States Department of Commerce announced the results of the third administrative reviews for sawn softwood products imported from Canada. The countervailing duty was reduced from an average of 17.9% to 8.6% (Federal Register, 2022). On 29 August 2022, Canada filed notice that it will challenge the results of the third administrative reviews of the anti-dumping and countervailing duty orders on Canadian sawn softwood (Ellson, 2022).

The Securities and Exchange Commission of the United States (SEC) has continued to advance plans for ESG (environmental, social, governance) disclosure requirements to allow investors to efficiently and consistently evaluate risk, including climate-change related impacts such as greenhouse gas emissions (US SEC, 2022). Renewable energy technologies and low-carbon industries, such as wood products, could benefit, as well as domestic producers with lower-impact supply chains.

Certified forests and products

The area of certified forests worldwide increased by 1.85% (8.4 million ha) in 2021, to 463 million ha, a new all-time high (graph 1.4).

The two major schemes, the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC), reported a combined total of 558 million ha of certified forest as of December 2021; this area includes 95 million ha of forest under double certification (i.e. forest areas certified by both schemes) (FSC, 2022a; PEFC, 2022a; PEFC, 2022b).

In response to the war in Ukraine, the Board of PEFC International classified all timber originating from the Russian Federation and Belarus as “conflict timber” (PEFC, 2022c). “Conflict timber” can also not be used in PEFC-certified products. PEFC states that “this also applies to all timber originating from occupied Ukrainian territory”. PEFC based its decision on the United Nations General Assembly resolution “ES-11/1. Aggression against Ukraine” (United Nations, 2022). This decision came fully into effect on 11 August 2022 and reduced the forest area certified by PEFC by about 12.5%.

In response to the war in Ukraine, the Forest Stewardship Council published a statement stipulating the suspension of all certificates in the Russian Federation and Belarus that allow the sale or promotion of FSC products. In addition, all sourcing of controlled forest products from the two countries is blocked (FSC, 2022b). This decision reduced the forest area certified by FSC by about 31%.

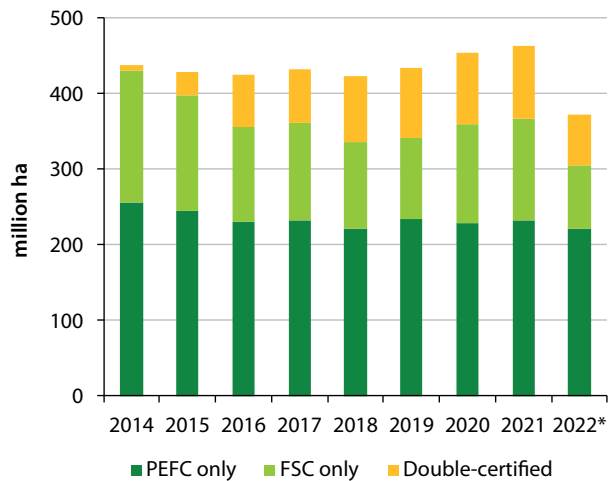
The decisions by the two main forest certification schemes significantly impact the global availability of wood from certified forests. After deducting double certified forest area, the global forest area under third-party certification schemes is estimated to have dropped by almost 20% to 372 million ha by the end of 2022.

Other forest certification developments during the reporting period include the development of an *Urban and Community Forest Sustainability Standard* by the Sustainable Forestry Initiative (SFI) that will expand eligibility for certification to organizations in Canada and the United States and that own, manage, or are responsible for urban forests (SFI, 2022). Efforts to develop certification standards that apply to Trees outside Forests have been supported through the PEFC’s revised

Forest Management benchmark approved in 2018. PEFC-UK recently submitted their revised system to include a Trees outside Forests standard (PEFC, 2022d). The PEFC Netherlands national forest system submitted for endorsement in 2021 also included a Trees outside Forests standard (PEFC, 2021).

GRAPH 1.4

FSC- and PEFC-certified forest area available for wood supply, 2014-2022



Notes: Double-certified area as of mid-2021; area certified by certification scheme as of December 2021. *Estimate by the Joint UNECE/FAO Forestry and Timber Section. The total actual area of certified forest is the sum of the area certified solely by the FSC, the area certified solely by the PEFC, and the area of double-certified forest. FSC = Forest Stewardship Council; PEFC = Programme for the Endorsement of Forest Certification.

Sources: FSC, 2022a; PEFC, 2022a, 2022b; UNECE/FAO, 2021.





Chapter 2

SAWN

SOFTWOOD

Lead author: Russ Taylor

Contributing author: Antti Koskinen

Highlights

The consumption of sawn softwood in 2021 is reported to have increased in Europe by 6.1% and in North America by 1.9%.

Sawn softwood production increased overall in the UNECE region in 2021 – by 4.3% in Europe, about 4% in the Russian Federation and 1.5% in North America.

Data from the European Sawmill Organisation (EOS) indicates that sawn softwood consumption in Europe may have reached slightly over 100 million m³, the second highest volume on record (only exceeded by the consumption in 2007). Nordic member countries (Finland, Norway and Sweden) were the main drivers of increased sawn softwood production in Europe with an additional output volume of 1.6 million m³ compared to 2020.

Exports of sawn softwood from Europe remained stable but shifted from overseas to intra-regional destinations due to the strong domestic demand and rising prices in 2021. Trade developments are quite heterogeneous with Germany and Finland increasing their exports by 8.8% and 6.4%, respectively, while the largest European exporter, Sweden, had a 9.8% decline in exports.

Market conditions in North America were extremely strong but also volatile in 2021 as a result of the global pandemic.

Sawn softwood consumption in the United States, driven by its strong housing which grew by an estimated 1.3 million m³ in 2021 while Canada added 0.6 million m³.

Sawn softwood production in the United States of America grew by only 0.4 million m³ in 2021 and the balance was made-up by increased imports from Canada and Europe increasing year over year by 1.1 million m³ and 0.38 million m³.

Canada recorded a drop in overseas exports of 11% (450,000 m³) in 2021 to 3.5 million m³, its lowest volumes since 2002.

United States exports of sawn softwood increased by 29% (551,000 m³) despite extremely high domestic prices.

Sawn softwood prices soared and reached record high levels in almost all global markets in 2021 as a result of the pandemic and broken supply chains.

The war in Ukraine exacerbated the global economic situation caused by rising inflation and lower economic growth and caused a decrease in sawn softwood demand starting in mid-2022.

Introduction and overview

All three UNECE subregions recorded increased consumption and production of sawn softwood in 2021. These trends continued into the first half of 2022 except for the member States in Eastern Europe, Caucasus and Central Asia (EECCA) where the impacts of the war in Ukraine slowed consumption and sanctions resulted in reduced production.

The European Organisation of the Sawmill Industry (EOS) reports that production in its European member countries³ grew by 4.3% (3.7 million m³) to 89.4 million m³ in 2021. Due to the strong demand in local markets, EOS member countries reported a 0.6% increase in intraregional trade in 2021 (EOS, 2022).

According to publicly available information, sawn softwood production in the Russian Federation seems to have increased by about 4% in 2021 to around 30 million m³.

North American sawn softwood production growth increased by only 1.5% (1.5 million m³) in 2021 as the COVID-19 pandemic caused worker shortages across the industry. The net apparent consumption of sawn softwood in North America increased by 1.9% in 2021, to approximately 102 million m³ and was higher year over year through the first half of 2022.

The war in Ukraine exacerbated the global economic situation caused by rising inflation and lower economic growth and caused a decrease also in sawn softwood demand starting in mid-2022.

Europe

■ PRODUCTION

The European sawmill industry had a robust year in 2021. The EOS member countries, accounting for around 75% of the production in the European subregion, reported an estimated production growth of 4.3% (3.7 million m³) to 89.4 million m³ compared to 2020. Sawn softwood production in Europe could have reached 119 million m³ if EOS results were extrapolated to non-EOS member countries. The growth in production was driven especially by the demand in Europe rather than the overseas exports. Production grew especially in the Nordic countries (Finland, Norway and Sweden) with an additional output volume of 1.6 million m³, whereas production in Central Europe (Austria, Germany and Switzerland) was more stable with growth of 0.3 million m³.

³ EOS represents some 35,000 sawmills in 12 countries across Europe (Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Latvia, Norway, Romania, Sweden, Switzerland).

■ CONSUMPTION

The consumption estimates for 2021 by the EOS member countries (accounting for about two thirds of the consumption in Europe) indicated a 6.1% growth to 68.6 million m³. The consumption growth is in line with the construction output development in Europe as described in Chapter 1 with 6.7% growth for the 19 main construction markets in Europe (Euroconstruct, 2022b). Data from EOS indicate that sawn softwood consumption in Europe may have reached slightly over 100 million m³, the highest volume on record (only exceeded by the consumption in 2007). Germany, the largest market in Europe, reported a decline in consumption by 2.5% for 2021, but most of the other large markets had substantial consumption growth. France, Sweden and the United Kingdom are reported to have double-digit growth and combined added around 3 million m³ to the European consumption in 2021.

■ TRADE

Owing to the strong demand in domestic markets, the European exports increased only marginally. EOS member countries reported a 0.6% increase in exports. However, some large exporters such as Germany and Finland increased their exports by 8.8% and 6.4%, respectively. On the other hand, the largest European exporter, Sweden, had a 9.8% decline in exports.

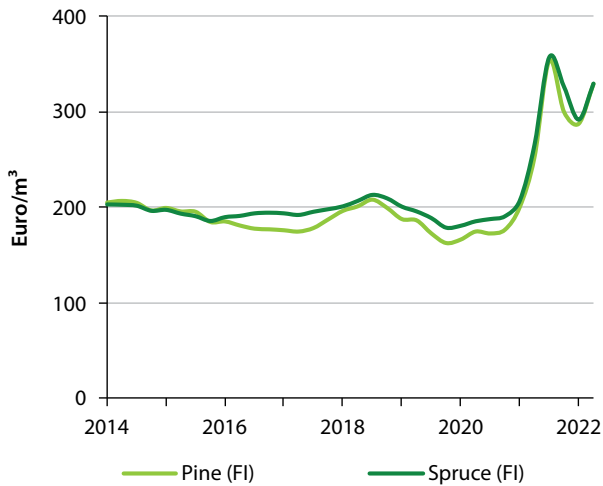
The main destinations of European exports shifted from overseas to intraregional trade. The largest European exporters increased their exported volumes to main European markets by 9%. Exports to overseas markets such as China, Japan, the Middle East and North Africa declined on average by 15%. Exported volumes to China decreased dramatically by 48% due to lower demand and unsatisfactory prices. The United States were the only overseas destination that did not follow the trend and became the main overseas destination for European sawn softwood exports in 2021, surpassing China.

The majority of European imports of sawn softwood originates from within the subregion, but the role of extra-regional suppliers is growing. The imports from the Russian Federation to the European Union and to the United Kingdom peaked with a growth rate of 26% to 5 million m³. Nearly all main importing countries increased their total imports with double digit growth except Germany, where imports increased only by 3% compared to 2020.

■ PRICES

Sawn softwood prices reached a record high in 2021, Data from Finland indicate that prices started to surge during the second quarter of 2021 reaching an all-time high in September of over €350 per m³ (\$412 per m³). During the last peak in 2007, prices (in real terms) were just above €300 per m³ (Graph 2.1).

GRAPH 2.1

Finland: Quarterly average sawn softwood prices, 2014 - June 2022


Note: Nominal export unit values.

Sources: Natural Resources Institute Finland; Centre d'Etudes de l'Economie du Bois (CEEb), France.

Price increases were driven by the strong demand both in Europe and North America as well as restricted supply due to logistical backlogs caused by the COVID-19 pandemic. Prices have remained on a high level through the second quarter of 2022, but the trend is declining as part of the many impacts of the war in Ukraine.

High price levels resulted in exceptionally good profitability in the European sawmilling sector in 2021. Investments in new capacity were planned throughout the subregion. More generally, the industry is consolidating, with Central European companies being particularly active in acquiring sawmills in the Nordic member countries and the British Isles.

■ MARKET PROSPECTS

When comparing market developments in the first quarter of 2022 to developments in the same period in 2021, EOS members report that the European market has been slowing down. Production has decreased in Germany and Finland and European imports have declined by around 10%. European exports to the United States have kept growing as have shipments to Japan and China.

Market prospects for 2022 changed dramatically in February when the military operation of the Russian Federation began inside the sovereign territory of Ukraine and FSC and PEFC terminated certificates for Russian and Belarussian timber in March 2022. In April 2022, the European Union imposed

sanctions on wood product imports from the Russian Federation. The import ban on wood products came into full effect in July (see Chapter 1).

Many member countries in Europe import wood from the Russian Federation, with the Baltic member countries being particularly dependent on imports from the Russian Federation and Belarus.

Over the past years, combined imports from Belarus, the Russian Federation and Ukraine to Europe are around 10 million m³ accounting for around 10% of the demand in the subregion.

Imports from the Russian Federation have been decreasing, but not as rapidly as expected. The sharpest decline took place in May 2022 when imports were down by 58% compared to May 2021 (Eurostat, 2022c).

The full impact of these developments on the European sawn softwood sector may only come into full effect in the fourth quarter of 2022 when the sanctions will be fully applied and stocks of wood and wood products from the Russian Federation will be depleted.

Europe being a net exporter of sawn softwood, it is likely that member countries will substitute the missing imports from the Russian Federation and Belarus by a reduction of their exports to other regions.



TABLE 2.1

Top ten destinations of sawn softwood exports from the Russian Federation in 2020 and 2021

	volume (1,000 m ³)		value (\$ million)		2020/2021 change (%)	
	2020	2021	2020	2021	volume	value
China	11,129	7,997	2,571	2,751	-28.1	7.0
Japan	1,234	1,142	285	393	-7.5	37.8
Germany	956	1,062	221	365	11.2	65.5
Uzbekistan	1,372	943	317	324	-31.3	2.3
Estonia	601	896	139	308	49.0	121.9
United Kingdom	337	470	78	162	39.5	107.7
Finland	409	428	95	147	4.5	55.6
Azerbaijan	432	348	100	120	-19.4	20.1
Netherlands	270	340	62	117	26.3	88.0
Latvia	165	287	38	99	74.4	159.7

Note: Excluding railway or tramway sleepers (cross ties) of wood; Sorted by 2021 values; median unit value 2020: \$231 per m³ and 2021 \$344 per m³; No data for Egypt available for 2020 and 2021 (\$314 million import value in 2018).

Source: Comtrade, 2022 (values).

Eastern Europe, Caucasus and Central Asia

■ PRODUCTION

According to publicly available data from Whatwood (2022), the Russian Federation increased sawn softwood production by about 4% year on year 2020 to 2021 to around 30 million m³.

■ TRADE

The value of sawn softwood exported by the Russian Federation increased by 25% in 2021, while volumes of sawn softwood contracted by 12-15% in 2021 (UN Comtrade, 2022). The top ten importers of Russian sawn softwood, as shown in table 2.1, account for 88% of sawn softwood exports by value from the Russian Federation.



North America

■ PRODUCTION

In 2021, North American production of sawn softwood increased by 1.5% (1.5 million m³), to approximately 103.4 million m³. The net apparent consumption of sawn softwood increased by 1.9% (1.9 million m³) in 2021, the export volume increased by 3.9% and the import volume increased by 5.5% for sawn softwood.

Market conditions in North America were extremely strong but also volatile in 2021. The global pandemic continued to fuel an unprecedented demand for new homes as well as in repair and remodelling. Chapter 1 highlighted that housing starts in the United States increased by 16% to reach 1.60 million units in 2021. Sales of new and existing homes, as well as home prices, continued to skyrocket and increase through to the middle of 2022.

The repair and remodelling segment was strong in the first half of 2021 but this slowed down by midyear. With the United States of America lifting its COVID-19 restrictions in the second quarter of 2021, discretionary spending shifted to travel, entertainment, dining out, etc. This left the so-called "big box" retailers holding large inventories as buyers decreased spending for several months. This, in turn, strongly impacted prices, particularly, those of sawn wood which went into an outright downward spiral.

■ PRICES

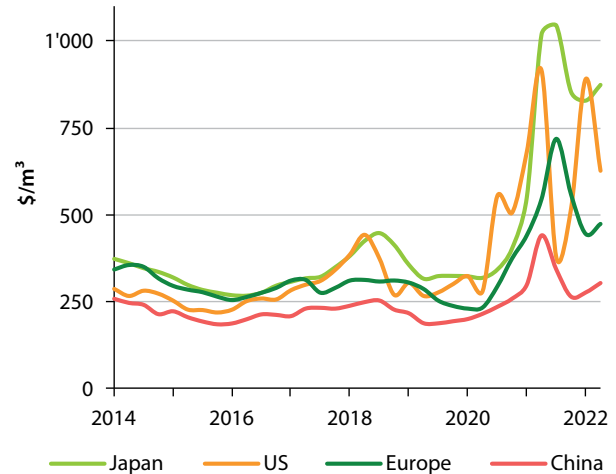
The bellwether price of the western spruce-pine-fir framing lumber assortment⁴ moved from a record high of \$985 per m³ (\$1,515 per Mbf) in May 2021 to below \$260 per m³ (\$400 per Mbf) by the end of August 2021 (graph 2.2) (Random Lengths, 2022a).

Sawn softwood prices increased even more in 2022 and peaked at \$890 per m³ (\$1,400 per Mbf) in mid-March before dropping into the \$350 per m³ to \$423 per m³ range (\$550 per Mbf to \$650 per Mbf range) in July 2022 (Random Lengths, 2022a).

Sawn softwood consumption in the United States grew by an estimated 1.3 million m³ in 2021 while in Canada consumption increased by 0.6 million m³. North American sawn softwood production growth increased only 1.5% (1.5 million m³) in 2021 as the COVID-19 pandemic caused worker shortages across the industry. Despite strong demand, mills could not keep up and this was part of the reason prices soared in the first half of 2021. Total sawn softwood production in the United States grew by only 0.4 million m³ in 2021 and the missing

GRAPH 2.2

Quarterly prices for sawn softwood in China, Europe, Japan and the United States, 2014-June 2022



Note: Data to June 2022, delivered-to-market prices. Japan: BC W-SPF 2x4, J-grade, C&F; Europe: Swedish spruce 47x100, C&F; United States: 2x4 W-SPF #2&Better, KD, S4S, Chicago, Random Length (8'-16' and longer); China: W-SPF #2&Btr KD, S4S, C&F.

Source: Random Lengths, 2022a; Russ Taylor Global, 2022.

volumes were imported from Canada (1.1 million m³) and Europe (0.34 million m³) (WWPA, 2022b).

There have been significant capital investments in existing sawmills as well as in new greenfield sawmills constructed in the South of the United States for the last five or more years. With some of the highest sawmill profits in the world, sawmills in the South of the United States have been generating 25-50% margins since the pandemic started owing to an oversupply of industrial roundwood causing raw material at very favourable costs. This has resulted in a large expansion of the sawmilling sector in the South with new capacity gains of 1.4 billion bf (2.4 million m³) in each of 2020 and 2021 and up to 3 billion bf (5.1 million m³) in 2022 (Russ Taylor Global, 2022). The rest of North America has seen small sawmill upgrades and only very few major expansions.

In mid-November 2021, devastating rains and windstorms in British Columbia destroyed road and rail infrastructure. Shipments from sawmills have been affected ever since, taking considerable production volume off the market and creating a tighter supply. This resulted in another surge in sawn softwood prices that carried over into 2022.

In British Columbia, the provincial government announced major changes to their forest policy in late 2021 that will particularly impact management of forests on crown land which currently supplies more than 90% of the province's harvest. These policies will restrict old-growth timber

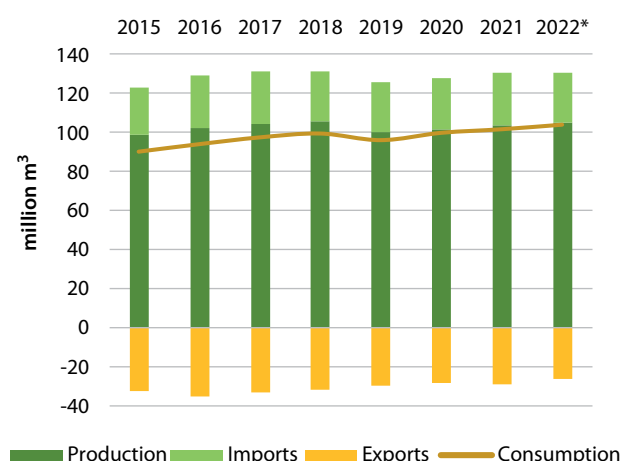
⁴ W-SPF 2x4 #2&Better, FOB British Columbia.

harvesting, facilitate the transfer of forest tenures from sawmill companies to First Nations and a roll-out of a caribou protection strategy. These initiatives together with already existing ones, will result in further reductions in the harvest; and sawn softwood production could be lower by up to 3 million m³ by the end of the decade (Russ Taylor Global, 2022b).

The countervailing and antidumping duties imposed on Canadian sawn softwood exports to the United States increased to 17.91% in late 2021 from 9% the previous year. The high prices in 2021 and the first half of 2022 have allowed mills to pass on the duties to the market, which increased prices for consumers and builders. The import duties are recalculated annually by the United States Department of Commerce; they were dropped to 8.6% effective mid-August 2022 (Global Affairs Canada, 2022). With high sawnwood prices, there has been less urgency for either of the two member States to negotiate a new agreement.

GRAPH 2.3

North America: Sawn softwood production, trade and consumption, 2015-2022



Note: Exports are shown as negative numbers.

Source: Russ Taylor Global data base, 2022; * 2022 – estimate.

■ TRADE

Imports of sawn softwood by the United States increased by 5.6% in 2021 owing to a tight North American supply coupled with strong domestic demand and high prices. United States imports from Canada grew by 4.0% or 1.08 million m³, while European shipments to the United States increased by 16.1% to 2.73 million m³ (378,000 m³ over 2020) led by Germany and Sweden (USDA FAS, 2022a).

Canada recorded a drop in offshore exports of 11% (450,000 m³) in 2021 to 3.5 million m³, its lowest volume since 2002 (Statistics Canada, 2022a). United States exports increased by 29% (551,000 m³) despite extremely high domestic prices (WWPA, 2022).

■ MARKET PROSPECTS

The net apparent consumption of sawn softwood in North America increased by 1.9% in 2021, to 101.8 million m³, and was higher through the first half of 2022 (WWPA 2022d, Statistics Canada, 2022a).

The war in Ukraine has created a new global crisis that has spilled over into North America. Sawn softwood prices slowed markedly starting in March of 2022 from the growing uncertainty from the war in Ukraine. Rising inflation and much higher mortgage rates have resulted, and this then caused a slowdown in sawn softwood demand starting in mid-2022.

Housing starts in the United States have slowed in 2022-Q2, homebuilder cancellation rates have increased and the prospects of slower repair and remodelling are now expected, as homeowners have much less disposable income. The prospects of a possible recession in the United States by the first quarter of 2023 and a resulting weak market outlook for North America for the rest of 2022 and the first half of 2023 make for uncertain conditions ahead with the prospects of slowing demand and lower sawn softwood prices.





Chapter 3

SAWN

HARDWOOD

Authors: Matthew Bumgardner, Diego Benedetti

Highlights

European sawn hardwood production, except for France and Belgium, recovered from COVID-19 with a 11% increase in 2021 due to high demand to levels last seen in 2015.

Consumption of sawn hardwood exceeded production in Europe, leading to depletion of stocks.

European production of wooden flooring – a major consumer of oak sawnwood – recorded the second-best result since 1991, with a production of 97,900 m³ of wood parquet in 2021.

Exports of sawn hardwood from Europe increased by 20% to over 3.2 million m³ in 2021. China imported 29% or 950,000 m³ of those volumes.

Member States are considering measures to reduce the volumes of oak logs exported outside Europe.

Increasing cost for electricity are a big challenge for sawn hardwood producers in Europe.

In the United States, hardwood demand from the furniture industry continues to decline, as net imports reached nearly 80% market share of the wood household furniture market.

Imports of temperate sawn hardwood by the United States increased by 8.1% in 2021. This increase was driven largely by increased imports of beech (mostly from Germany) and birch (mostly from Canada).

Canada accounted for nearly 48% of total sawn hardwood imports by the United States in 2021.

The United States imported 593,000 m³ of temperate and tropical sawn hardwood in 2021 – the lowest total import volume since 2009.

Aggregate sawn hardwood prices in the United States reversed a declining trend and exceeded the long-term average for the first time since 2005.

Europe

The trends and developments in the European subregion this year are based on data and intelligence available at the European Organization of the Sawmill Industry (EOS). Their data cover about two thirds of European sawnwood production and are used as a proxy for the trend in the subregion in 2021 and early 2022.

■ PRODUCTION

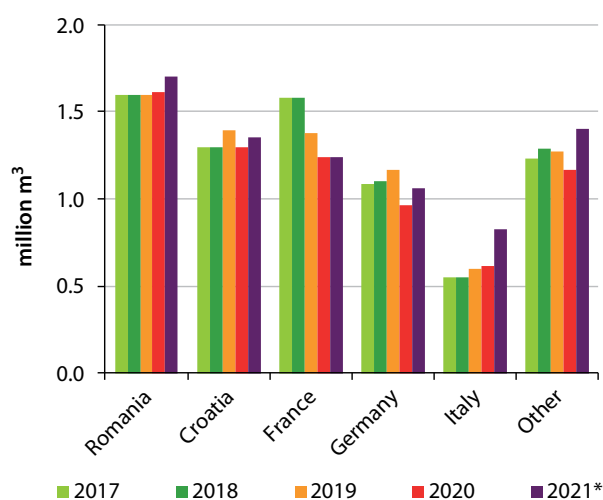
European sawn hardwood production was significantly impacted by the COVID-19 crisis in 2020, with a strong decline particularly in France and Germany. The situation dramatically improved in 2021, with a double-digit increase (+11%) on the back of a strong recovery in demand. Production in the member countries reporting to the EOS reached 6.2 million m³ in 2021, the highest value since 2015.

Production in 2021 grew across most member countries in the subregion. Among the largest producers, Croatia, Germany and Romania performed particularly well, with production in Germany increasing by 10% to 1.06 million m³ and in Romania by over 5% to 1.7 million m³. A shortage of domestically available oak logs constrained production in France, with stable production of about 1.24 million m³ and a further drop of production by 10% in Belgium (graph 3.1).

The European sawn hardwood industry is hampered by international competition for raw material, that causes direct export of mostly unprocessed oak logs, primarily to China.

GRAPH 3.1

Top five sawn hardwood producers, Europe (2017-2021)



Note: *Estimate.

Source: EOS, 2022.

Small and medium sawmills, namely in France and in Belgium, are suffering the most. A study from Wallonia (Belgium) indicates that about 26% of hardwood sawmills went out of business between 2010 and 2020 (Defays V. and Saerens A., 2022).

Chinese imports of European oak logs increased by over 25% in 2021 to over 700,000 m³. This trend accelerated further in the first five months of 2022, with imports of oak logs from France increasing by a further 30% year-over-year. Imports of oak logs from Slovakia grew by 70% (China customs, 2022).

This situation is not deemed sustainable by many sawmills across Europe that cannot afford the prices paid by foreign buyers. The problem is further compounded by the log export ban introduced by the Russian Federation at the beginning of 2022. The Russian Federation accounted for slightly less than a fifth of the total Chinese import of oak logs, which are substituted for by European logs.

Similar developments, not yet recorded by official statistics, were taking place in the Western Balkans, namely Bosnia and Herzegovina, Croatia and Serbia. These three member States introduced temporary 60-90 day export bans on various assortments of wood products, including oak logs (ANSA, 2022; Sarajevo Times, 2022; SEENEWS, 2022).

Beech is the most important species by volume for sawn hardwood in the European subregion and is confronted with the fallout of the very hot and dry summers in 2018-2020 and 2022 in Central Europe. Many beech trees either died, are in the process of dying, have been weakened or are now prone to attacks by biotic agents (BMEL, 2022).

European sawn hardwood producers expect that legislative measures as part of the European Union Green Deal package may significantly reduce log availability in the coming years (see chapter 1).

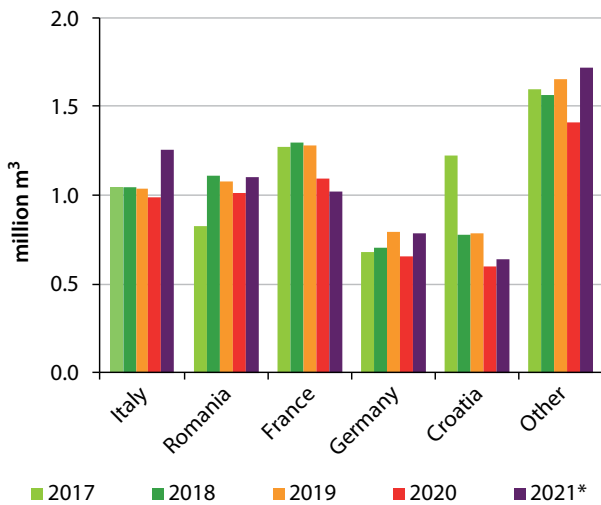
The EOS expects that sawn hardwood production in Europe may decline by 3% in 2022. This estimate is subject to high variability due to the significant uncertainty amid global geopolitical and economic tensions. One of the first tangible effects of those tensions are higher electricity prices, which further reduce the global competitiveness of the sawmill sector – as well as downstream sectors such as the flooring and the furniture industry in the sub-region.

■ CONSUMPTION

Consumption of sawn hardwood was very strong in the subregion and the lack of oak logs has pushed most hardwood sawmills in the region to reduce their inventory to a minimum. In the EOS member countries, consumption of sawn hardwood increased by 14% to almost 5.9 million m³. Graph 3.2 indicates that almost every major market in Europe, except for France and Croatia, recovered from COVID-19 and reached at least

GRAPH 3.2

Top five sawn hardwood consumers, Europe



Note: *Estimate.

Source: EOS, 2022.

pre-COVID-19 consumption levels. France consumed about 1 million m³ of sawn hardwood in 2021, about 260,000 m³ less than in 2019.

While the first few months of 2022 saw satisfying consumption of sawn hardwood, the outlook for the second half is slightly more pessimistic. Overall EOS anticipates consumption to decline by about 8% in 2022.

The parquet (wooden flooring) industry in Europe remains an important consumer of European hardwoods. The sector recorded the second-best result since 1991, with a production of 97,900 m³ of wood parquet in 2021. After a stable year in 2020, European consumption of parquet rose by an estimated 5.8% in 2021. Consumption of parquet has increased in all European markets, especially during the first semester of 2021, when compared to the same period in 2020. Demand continued to grow throughout 2021 but at a slower pace, as consumers dedicated their spendings to areas such as leisure and travel. Nevertheless, renovation, and adaptation of homes to “post-COVID-19” life remains the driver of the parquet consumption growth.

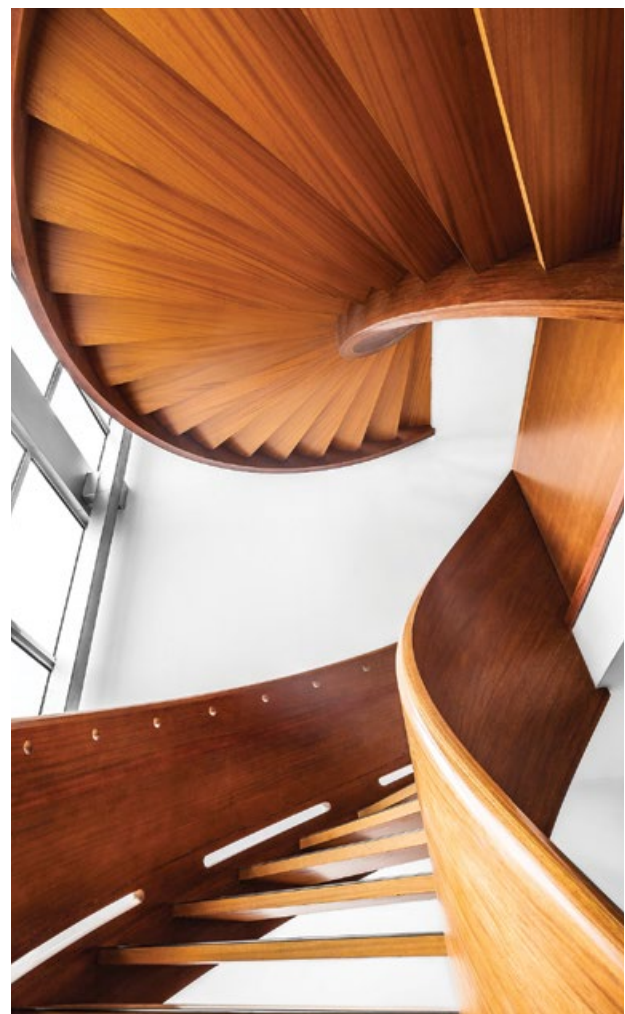
The use of wood species for wooden flooring in 2020 indicates that the share of oak increased slightly and reached 81.8% compared to 80.6% in 2019. Tropical wood species represent 3.0% of used wood. Ash and beech are still the two other most common chosen species with 5.6% and 2.8% (compared to 7.2% and 2.0% in 2019) respectively.

The European parquet markets showed heterogeneous developments at the beginning of 2022. While Italy, Scandinavia and Spain report still significant increases in demand, Benelux, France, and Switzerland present flat evolutions. Austria and Germany are already experiencing decreases in output, reflecting the difficulty to fill orders (FEP, 2022).

Another important driver for European hardwood consumption is the furniture market. After contracting in 2020, furniture consumption fully rebounded in 2021 by about 10%, reaching almost euro 140 billion (at retail prices). In 2021, all segments of the furniture market surpassed their 2019 market size, thus fully rebounding from the pandemic.

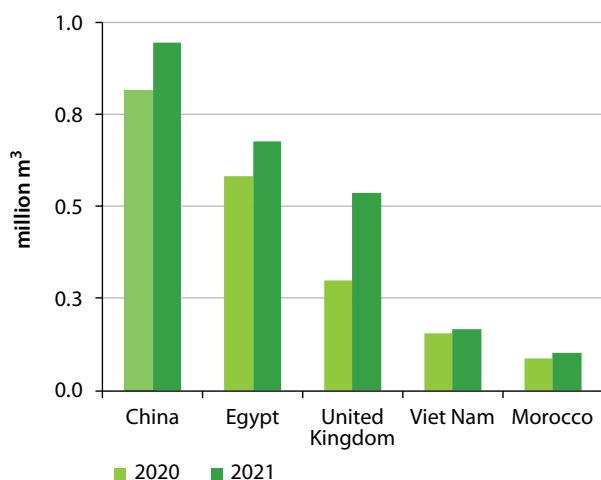
The lockdown experience highlighted the importance of home, which acquired a new centrality both for living and working. Spending more time at home highlighted the usefulness of having functional spaces for the whole family.

Consumers invested in improving their living spaces, often allocating substantial portions of available income to furniture because of decreased expenditure for other leisure activities.



GRAPH 3.3

Top 5 importers of EU27 sawn hardwood, 2020-2021



Source: Eurostat, 2022c.

For this reason, the worldwide pandemic-induced contraction in furniture consumption in 2020 was limited in size, affecting the different products of the furniture aggregate in different ways.

The prospects for 2022 are favourable, but uncertainties deriving from supply constraints, transport problems, and the geopolitical and economic situation could alter the positive outlook significantly (CSIL, 2022).

TRADE

In 2021 and 2022 exports of sawn hardwood from Europe have been lively both in the beech and in the oak sectors, by far the two most important sawn hardwood species of the subregion. Sawn hardwood companies that rely on foreign trade are negatively affected by the geopolitical situation: long-distance exports are hampered by unstable (often high) freight rates, COVID-19 induced logistical challenges mainly in China and increased fuel prices.

Exports of sawn hardwood from the EU to the rest of the world increased by 20% to over 3.2 million m³ in 2021. 950,000 m³ (29%) of European exports were destined to China, followed by Egypt with 675,000 m³, and the United Kingdom with over 500,000 m³. Viet Nam is another relevant importer, with a market share of slightly over 5% (graph 3.3).

Eastern Europe, Caucasus and Central Asia

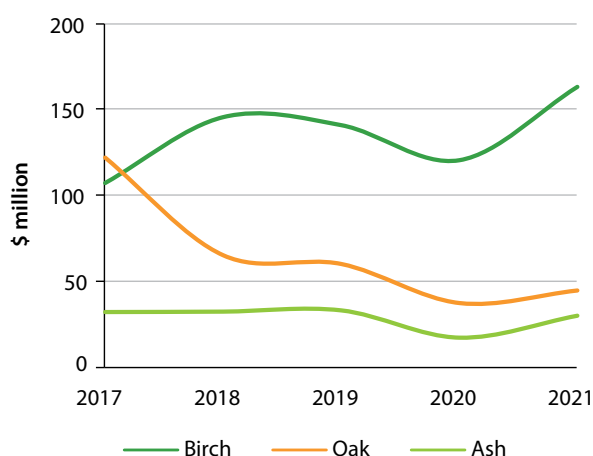
The Russian Federation was the number four exporter of sawn hardwood exporter in the world in 2021 behind Thailand, the United States of America. The Russian Federation exported sawn hardwood with a total value of \$300 million in 2021. Exports recovered strongly to pre-COVID-levels and increased by 35% over 2020. Birch, with a total value of \$163 million, accounted for half of the value of sawn hardwood exported in 2021. The second biggest value in exported sawn hardwood was oak, which has decreased significantly since 2017 (graph 3.4).

More than two third of both birch and oak sawn hardwood were exported from the Russian Federation to China in 2021 (Comtrade, 2022).

Ukraine remained the second biggest producer of sawn hardwood in the EECCA subregion. However, after ranking 13th in the list of top global sawn hardwood exporters in 2016 it dropped to 18th rank in 2020, where it remained also in 2021. Ukrainian sawn hardwood production dropped by 50% since 2018 and reached only 287,000 m³ in 2021. Almost none of the sawn hardwood produced in Ukraine was consumed domestically. The country exported 300,000 m³ which is only 57% of the pre-Covid volumes.

GRAPH 3.4

Top three sawn hardwood exports from the Russian Federation (2017-2021)



Source: Comtrade, 2022.

North America

■ PRODUCTION

United States sawn hardwood production increased by 640,000 m³ or 3.9% from 2020 to 2021, while Canadian production declined by 12% (Statistics Canada, 2022b). United States apparent consumption increased by 810,000 m³ or 5.9% in 2021.

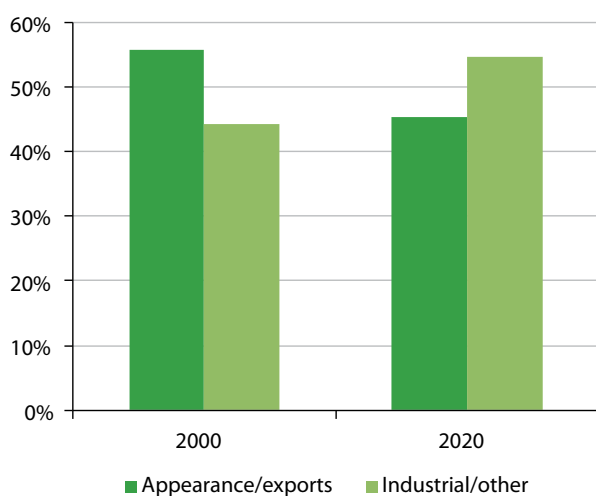
These increases were associated with sharp rises in the prices of higher quality hardwood sawn products used in appearance applications (cabinets, furniture, millwork and flooring) in 2021.

These appearance applications (including exports) accounted for 45% of the consumption of sawn hardwood in the United States in 2020, while industrial uses (pallets, sleepers, etc.) and other uses accounted for the remaining 55%. This is a reversal from earlier in the century; in 2000, appearance applications were the main uses accounting for 56% of consumption of sawn hardwood in the United States (graph 3.5).

The housing market was relatively strong toward the end of 2021 heading into early 2022 (See chapter 1). Conversely, hardwood demand from the furniture industry continued to decline, as net imports were calculated to have reached nearly 80% market share of the wooden household furniture market in the United States in 2019. In 2021, employment in the furniture industry was estimated to be below 29,000 units (US Bureau of Labor Statistics, 2022). At the same time,

GRAPH 3.5

Sawn hardwood consumption in the United States by major user groups, 2000 and 2020



Note: Appearance/exports includes cabinets, furniture, millwork, and flooring, etc.; Industrial/other includes pallets, sleepers, etc.

Source: Luppold and Bumgardner, 2021.

domestic consumption of wood furniture also has declined (Luppold and Bumgardner, 2022).

■ CONSUMPTION

Sawn hardwood consumption increased by 5.9% in 2021 (table 3.1).

TABLE 3.1

Sawn hardwood balance, United States, 2017-2021 (million m³)

	2017	2018	2019	2020	2021	2021-2022
	Million m ³					Change (%)
Production	22.77	22.65	22.43	16.69	17.33	3.9
Imports	0.72	0.95	0.77	0.63	0.59	-6.3
Exports	4.50	4.47	3.71	3.51	3.30	-6.0
Apparent consumption	18.99	19.14	19.49	13.81	14.62	5.9

Source: UNECE/FAO, 2021; USDA FAS 2022b.

Increased sawn hardwood consumption was accompanied by small increases in employment in the United States cabinet and millwork sectors in 2021. Employment in the United States cabinet⁵ and millwork⁶ industries generally track well with single family housing starts (US Bureau of Labor Statistics, 2022, US Census Bureau, 2022d). However, in the last couple of years, employment in these sectors has declined while single family housing starts continued to increase. Employment in these sectors reversed this trend in 2021 to meet increased demand from housing and remodeling markets (graph 3.6).

Similarly, employment in the United States pallet and container industry⁷ increased slightly (by 1.4%) in 2021 after declining by 2.9% in 2020, suggesting increased activity in industrial hardwood markets as well. This was consistent with improvement in overall United States industrial production through much of 2021 to reach near pre-COVID levels (US Federal Reserve Bank of St. Louis, 2022).

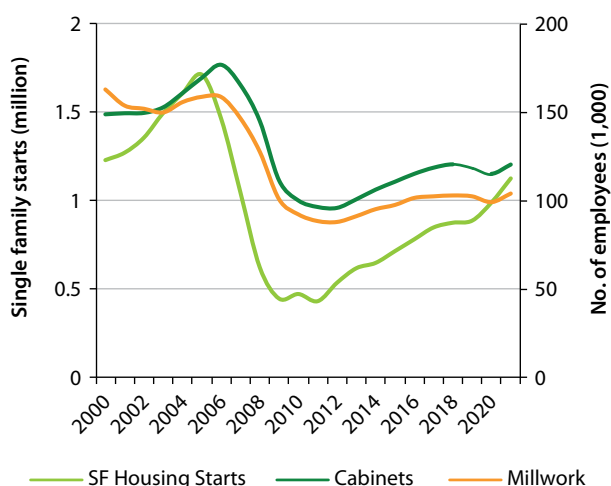
5 North American Industry Classification System (NAICS); 337110.

6 NAICS: 32191.

7 NAICS: 321920.

GRAPH 3.6

Single family housing starts and employment in the cabinet and millwork industries in the United States, 2000 to 2021



Notes: Cabinet: NAICS 337110; millwork: NAICS 32191.

Sources: US Census Bureau, 2022e, US Bureau of Labor Statistics, 2022.

TRADE

Imports of temperate sawn hardwood by the United States increased by 8% in 2021. This increase was driven largely by increased imports of beech (mostly from Germany), birch (mostly from Canada), and “other temperate” species (USDA FAS, 2022b). Intraregional trade remained important, as Canada accounted for nearly 48% of total sawn hardwood imports by the United States in 2021.

Imports of tropical sawn hardwood declined further by 37% in 2021, after already declining by 34% in the United States in 2020. At a volume of 593,000 m³, 2021 was the lowest year for total imports (temperate and tropical) since 2009.

The largest increases in trade of sawn hardwood by the United States were intraregional (North America) in 2021, including a 46% gain in exports to Canada and a 35% increase in exports to Mexico (USDA FAS, 2022b). Meanwhile, exports from the United States to China and Viet Nam declined by 11% and 23%, respectively. These changes resulted in Canada moving from 14% of total exports from the United States in 2020 to 19% in 2021, second only to China, which accounted for 33% of sawn hardwood exports by the United States in 2021.

PRICES

The inflation-adjusted aggregate price index (1982=100) for sawn hardwood in the United States is shown in graph 3.7, derived from the sawn hardwood price series adjusted for inflation using the producer price index (U.S. Bureau of Labor Statistics 2022).

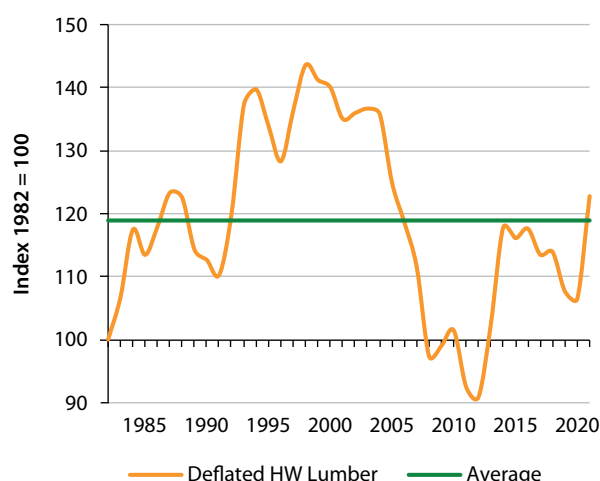
The loss of domestic furniture manufacturing, the Great Recession and housing crisis in 2008 and after, and the associated shifts to industrial markets noted earlier have impacted the sawn hardwood market and its prices in North America since the early part of the 21st century (Luppold and Bumgardner, 2021).

The aggregate price index was sharply higher in 2021; this increase moved the 2021 price above the long-term average for the first time since 2005 and reversed a declining trend since 2016 (graph 3.7).

The increase was driven in part by improved demand for higher-value hardwoods deriving from relatively strong housing and remodeling markets. At the same time, COVID-19-related production and supply chain disruptions continued to impact sawn hardwood supply in 2021, causing further pricing pressures. Prices for industrial products also increased in 2022. For example, the price of Appalachian green pallet cants rose over 70% in 2021, with most of the increase occurring in the middle of the year (Hardwood Market Report, 2021).

GRAPH 3.7

Annual inflation-adjusted sawn hardwood price index and average in the United States, 1982 to 2021



Note: Index 1982 = 100.

Source: US Bureau of Labor Statistics 2022.

■ TRENDS IN 2022

Early observations for 2022 suggest a cooling housing market due in part to increased borrowing rates, which could affect demand from appearance-based markets. At the same time, sawn hardwood production has been increasing, causing prices to moderate. Exports of sawn hardwood from the United States are ahead of their 2021 pace, with Mexico experiencing the fastest growth among major markets





Chapter 4

WOOD-BASED PANELS

Lead author: Ivan Eastin

Contributing author: Orifon Abidov

Highlights

The wood-based panels sector in the UNECE reversed its decline from 2020 and is reported to have grown strongly in 2021 throughout the UNECE region.

The apparent consumption of wood-based panels increased by 11.4% in North America in 2021, fuelled by strong increases in housing starts and remodelling activities within the region. Production capacity increased by 1% while capacity utilization increased by 1.2% in the North American structural panel industry in 2021.

COVID-19 related impacts, including a shift towards remote work arrangements and travel restrictions that curtailed many vacation plans, resulted in increased investments in new housing and remodeling of existing homes that significantly increased demand and caused prices for wood-based structural panels to soar to record levels.

Despite the continuing challenges caused by the COVID-19 pandemic in 2021, total wood-based panels production in Europe is reported to have recovered from production declines in 2020 to surpass the pre-pandemic production volumes recorded in 2019.

Total wood-based panel production in the European sub-region is reported to have reached 63.7 million m³ (+9.8% compared to 2020 and 4.5 million m³ higher than 2019). All panel types contributed to this growth, especially within the construction and furniture sectors.

Production of all wood-based panels in the Russian Federation are reported to have grown by 15-17% in 2021.

The exports of all structural panels from the Russian Federation increased substantially in value and volume in 2021. Values of exports of non-structural panel exports also increased but volumes remained stable due to market developments.

This chapter covers both structural panels (plywood made from cross-laminated veneer, and oriented strandboard – OSB – made from wood strands bonded together) and non-structural panels (particle board and fibreboard). The Harmonized Commodity Description and Coding System for classifying traded products (also called the Harmonized System) includes OSB as particle board. It is treated as a separate product here, however, because OSB and particle board differ in their manufacture and use and in the raw materials used to make them.

Fibreboard is the term used for various types of panels made of wood fibre, including:

- high-density fibreboard (HDF) and medium-density fibreboard (MDF), which are both included in the MDF category here;
- wet-process hardboard, which is similar in density to HDF but made with a wet process; and
- low-density fibreboard, which comprises products such as insulation board, “other board” and softboard (both ridged and flexible).

In contrast to previous years, this chapter was prepared by the authors based on external data. The trends in Europe were assessed by using the data and trends reported to the European Panel Federation (EPF, 2022).

Europe

Total wood-based panel production increased by 9.8% in EPF member countries⁸ in 2021, to 63.7 million m³. Panel production in 2021 surpassed the 2019 pre-pandemic volume by 7.6% (+4.5 million m³). Increased growth in construction output and the strong recovery in furniture production supported demand for wood-based panels and all panel types experienced growth.

The furniture industry remained the largest end-user of wood-based panels in the European subregion, with its share increasing from 47% in 2020 to 49% in 2021 thanks to 11% growth in furniture production in the EU27. The building industry, including doors and flooring applications, accounted for 38% of overall production (stable compared to 2020). The remaining demand for wood-based panels was for packaging (3%) and other applications, such as moulding and do-it-yourself (10%) (EPF, 2022).

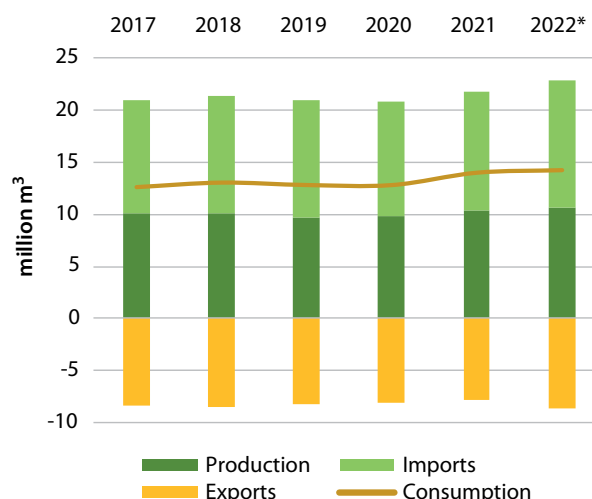
⁸ EPF member countries includes countries in the European Union (EU27), Iceland, Liechtenstein, Norway, Switzerland and the United Kingdom.

■ STRUCTURAL PANELS

Graph 4.1 summarizes structural panels production, trade and consumption between 2017 and 2021, while graph 4.2 presents similar data for non-structural panels.

GRAPH 4.1

Europe: Structural panels production, trade and consumption, 2017-2021

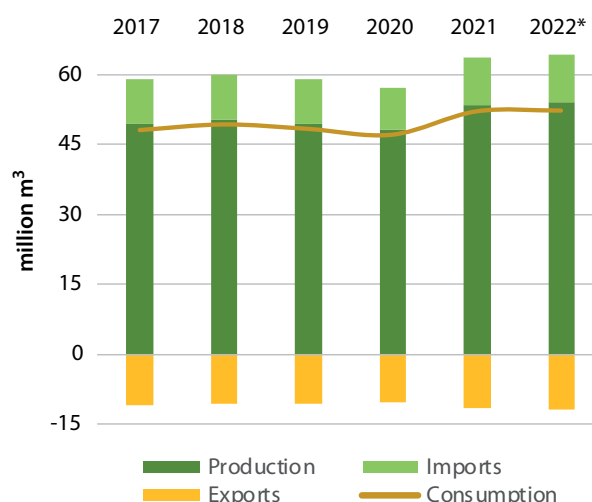


Note: Exports are shown as negative numbers; * estimate.

Source: EPF 2022.

GRAPH 4.2

Europe: Non-structural panels production, trade and consumption, 2017-2021



Note: Exports are shown as negative numbers; *estimate.

Source: EPF 2022.

■ NON-STRUCTURAL PANELS

Non-structural panels (+10.8%) fared better than the structural panels (+4.9%) in Europe in terms of output, but a strong domestic consumption of both panel types (10.6% versus 9.5%) reduced the availability for exports and also drove up imports. The kitchen furniture industry grew by 21% in 2021 within the EU27, which helps to explain partially this trend.

Despite the strong performance in 2021, the outlook for 2022 is more cautious due to the current supply chain, geopolitical and inflationary challenges. Despite this caution, the prospects for the European wood-based panel industry in 2022 remain favourable thanks to political support for programs such as the European Green Deal, the European Renovation Wave and the New European Bauhaus. The EPF forecasts that wood-based panels production in the subregion may rise by 1.5% in 2022, to another historic high.

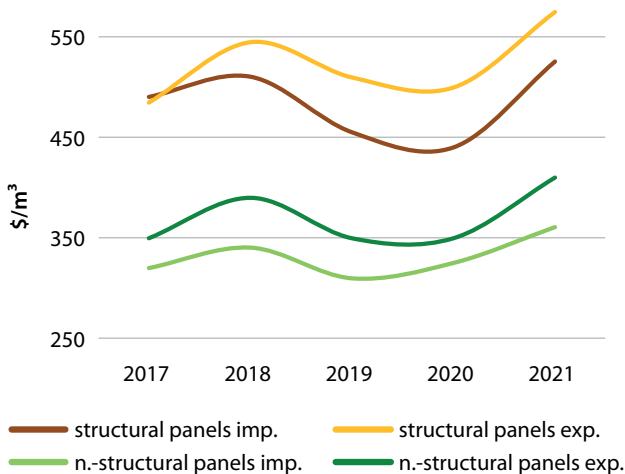
■ TRADE

Unit values increased for both imports and exports of structural and non-structural panels in 2021 (graph 4.3).

Three-quarters of European imports of wood-based panels came from Belarus, the Russian Federation and Ukraine, which increased strongly by volume in 2021 by 15-25%. At the same time, the European exports to China, Japan, Republic of Korea and the United States increased by a double-digit rate thanks to strong demand in wood-based panels demand in these countries.

GRAPH 4.3

Europe: Traded wood-based panels unit values, 2017-2021



Note: Data were adjusted by EPF to reflect densities.

Source: Eurostat, 2022c.

■ TRENDS IN 2022

First data for 2022 indicate a further strong year for structural and non-structural panels in Europe despite a weak euro, a looming recession, and the fallout of the war in Ukraine.

Eastern Europe, Caucasus and Central Asia

Publicly available information indicates that production in the Russian Federation of MDF / HDF (including fibreboard produced by dry process) increased by 15% in 2021 while production of particle board increased by 17% and OSB by 15% (Whatwood, 2022).

■ STRUCTURAL PANELS

The markets for structural panels developed exceptionally well in 2021. The value of OSB exports from the Russian Federation almost tripled from \$71 million in 2020 to \$207 million in 2021. The top ten importing partners⁹ accounted for 80.4% of OSB exports by value. China, Chile, Kazakhstan, and Kyrgyzstan, which accounted for 27.8% of OSB exports (by value) in 2021, are the trading partners among the top ten who will allow imports of OSB from the Russian Federation in the fourth quarter of 2022 and onwards.

Plywood exports from the Russian Federation increased by about 56% from \$1.08 billion in 2020 to \$1.68 billion in 2021. Exports of plywood are less concentrated than those of OSB and the top ten countries¹⁰ only account for 63% of the exports. China and Republic of Korea, accounting for 6.0% of plywood exports (by value) in 2021, are the only two main trading partners among the top ten who will allow imports from the Russian Federation starting in the fourth quarter of 2022.

■ NON-STRUCTURAL PANELS

Exports of non-structural panels from the Russian Federation evolved strongly and are likely to be much less affected by sanctions than structural panels beginning in the second half of 2022 since they are mostly exported to countries without any trade restrictions.

The value of fibreboard exports from the Russian Federation increased by 26% from \$339 million in 2020 to \$427 million in

⁹ In decreasing order of value of imports of OSB: United States, China, United Kingdom, Poland, Kazakhstan, Finland, Chile, Sweden, Kyrgyzstan and Germany.

¹⁰ In decreasing order of value of imports of plywood: United States, Germany, Poland, Netherlands, Italy, Finland, Canada, Republic of Korea, United Kingdom and China.

2021. The top ten importing partners¹¹ accounted for about 83% of fibreboard exports by value. Exports of fibreboards are likely to be less impacted by sanctions since, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan and Uzbekistan accounted for 59% of fibreboard exports in value in 2021 and they do not foresee any restrictions to fibreboard exports in the future.

The value of particle board exports from the Russian Federation increased by 35% from \$253 million in 2020 to \$341 million in 2021. The export market is highly concentrated and also very much oriented towards countries in the EECCA region. The top ten importing partners¹² accounted for about 93% of particle board exports by value of which 80% are directed to countries without trade restrictions foreseen in the coming months.

Trade data for the first two quarters of 2022 are too weak to draw any implications on the possible effects of the sanctions against exports from the Russian Federation and Belarus. This assessment is further hampered by the decision of the Russian Federations' Federal Customs Service to temporarily stop publishing export and import statistics for an undefined period of time (Whatwood, 2022).

North America

The apparent consumption of wood-based panels increased by 11.4% in North America in 2021, driven largely by a jump in new housing starts. In addition, an increase in remodelling, attributed to curtailed vacation activities caused by the COVID-19 pandemic, allowed many homeowners to invest in home repairs and renovations. The combination of increased housing starts and remodelling activities during the summer caused the prices of structural wood-based panels to skyrocket to record high levels (graph 4.4).

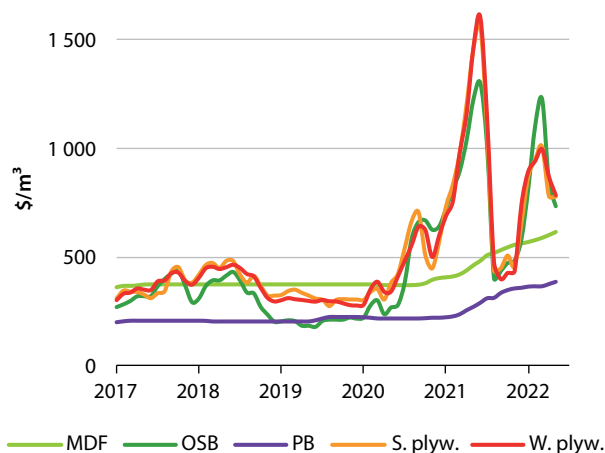
Total wood-based panel production in North America rose by 8.8% in 2021, to 44.1 million m³ (graphs 4.5 and 4.6). Production capacity in the North American structural panel industry increased by 1.0% with the capacity utilization rate increasing marginally from 74.5% in 2020 to 74.7% in 2021 (APA, 2022a).

11 In decreasing order of value of imports of fibreboard: Uzbekistan, Kazakhstan, Belarus, Azerbaijan, Romania, Belgium, Poland, Ukraine, Kyrgyzstan and Germany.

12 In decreasing order of value of imports of particle board: Uzbekistan, Kazakhstan, Azerbaijan, Belarus, Kyrgyzstan, Poland, Lithuania, Sweden, Ukraine and Mongolia.

GRAPH 4.4

North America: Wood-based panel prices, 2017-2021



Note: m³ per 1,000 square feet: western plywood (W. plyw.): 1.180; southern plywood (S. plyw.): 1.106; OSB: 1.032; particle board and MDF: 1.475.

Source: Random Lengths, various years.

■ STRUCTURAL PANELS

The consumption of structural wood-based panels increased overall by 7.5% in North America in 2021, driven largely by a 9.3% increase in housing starts as outlined in chapter 1, with demand rising for OSB by 7.8% and plywood by 6.8% (graph 4.5).

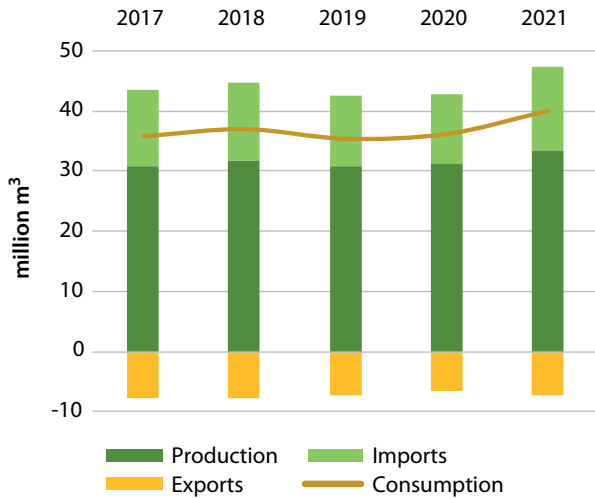
Trends in the consumption of wood-based structural panels in North America were positive across the major end-use markets with the singular exception of the non-residential sector – wood-based panel consumption increased by 15.2% in the residential construction market, by 1.8% in the remodelling market, by 3.7% in the industrial market but it was down by 10.3% in the non-residential market (APA, 2022b).

■ NON-STRUCTURAL PANELS

North American consumption of non-structural panels increased 11.2% in 2021, with MDF consumption increasing by 5.5% and particle board increasing by 15.5% compared to 2020. Although North American housing starts are projected to be flat in 2022, due to rising interest and mortgage rates (APA 2022), the production of non-structural wood-based panels is expected to increase by 11% in 2022 (CPA, 2022). North American production capacity for non-structural panels was down by 0.4% in 2021, to approximately 16,169 m³, due to particle board closing in the United States. The capacity utilization rate in 2021 increased in the particle board subsector (from 61% in 2020 to 71.7%) as well as the MDF subsector (from 76.4% in 2020 to 80.4%) (CPA, 2022) (graph 4.5).

GRAPH 4.5

North America: Structural panels production, trade and consumption, 2017-2021



Note: Exports are shown as negative numbers.

Source: APA, 2022; Trade Data Monitor, 2022.

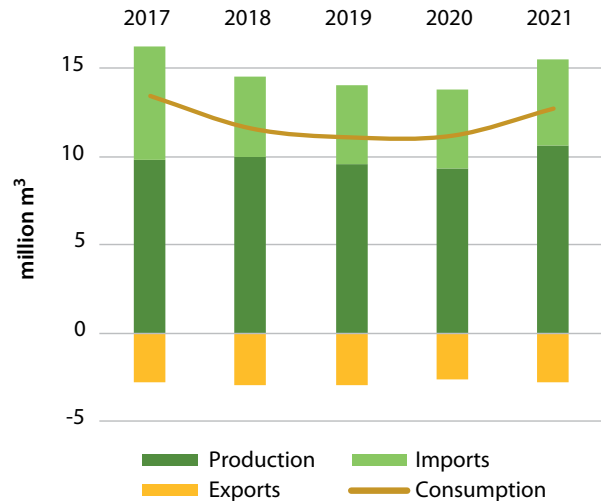
The value of North American imports of wood-based panels jumped significantly in 2021 (+66.8%), to \$11.1 billion. The total value of wood-based panel imports by the United States rose by 69.8%, including for plywood (+52%), fibreboard (+24%), particle board (+11%) and OSB (+137%). In Canada, the total value of wood-based panel imports increased by 46.8% in 2020, led by plywood (69%), particle board (+39%), OSB (+34%) and fibreboard (+27%).

The value of wood-based panel exports from North America jumped by 78.3% in 2021, to \$5.9 billion, with Canada accounting for 85.6% of the total. The value of exports from



GRAPH 4.6

North America: Non-structural panels production, trade and consumption, 2017-2021



Note: Exports are shown as negative numbers.

Source: CPA, 2022b; Trade Data Monitor, 2022.

North America (including trade between Canada and the United States) leapt by 115.9% for OSB, by 49.2% for plywood, by 26.1% for fibreboard and by 15.8% for particleboard.

Strong demand for structural wood-based panels in both new home construction and the repair and remodel sector, coupled with COVID-19-related supply constraints, led to unprecedented price increases for wood-based panels. Between November 2020 and June 2021, prices more than tripled for western plywood (+220%), and southern plywood (247%) while OSB prices increased by two-fold (108%); particleboard (+30%) and MDF (+22%) registered smaller price hikes (Random Lengths, 2022b). Increases in production and imports, along with improved supply logistics, caused structural panel prices to fall quickly in the second half of 2021 (graph 4.4).

■ TRENDS IN 2022

Estimates for 2022 suggest that North American production of structural and non-structural panels will increase modestly in 2022, although prices are expected to decline to more normal levels. Exports are projected to increase by approximately 1% while imports are expected to drop by 3%, which may be attributed to reduced panel imports from the Russian Federation.

A large stack of brown paper rolls in a warehouse. The rolls are arranged in rows, filling the frame. The lighting is warm, highlighting the texture of the paper. Some rolls have small white labels on them. The perspective is from a slightly elevated angle, looking down at the stacks.

Chapter 5

PULP AND PAPER

Lead author: Michel Valois

Contributing authors: Bernard Lombard, Eduard Akim

Highlights

Total woodpulp production rose by 3.5% in Europe in 2021 to reach 37.3 million tonnes owing to renewed customer demand. European total production of chemical pulp increased 3.9% with total production of sulphite and sulphate pulp increasing 1.1% and 4.1% respectively compared to 2020.

Chemical woodpulp production also rose by 3.9% in Eastern Europe, the Caucasus and Central Asia in 2021, to 6.9 million tonnes, due mainly to capacity expansion in Belarus. There was a corresponding increase in apparent consumption in that region of 2.5%, to 4.5 million tonnes.

In North America, woodpulp production dropped by 3.0% in 2021, to 64.4 million tonnes mainly due to paper-machine closures, conversions and unplanned downtime. Chemical pulp production was down by 2.0% (to 52.6 million tonnes), while apparent consumption fell 4.0% (to 45.1 million tonnes).

The utilisation of paper for recycling grew at 5.8% in 2021 to 50.7 million tonnes. Corrugated and kraft papers represented 58.9% of the total, while mixed grades were 18.9%, newspapers and magazines were 13.1% and other grades represented 9.1%.

The European recycling rate decreased to 71.4% in 2021, down from 73.3% in 2020. The decline is largely due to the drop in apparent consumption at collection points such as office buildings as pandemic-related lockdowns and restrictions had white-collar workers working remotely via electronic means.

Paper for recycling collected in 2021 increased by 1.7% and reached 55.4 million tonnes in Europe in 2021.

Global trade of paper for recycling seems to be slowing down; net import of paper for recycling from outside the European subregion was at its lowest level since 2005.

China banned imports of recovered paper in 2021 and the markets adjusted to that by providing recycled pulp instead. Recycled pulp imports into China grew by 31.3%, reaching 3.3 million tonnes.

Introduction and overview

The global pulp, paper and paperboard industry experienced a mixed recovery in 2021 owing to the partial re-opening of economies following the height of the COVID-19 pandemic.

The production of total woodpulp grew in Europe in 2021 but fell in North America owing to closures and unplanned downtime. The latter was also the reason for the market pulp production decline across Europe and North America.

Apparent consumption of woodpulp grew in Europe, as the result of a recovery in the printing and writing papers and paperboard segments. In North America, closures in the graphic papers segment and high prices reduced apparent consumption, with end users destocking.

The production of graphic papers declined in North America mainly owing to closures but experienced an increase in Europe and in Eastern Europe, Caucasus and Central Asia (EECCA) countries as economies re-opened following the COVID-19 pandemic.

Printing and writing paper production rose in Europe and the EECCA on stronger orders as end users experienced improved business opportunities, but production fell in North America as a result of paper-machine closures. Newsprint production and apparent consumption each showed negative growth in 2021, confirming the long-standing trend of the print industry transformation towards electronic formats.

Production and consumption of sanitary and household papers in Europe and North America fell. Consumers had bought huge amounts in 2020 fearing a shortage; they essentially destocked in 2021.

Paperboard production and apparent consumption continued to grow in 2021. New capacity, in addition to upgraded paper machines and conversions from graphic papers output, enabled production across the entire UNECE region to grow. Apparent consumption of paperboard experienced an equally strong result, fuelled largely by e-commerce.

Pulp, paper and paperboard prices all rose in 2021 and into 2022 across the entire UNECE region. Pulp prices rose owing to a rebound in production in key grades, unplanned downtime, rising costs, weather impacts and COVID-19-related issues affecting the entire logistics systems.

China experienced an economic slowdown in 2021 and this continued into mid-2022 with a lower demand for pulp, paper and paperboard. Prices for pulp were higher in 2022, but key paperboard grades saw declines as a result of weak domestic demand caused by COVID-19 related lockdowns.

Printing and writing paper, newsprint and paperboard prices rose in 2021 and into 2022 due to inflationary pressures. Everything from fibre, energy, chemicals, labour, insurance, transportation and rents saw increases from early 2021 until June 2022.

Europe

■ WOODPULP

Total woodpulp production rose by 3.5% in Europe in 2021 to reach 37.3 million tonnes due to renewed customer demand (CEPI, 2022a). Total production of chemical pulp increased by 3.9%, with the total production of sulphite and sulphate pulp increasing by 1.1% and 4.1% respectively compared to 2020. Production of mechanical and semi-chemical pulp increased by 2.1% in 2021.

Market pulp production was lower by 0.6% in 2021 to 15.2 million tonnes, with Austria showing the largest drop at 14.4%, the result of integration¹³; while France was down 12.3% due to unplanned downtime.

Market and integrated pulp consumption grew by 6.5% in Europe in 2021 to reach 40.3 million tonnes. Consumption of mechanical and semi-chemical pulp increased by a combined 2.8% compared to 2020. Consumption of chemical pulp increased by 7.4% in 2021.

The demand for market pulp in the subregion waned in mid-2021 on high prices, leading to pricing weakness that persisted to the end of the year.

■ PAPER AND PAPERBOARD

Europe's production of paper and paperboard rebounded by 6.1% in 2021, at 90.6 million tonnes. The increase was driven by a renewed customer demand in Europe as well as in global markets. Exports grew by 4.1% in 2021, surpassing pre-COVID-19 levels from 2019. They were driven by strong growth in sales to North and South American markets. Exports accounted for 22.3% of paper and paperboard production in 2021. As a result, the sector's production operating rate reached 90%, compared to only 85% in 2020 (CEPI, 2022b).

In 2021, the subregion's apparent consumption of paper and paperboard grew by 5.8% to 75.2 million tonnes (CEPI, 2022b).

¹³ Conversion of a market pulp mill into an integrated pulp and paper mill.

■ GRAPHIC PAPERS

Production of graphic papers grew by 5.6% in 2021 to 25.1 million tonnes. Newsprint production fell 7.4% to 3.8 million tonnes, while printing and writing papers increased 8.4% to 21.3 million tonnes. Uncoated woodfree papers production grew 9.3% to 7.8 million tonnes, while coated woodfree papers rose 10.1% to 4.4 million tonnes. Uncoated mechanical papers production rose 6.1% in 2021 to 4.5 million tonnes, while coated mechanicals grew by 7.4% to 4.5 million tonnes.

The subregion's consumption of graphic papers grew by 2.7% in 2021 to 19.0 million tonnes. Newsprint consumption fell 2.7% to 3.4 million tonnes, while printing and writing papers rose by 4.0% to 15.6 million tonnes in 2021. Consumption of uncoated woodfree papers grew by 4.7% to 6.1 million tonnes in 2021, while coated woodfree papers rose by 1.4% to 2.4 million tonnes. Consumption of uncoated mechanical papers grew by 1.9% in 2021 to 3.7 million tonnes, while coated mechanicals rose by 7.2% to 3.3 million tonnes.

Production of graphic papers in the January-April 2022 period is expected to show a marked decline, as a result of a strike at a major producer's entire mill network in Finland. The situation negatively affected domestic graphic paper shipments which caused an increase in imports. In the chemical market pulp segment, it is anticipated that domestic and export shipments will drop as well.

■ PACKAGING

Production of packaging papers and paperboard grades increased by 7.5% in 2021 to reach a record high 53.5 million tonnes. Case material production grew by 8.4%, while folding boxboard rose by 2.4% and wrappings increased by 11.6%.

Consumption of packaging paperboard grades grew by 8.5% in 2021 to 44.9 million tonnes. Case materials rose 9.9% to 31.6 million tonnes, while folding boxboard grew by 0.8% to 6.1 million tonnes and wrappings experienced a 13.0% rise to 2.8 million tonnes.

■ HOUSEHOLD AND SANITARY PAPERS

Production of household and sanitary paper fell by 2.2% in 2021 whereas their consumption fell by 3.0% in the same period. Fearing shortages of household and sanitary papers at the start of the pandemic in 2020, consumers had hoarded these products. Therefore, in 2021, the market went through a period of destocking.



■ RECYCLING

Total paper for recycling¹⁴ collected in 2021 reached 55.4 million tonnes, a 1.7% rise among CEPI member countries¹⁵ (CEPI, 2022b). Collection of corrugated and kraft papers reached 33.4 million tonnes, a 3.3% rise versus 2020. Mixed paper collection reached 10.9 million tonnes (+2.4%), while newspapers and magazines were 6.7 million tonnes (-3.6%), and other grades were 4.4 million tonnes (-2.6%).

Global trade of paper for recycling seems to be slowing down with net import of paper for recycling from outside the European subregion at its lowest level since 2005. The export of paper for recycling to member States outside the European subregion decreased the fourth consecutive year and dropped by 17.8% in 2021.

¹⁴ There are three categories of paper that can be used as feedstocks (paper for recycling) for making recycled paper: mill broke, pre-consumer waste, and post-consumer waste. Mill broke is paper trimmings and other paper scrap from the manufacture of paper, and is recycled in a paper mill. Pre-consumer waste is a material which left the paper mill but was discarded before it was ready for consumer use. Post-consumer waste is material discarded after consumer use, such as old corrugated containers, old magazines, and newspapers (Wikipedia, 2022).

¹⁵ Members of Cepi in 2021 The National Associations of the 18 following countries are Cepi members: Austria, Belgium, Czechia, Finland, France, Germany, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom.

The utilisation of paper for recycling grew by 5.8% in 2021 to 50.7 million tonnes (CEPI, 2022b). Corrugated and kraft papers represented 58.9% of the total, while mixed grades were 18.9%, newspapers and magazines were 13.1% and other grades represented 9.1%.

The production of case materials utilized 31.8 million tonnes of recycled fibres in 2021 (8.1% increase versus 2020). Wrappings, other papers, and board for packaging used 4.8 million tonnes (6.3% growth), while newsprint used 3.5 million tonnes – less than 50% of the figure in 2000, and almost 60% less than in 2010. Printing and writing papers production used 2.9 million tonnes (+5.3%), while cartonboard used 3.5 million tonnes (+4.0%), household and sanitary papers incorporated 2.5 million tonnes (-6.1%) and other papers and board rounded out the total with 1.7 million tonnes (+17.6%).

The European recycling rate decreased to 71.4% in 2021, down from 73.3% in 2020. The decline is largely due to the production of paper and paperboard products rising faster than the collection of paper for recycling. Collection points, such as office buildings, were not adjusted to respond to the changed flows triggered by pandemic-related lockdowns, restrictions and the increase in remote working by white-collar employees as well as the ongoing growth of electronic communication.

■ PRICES

Pulp, paper and paperboard prices in Europe all saw increases in 2021 and into 2022. Pulp prices were higher on supply-side shocks, while those of printing and writing papers were up on stronger demand and rising costs. Paperboard prices were higher in 2021 owing to stronger demand.

The impact of the war in Ukraine on the European pulp and paper industry has been significant in terms of cost of raw materials, trade and especially energy prices. The rise in costs is on top of the effect of the European economy exiting the pandemic and the resulting disruptions in the supply chain. Raw material prices have jumped, while as of August 2022 fibre imports into Europe from the Russian Federation have stopped because of sanctions. By mid-2022 energy prices had become extremely volatile; rationing because of electricity and natural gas price hikes already caused paper mills to cease manufacturing. In 2022, most producers imposed surcharges for paper and paperboard were applied which inevitably will lead to a significant reduction in demand and higher imports from sources where production costs are lower. As the European industry enters the winter 2022/2023, energy prices are bound to rise further and could force the closure of several pulp and paper mills. The crisis plans by some integrated paper mills foresee to the stop of their pulping operations and the of purchase market pulp to run their paper operations.

Eastern Europe, Caucasus and Central Asia

Chemical woodpulp production rose by 3.9% in the EECCA in 2021, to 6.9 million tonnes due mainly to capacity expansion in Belarus. There was a corresponding increase in apparent consumption in the EECCA of 2.5%, to 4.5 million tonnes.

Paper and paperboard production rose by 2.6% in the EECCA in 2021, to 11.7 million tonnes. The Russian Federation was by far the EECCA's biggest producer of paper and paperboard in 2021, at 9.8 million tonnes, up by 3.3% compared with 2020.

The production of packaging materials rose by 2.4% in the EECCA in 2021 to 7.7 million tonnes, with case materials increasing by 2.1%, cartonboard up by 4.1% and wrapping papers higher by 2.2%. Newsprint production fell by 7.4% and exports dropped by 6.7%; the domestic consumption of this product was down by 8.0%, to 320,000 tonnes. The production of coated papers rose by 7.5% but consumption fell by 10.7%. The production and consumption of uncoated wood-free papers rose by 15.7% and 10.8%. The apparent consumption of sanitary and household papers grew by 2.5% (VVM, 2022).

In the Russian Federation, chemical market pulp production grew by 3.3% in 2021, to 3.1 million tonnes, aided by capacity expansions. Exports fell by 9.7% on weaker demand from China. Imports, mainly of fluff pulp, grew by 8.1% to 130,000 tonnes.

The war in Ukraine has caused significant changes to the pulp, paper and paperboard industries of both member States. In Ukraine, factories are running at a fraction of 2020 levels owing to damage by shelling, abandonment by owners or a lack of personnel. (VVM, 2022).

According to the authors, in the Russian Federation, sanctions imposed by foreign countries have resulted in lower exports of market pulp graphic papers and paperboard. Several pulp and paper mills in the Russian Federation have reduced the amount of bleached pulp production due to a lack of chemicals and are producing lower-brightness cut-size office papers. Imported fluff pulp (of which 2021 levels reached 130,000 tonnes) was replaced by domestically produced northern bleached softwood kraft pulp (NBSK) made from larch. A further consequence of the sanctions is that formerly foreign sources parts and equipment needed for the maintenance of existing machinery now have to be supplied by domestic factories.

North America

■ WOODPULP

In North America, woodpulp production dropped by 3.0% in 2021, to 64.4 million tonnes mainly due to paper-machine closures, conversions and unplanned downtime (VVM, 2022). Chemical pulp production was down by 2.0% (to 52.6 million tonnes), while apparent consumption fell 4.0% (to 45.1 million tonnes).

Chemical market pulp production fell 4.1% in 2021 to 13.4 million tonnes, while apparent consumption fell 4.6% to 7.5 million tonnes (VVM, 2022). A combination of closures and unplanned downtime contributed to the decline in production, while demand was negatively impacted by high prices and paper-machine closures. The pandemic caused a drop in the demand for printing and writing paper.

■ PAPER AND PAPERBOARD

The production of paper and paperboard dropped by 1.5% in North America in 2021, to 73.8 million tonnes (VVM, 2022). The apparent consumption of paper and paperboard continued its downward trend, declining by 3.3%, to 66.3 million tonnes.

■ GRAPHIC PAPERS

The production of graphic papers fell by 2.7% in North America in 2021 (to 12.1 million tonnes). In fact, since 2016, it has fallen by 45.1% leading to significant – and mostly permanent – capacity reductions. After the pandemic-related restrictions, production rose marginally on stronger demand caused by an economic rebound. Domestic capacity, however, was insufficient to meet the demand and stronger imports (+13.6%) were therefore required to fill the shortfall caused by numerous paper-machine closures in 2020.

North American printing and writing paper production fell by 0.5% in 2021 to 9.8 million tonnes.

North American printing and writing papers exports fell by 18.7%, while imports rose 7.3% (PPPC, 2022). These results are due to rising paper prices following a series of mill closures and the post-pandemic recovery.

Production of uncoated woodfree papers rose 1.6% to 5.4 million tonnes, while coated woodfree papers fell 5.7% to 1.6 million. Uncoated mechanical papers production rose 4.5% to 1.8 million tonnes, while coated mechanical papers fell 10.2% to 1.0 million tonnes (PPPC, 2022).

Newsprint production fell 6.7% in 2021 to 2.3 million tonnes (PPPC, 2022), while apparent consumption fell 6.5% to 1.6 million tonnes owing to lower use of newspapers and reduced advertising. At the height of the newsprint market in 2001, North American demand was in excess of 14 million tonnes some 20 years ago.



Apparent consumption for printing and writing grades rose 3.0% in 2021 to 11.5 million tonnes as schools and offices re-opened and advertising resumed in a large way.

Apparent consumption for uncoated woodfree papers rose 4.2% in 2021 to 5.9 million tonnes, while coated woodfree papers saw a 4.3% rise to 2.4 million tonnes. Uncoated mechanical papers apparent consumption rose 4.6% to 1.8 million tonnes, but coated mechanical papers fell 5.9% to 1.3 million tonnes as a result of a reduction in printing activity of magazines, inserts and flyers that continue to change to electronic formats.

In 2022, inflationary pressures on the cost of raw materials and transportation systems have forced paper producers to raise prices which caused end users to reduce their consumption, switch to electronic formats or use lower-cost papers.

■ PACKAGING

Production increased by 3.7% in the subregion in 2021 for packaging materials, to 53.7 million tonnes, due to new capacity, including upgraded equipment as well as conversions from graphic paper.

North American case material (containerboard) production reached 42.5 million tonnes in 2021, an increase of 5.2% versus 2020.

North American case material apparent consumption reached 35.8 million tonnes in 2021, an increase of 2.2% versus 2020.

Net exports reached 6.7 million tonnes, an increase of 24.0% aided by an increase in capacity, mainly the result of conversion from newsprint production.

In the United States, case material capacity expanded for the 11th consecutive year (the fastest in 25 years on conversions and upgrades), reaching a record high of 38.4 million tonnes. Folding boxboard capacity increased 0.6% in 2021, following a 2.5% decline in 2020, and outperforming its long-term trend of a 0.4% decline (CCA, 2022; AF&PA, 2022).

■ SANITARY AND HOUSEHOLD PAPERS

Sanitary and household paper production reached 10.3 million tonnes in 2021, a decrease of 4.4%. North American sanitary and household papers apparent consumption was down 5.9% in 2021 to 10.5 million tonnes versus 2020, as consumers destocked following a period of strong buying in 2020 due to fears of potential shortages resulting from the pandemic.



■ PRICES

Pulp, paper and paperboard prices in North America all increased in 2021 and into 2022. Pulp prices were higher on supply-side shocks, while those of printing and writing papers were up on stronger demand and as a result of paper-machine closures, as well as rising costs. Shortages continued to be reported, with publishing houses delaying the printing of books. Imports of coated woodfree papers were up 20.5% in the first six months of 2022, while uncoated woodfree papers were up 4.0%. Paperboard prices were higher in 2021 on strong demand. In 2022, a significant growth in capacity is anticipated from upgraded and new paper machines. The market for packaging materials continues to experience strong demand from ecommerce platform sales and the switch from plastics to the more sustainable paper packaging solutions.

Extraregional influences on the UNECE

■ CHINA

Paper production and consumption increased in China in 2021, as the country rebounded from COVID19 measures and an on-going drop in recovered-paper imports (China Paper Association, 2022). Overall, paper production reached 121.1 million tonnes in 2021, up by 7.5% compared with 2020, and consumption was 126.5 million tonnes, up by 6.9%.

Chinese production declined by 18.2% in 2021 for newsprint (to 900,000 tonnes). Newsprint consumption dropped by 8.6% (to 1.6 million tonnes).

Chinese production of uncoated printing and writing papers declined by 0.6% in 2021, to 17.2 million tonnes, while coated printing and writing papers fell 0.8% to 6.4 million tonnes. Consumption of uncoated printing and writing papers rose 0.6% in 2021 to 17.9 million tonnes, while coated papers increased by 2.1% to 5.8 million tonnes.

An increase in the consumption of uncoated printing and writing papers in 2021 can be attributed in part to a rebound in the publishing sector, as economic activity rose following restrictions related to the pandemic. The increased consumption of these grades was facilitated by stronger imports to compensate for lower domestic production arising from plant closures, as well as by a reduction in exports driven by the pandemic (China Customs Bureau, 2022; China Paper Association, 2022).

China's household and sanitary papers production reached 11.1 million tonnes in 2021, up by 2.3%. Household and sanitary papers consumption reached 10.5 million tonnes, up 5.0% compared with 2020.

China's production and consumption of folding boxboard also grew in 2021 – by 2.4% (to 15.3 million tonnes) and 3.9% (to 14.3 million tonnes), respectively. This increase in production and consumption was driven by increased demand that was caused by many countries opting for lockdowns to minimize spread of the COVID-19 virus. Work-from-home measures and business retail closures drove online shopping and package-delivery services.

China's case material sector posted very strong growth in 2021. Mills in China produced 28.1 million tonnes of linerboard and 26.9 million tonnes of fluting, up by 15.0% and 12.3%, respectively, compared with 2020. Consumption grew less strongly, with linerboard up by 12.7% and fluting rising by 7.2%.

China banned the import of recovered paper as of January 2021. At the peak, China imported some 30 million tonnes of recovered paper. Along with high imported pulp prices, domestic paper producers were incentivized to ramp up their

own production and invest in new woodpulp lines in 2021. As a result, woodpulp production reached 18.1 million tonnes in 2021, up 21.4% compared with 2020.

The recovered paper import ban in 2021 saw folding boxboard pulp imports grow by 31.3%, reaching 3.3 million tonnes (China Paper Association, 2022).

China's market-pulp imports reached 30.5 million tonnes in 2021, a drop of 2.7% versus 2020. Chemical market pulp imports fell 6.6% to 22.1 million tonnes. The country also imported 10.9 million tonnes of paper and paperboard in 2021, down 5.6% versus 2020.

Market-pulp prices rose in the first five months of 2021 on rising demand before declining as a result of the economic slowdown caused by slower exports during the pandemic related measures. A flurry of supply-side shocks across several regions and a transportation and logistics network in chaos owing to pandemic restrictions (including a shortage of containers and personnel) created the perfect environment for panic buying, causing prices to rise rapidly in the first half of 2022.

■ BRAZIL

Brazil produced 22.5 million tonnes of woodpulp (integrated and market) in 2021, an increase of 7.4% compared with 2020, and 10.5 million tonnes of paper and paperboard, an increase

of 5.0%. The stronger pulp production was due mainly to a recovery of demand in global markets on expectations of a quick exit from the pandemic.

Brazil exported 15.7 million tonnes of pulp in 2021, an increase of 0.4%. Its pulp imports fell by 10.8%, due mainly to a sharp devaluation of the currency against the dollar driven by the economic impact of the pandemic (Ibá, 2022).

■ CHILE

Chile's exports of chemical market pulp fell 7.9% in 2021 due mainly to transportation and logistics issues resulting from the pandemic (Infor, 2022). Port congestion and labour shortages were largely to blame. Bleached radiata-pine exports fell by 1.9% and bleached eucalyptus exports fell 14.5%.

Dissolving pulp exports rose 418.7% on conversion from paper grade production and unbleached radiata-pine higher by 2.4%.

Chile's paper and paperboard exports fell 19.5% in 2021, due mainly to lower demand and increased competition from existing as well as incremental supply in North American markets. Graphic papers exports were lower by 91.4%, while folding-folding boxboard exports fell by 18.3% in 2021.



Chapter 6

WOOD ENERGY

Lead author: Francisco X. Aguilar

Contributing authors: Consuelo Brandeis,
Branko Glavonjić, Warren Mabee, Johan Vinterbäck



Highlights

Rising prices for oil, gas and electricity are very likely to further boost consumption of wood energy by individual households throughout the UNECE region.

The leading exporters of wood pellets worldwide in 2021 were Canada and the United States. They exported 10.6 million tonnes to the biggest importer in the world, the United Kingdom.

With 7.8 million tonnes of wood pellets imported and consumed in 2021, the Drax powerplant in the United Kingdom is the biggest single consumer of wood pellets in the world. Plans for bioenergy with carbon capture and storage (BECCS) units could capture 8 million tonnes of CO₂ annually in the future.

Member countries of the European Union consumed about 23.1 million tonnes of wood pellets in 2021. EU27 wood pellet consumption could exceed 24 million tonnes in 2022 driven by high fossil fuel prices and increased demand by individual households.

Member countries of the EU27 imported 1.9 million tonnes of wood pellets from the Russian Federation in 2021 and banned their import in April 2022. This could trigger increased wood pellet imports from North America in the second half of 2022.

In the Western Balkans, fuelwood prices increased on average by 30% year-on-year by May 2022. Prices for wood pellets and wood chips also increased significantly.

Bosnia and Herzegovina, and Serbia introduced export controls for fuelwood to counter reported shortages.

The Russian Federation and Belarus exported almost 3 million tonnes of wood pellets in 2021 – mainly to Europe. 2.4 million tonnes came from the Russian Federation (increase by 28%) and 598 thousand tonnes from Belarus (plus 13%).

Introduction and overview

The COVID-19 pandemic had relatively minor effects on wood energy markets. Across the UNECE region, wood energy consumption, which is still dominated by fuelwood use by individual households, remained stable. The market for wood pellets is much more dynamic and continues to expand – driven by policy targets and incentives, improved technologies, and high competing energy prices from fossil sources.

With a reported consumption of 23.1 million tonnes of wood pellets in 2021, the EU27 is the world's largest market. The EU's continued growth in demand – which far exceeds regional production – has resulted in greater wood pellet imports from North America, Belarus and the Russian Federation throughout 2021. Europe's recent ban (European Council, 2022) on wood pellets from the Russian Federation will likely increase European production and imports from North America.

The United States is the largest exporter of wood pellets worldwide, with the United Kingdom as the top destination (72%, volume) in 2021, followed by the Netherlands (16%) and Denmark (6%). High domestic fossil energy prices in the United States will likely support greater residential wood energy consumption.

A steep rise in regional wood energy prices in the Western Balkans has been reported for the first half of 2022. Shortages for firewood in Bosnia and Herzegovina, and Serbia have triggered the adoption of export controls.

Europe

The European Parliament passed the second revision of the EU Renewable Energy Directive (RED) on 14 Sept 2022. One of the main items discussed prior to its adoption was whether "primary woody biomass" (feedstock sourced directly from forests) would be considered an eligible renewable energy source to meet national renewable energy targets (European Parliament, 2022a). The third version of the RED (RED III) does not declassify primary woody biomass as a renewable energy but calls for the removal of subsidies for bioenergy sourced from primary woody biomass, phasing down of biomass in the renewable energy mix, and the cascading use of wood (European Parliament, 2022b).

Increased prices of electricity and European emission rights caused a sharp increase in demand for wood energy in the second half of 2021. Prices for wood chips reached an all-time high on October 5, 2021 (Baltpool, 2021).

Sweden recorded bark-beetle damages to spruce stands exceeding 8 million m³ in 2021 (Wulff and Roberge, 2021). Heating plants in Sweden used locally sourced insect

damaged wood during cold spells in the winters of 2021 and 2022. The share of insect-damaged wood used as fuel has since decreased as higher prices have been found (for this wood fibre) in woodchip and pulp markets.

The United Kingdom remains by far the biggest market for wood pellets worldwide. It consumed 9.4 million tonnes – of which 9.1 million tonnes (+1%) were imported and 0.3 million tonnes (+2%) domestically produced in 2021 (UK Forest Research, 2022). 7.8 million tonnes of these were imported and consumed by the world's biggest single user of wood pellets, the Drax powerplant (Drax, 2022a). Drax has submitted plans to build what could be the world's largest carbon capture and storage project. The company plans to invest £2 billion in two bioenergy with carbon capture and storage (BECCS) units. Once operational they could capture at least 8 million tonnes of CO₂ per year (Drax, 2022b).

EU27 wood pellet consumption increased by about 3% and reached an estimated 23.1 million tonnes in 2021. Italy remained the second biggest market for wood pellets in the world, with an estimated consumption of about 3.4 million tonnes mainly by private households, substituting for more expensive fossil fuels. Italy imported about 1.9 million tonnes of pellets.

The most dynamic markets for wood pellet consumption in the UNECE region are Germany and the Netherlands with consumption increasing by 20% and 15% respectively over 2020. Each of the two member States consumed 2.9 million tonnes in 2021. The increase in consumption was mainly driven by the increased demand of private households in Germany, while the demand in the Netherlands was driven by policy incentives for increased use of biomass by commercial heat and power plants.

The consumption of wood pellets in member countries of the EU27 may exceed 24 million tonnes in 2022. Growth will be driven high fossil fuel prices and by expanding residential markets (France and Germany) where public programs are promoting the installation of biomass boilers (Flach and Bolla, 2022).

EU27 wood pellet imports from the Russian Federation, which had exceeded 1.9 million tonnes in 2021, were banned by the EU as of the beginning of April 2022 (European Council, 2022). The change in wood pellet trade with Belarus, the Russian Federation and Ukraine as a result of the war in Ukraine, might result in an increase demand for alternative sources of wood pellets from Europe and North America.

Western Balkans¹⁶

The countries in the Western Balkan subregion consumed 22.7 million m³ of fuelwood in 2021, about 0.8 million m³ less than in 2020. A relatively mild winter and an increasing number of households transitioning to using wood pellets explains this trend.

The amount of fuelwood destined for export from the region is significant (over 7% of production). Export of fuelwood increased by 32.5% (1.73 million m³) in 2021 with Italy as the main destination (see Agency for Statistics of Bosnia and Herzegovina, 2022; Croatian Bureau of Statistics, 2022; Institute for Statistics of Albania, 2022; Statistical Office of Montenegro, 2022; State Statistical Office of the Republic of North Macedonia, 2022; Statistical Office of the Republic of Serbia, 2022; Statistical Office of the Republic of Slovenia, 2022; University of Belgrade-Faculty of Forestry, 2022).

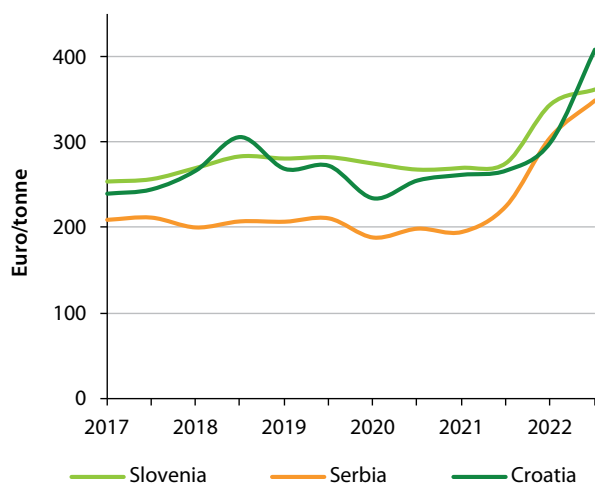
The average value of a 1 m³ of exported fuelwood was \$83.5 in 2021, about 6% higher than the average annual price in 2020 (UN Comtrade, 2022).

Decline in production, growth in exports and production costs, and household purchase of fuelwood in the face of uncertain prices for natural gas and electricity triggered this sharp price increase. Fuelwood prices in domestic markets increased by approximately 30% year-over-year in May 2022 and accelerated further to reach an annual increase of 50% by September 2022 (University of Belgrade-Faculty of Forestry, 2022). Shortages of fuelwood have been reported in Bosnia and Herzegovina, and Serbia by mid-2022. Governments in Belgrade and Sarajevo have implemented temporary export controls to protect local markets (New Economy Journal, 2022; Chamber of Commerce of the Republic of Srpska, 2022).

Wood pellet production by member States in the Western Balkan subregion increased by 12.4% to 1.8 million tonnes in 2021. The production of ENplus certified wood pellets (A1 and A2 qualities) totalled 1.27 million tonnes, about 70% of total production, with a majority being certified as A2 (University of Belgrade-Faculty of Forestry, 2022). Wood pellet prices also experienced a sharp increase during the first half of 2022 driven by uncertainty in global energy markets. (Graph 6.1).

¹⁶ The Western Balkans comprise Albania, Bosnia and Herzegovina, Croatia, Montenegro, North Macedonia, Serbia and Slovenia



GRAPH 6.1
Wood pellets average domestic market prices in Croatia, Serbia and Slovenia


Note: Average market prices of wood pellets (including VAT, 15 kg bags) as of April in selected member States of the Western Balkans.

Sources: University of Belgrade-Faculty of Forestry, 2022; Slovenian Forestry Institute; 2022).

Other wood fuel markets continued recent trends, with sustained growth in the production of wood chips (used in district heating and combined heat and power systems), and the reduction in charcoal and wood briquette consumption. Similar to the case of wood pellets, in the first quarter of 2022 the prices of wood chips increased by 25-30% compared to October 2021 throughout the region. Charcoal prices have risen by 19-26% over the same period.

Eastern Europe, Caucasus and Central Asia

The Russian Federation increased its exports of wood pellets to 2.4 million tonnes in 2021, an increase of 28% over the previous year. The total value of wood pellets exported from the Russian Federation increased by over 28% to USD 370 million in 2021. 75% of production was exported to Belgium, Denmark Italy, the Netherlands and the United Kingdom.

Belarus also increased its exports, reaching 598 thousand tonnes in 2021, an increase by 13% year-on-year. The total value of wood pellets exported from Belarus, however, decreased by 1.4% to USD 65 million. Almost all volumes exported from Belarus (94%) were destined to three neighbouring member States, Latvia (345 thousand tonnes), Lithuania (138 thousand tonnes and Poland (77 thousand tonnes) (UN Comtrade, 2022).

North America

Between 2020 and 2021, energy production from renewable sources in the United States increased over 5%, with wood energy production increasing by nearly 2% (EIA, 2022a). Production capacity of wood pellets grew nearly 5%, from 11.2 million tonnes in 2020 to 11.8 million tonnes by the end of 2021 (EIA, 2022b). States in the south of the United States hold close to 80% of all wood pellet mill capacity where production is directed to utility-grade pellets for export. Production of utility grade pellets accounted for 81% of the total United States wood pellet production in 2021, a 2% increase from the previous year. The United Kingdom, with 6.8 million tonnes remains the top export market (72% of all exports in 2021, volume) followed by Netherlands (16%) and Denmark (6%) (USITC, 2022). Total wood pellet production in the United States was stable in 2021 at around 8.4 million tonnes and jumped by almost 14% by end of first quarter of 2022, compared with same period in 2021 (EIA, 2022a).

As reported by the United States Department of Energy (EIA, 2022b), the average domestic price for wood pellets rose by 16% in real terms (constant 2021 US dollars) in 2021, from \$185 per tonne in 2020 to \$214 per tonne in 2021. Similarly, the average export price increased by 6%, from \$176 per tonne to \$187 per tonne, year-on-year. Rising prices for oil, gas and electricity could result in higher domestic residential demand for wood energy, while Europe's import ban of wood pellets from the Russian Federation and Belarus will likely increase demand for the United States pellet exports (Voegelé, 2022).

An executive order on "Strengthening the Nation's Forests, Communities, and Local Economies", tasked the United States Department of Agriculture to pursue science-based, sustainable forest and land management alternatives. The Forest Service is invited to develop wood product innovations that enhance carbon sequestration while providing economic opportunities and increasing demand for small-diameter wood generated through hazardous fuels and restoration treatments aiming at reducing dangerous fuel levels (USDA, 2022). Hazardous fuels are characterized by dense understory and/or mid-story and accumulated vegetation (live or dead) that would threaten the overstory in case of wildfire. This executive order could possibly increase the supply of wood fibres used for bioenergy from national forests and grasslands.

In Canada, the wood products industry consumed about 17.3 million tonnes of spent pulping liquors to provide process energy in 2020, a decline of 8% from the previous year (Statistics Canada, 2022c). This decline is likely linked to the pandemic, which affected production beginning in spring of 2020. About 10.5 million tonnes of solid wood waste was also used by the industry in 2020, a 9% drop from the previous year (Statistics Canada, 2022c). Solid wood waste includes both wood processing residues and post-consumer wood. The drop

in consumption was mainly driven by a reduced availability of wood processing residues due to less overall production in the forest-based industries.

Wood fuel consumption remained low at about 0.61 million tonnes in 2020. Domestic wood pellet consumption is relatively small but almost doubled from an estimated 0.42 million tonnes in 2020 to 0.73 million tonnes in 2021 (Watters, 2021).

Canada's production of wood pellets decreased slightly from 2020 figures to about 3.8 million tonnes in 2021. The current level of wood pellet production represents about 80% of existing Canadian pellet plant capacity, suggesting an increase in efficiency of capacity usage where production had been at 50% of installed capacity or less (Canadian Biomass, 2022). Some 3.14 million tonnes or about 88% of wood pellet production was exported in 2021. The largest export destinations were the United Kingdom (40%), Japan (35%), Republic of Korea (8 %) and the United States (6%) in 2021. Growth in exports slowed down during the COVID-19 pandemic, but exports to Japan and South Korea rose sharply from 2020 to 2021 (UN Comtrade, 2022; Statistics Canada, 2022d).

Extraregional influences on the UNECE

Expansion of Japan's feed-in-tariff programme is boosting demand for imported wood pellets. The imported volumes increased by 50% in 2021 and reached 3.1 million tonnes. Canada and Viet Nam are by far Japan's largest suppliers of wood pellets (UN Comtrade, 2022). Following a disruption in supply of wood pellets from Canada in late 2021 due to flooding, Canadian exports have recovered, and trade is expected to grow. Japan imported 321.2 thousand tonnes of wood pellets in January 2022, up by 81.5 thousand tonnes year-on-year and by 37.4 thousand tonnes from December 2021 (Argus Media, 2022).

Demand for wood pellets in the Republic of Korea remains strong with more than 75% being sourced from Asia (Indonesia, Malaysia and Viet Nam). The prospects for wider trade with Canada might improve as the market expands and sustainability criteria on biomass are implemented.





REFERENCES

References

- AF&PA. 2022. American Forest & Paper Association. Available at www.afandpa.org
- AFRY Management Consulting. 2022. Internal databases
- Agency for Statistics of Bosnia and Herzegovina. 2022. Databases. Available at: <http://www.bhas.ba/?lang=en>
- ANSA. 2022. Bosnia: temporary ban on wood export introduced Due to massive increase in prices. Available at: https://www.ansa.it/nuova_europa/en/news/countries/bosnia/2022/06/15/bosnia-temporary-ban-on-wood-export-introduced_f30a2f37-c902-442c-9dbd-57c8dba70850.html
- APA (The Engineered Wood Association). 2022a. Structural panel and engineered wood yearbook. Available at: www.apawood.org.
- APA (The Engineered Wood Association). 2022b. Market outlook and regional production. Economic report. Available at: www.apawood.org.
- Argus Media. 2022. Japan's January wood pellet imports rise. Available at: <https://www.argusmedia.com/en/news/2311333-japans-january-wood-pellet-imports-rise>
- Baltpool. 2021. Biomass exchange. Available at: <https://www.baltpool.eu/en/biomass-exchange/>
- BIS (Bank of International Settlements). 2022. BIS residential property price statistics, Q1 2022. Available at: https://www.bis.org/statistics/pp_residential_2208.htm
- BMEL. 2022. Massive Schäden - Einsatz für die Wälder Stürme, die extreme Dürre der Jahre 2018-2020 und der Borkenkäferbefall – das hat den Wäldern in Deutschland in den vergangenen Jahren immens zugesetzt. Available at: <https://www.bmel.de/DE/themen/wald/wald-in-deutschland/wald-trockenheit-klimawandel.html>
- BMO (Bank of Montreal). 2022. Canadian economic outlook. Available at: <https://economics.bmocapitalmarkets.com/economics/forecast/ca/cdamodel.pdf>
- Canadian Biomass. 2022. Pellet map 2022. Ottawa, Canada, <https://www.canadianbiomassmagazine.ca/canadian-biomass-pellet-mill-map/>
- CCA. 2022. Canadian Corrugated and Containerboard Association. Personal communication
- CEPI. 2022a. Confederation of European Paper Industries. Press release: EU Commission proposals on mandatory reductions risk causing greater uncertainty for industry in case of gas supply disruptions. Available at: <https://www.cepi.org/press-release-eu-commission-proposals-on-mandatory-reductions-risk-causing-greater-uncertainty-for-industry-in-case-of-gas-supply-disruptions/>
- CEPI. 2022b. Confederation of European Paper Industries. Available at: www.cepi.org
- Chamber of Commerce of the Republic of Srpska. 2022. ZABRANA IZVOZA OBLOVINE, OGREVNOG DRVETA I PELETA DO KRAJA SEPTEMBRA. Available at: <https://komorars.ba/zabrana-izvoza-oblovine-ogrevnog-drveta-i-peleta-do-kraja-septembra/>
- China Customs Bureau. 2022. Available at: <http://43.248.49.97/indexEn>
- China Paper Association. 2022. Available at: <http://enchinappi.org>
- CMHC (Canada Mortgage and Housing Corporation). 2022. Housing market outlook. Available at: www.cmhc-schl.gc.ca/en/data-and-research/publications-and-reports/preliminary-housing-start-data
- COMTRADE. 2022. Trade database of the United Nations Statistics Division (Comtrade). Available at: <https://comtrade.un.org/data>
- CPA (Composite Panel Association). 2022a. 2021 North American capacity report. Available at: www.compositepanel.org.
- CPA (Composite Panel Association). 2022b. Industry snapshot. Available at: www.compositepanel.org.
- CREA (Canadian Real Estate Association). 2022. Quarterly forecasts. Available at: www.crea.ca/housing-market-stats/quarterly-forecasts

- Croatian Bureau of Statistics. 2022. Databases. Available at: <https://www.dzs.hr/defaulte.htm>
- CRS (Congressional Research Service). 2022. Inflation Reduction Act: Agricultural, Conservation, Renewable Energy, and Forestry. August 3, 2022. Available at: <https://crsreports.congress.gov/product/pdf/IN/IN11978>
- CSIL. Centre for Industrial Studies. 2022. 'Furniture retailing in Europe'. Available at: <https://www.csilmilano.com/project/furniture-retailing/>
- Defays V. and Saerens A. 2021. Le secteur du sciage. État du secteur du sciage en Belgique en 2020. Available at: https://www.houtinfobois.be/wp-content/uploads/2021/09/FNS-Sciage2021_FR_VF.pdf
- Drax. 2022a. Annual report and accounts 2021. Available at: https://www.drax.com/wp-content/uploads/2022/03/Drax_AR2021_Strategic_Report.pdf
- Drax. 2022b. Hundreds of millions of pounds worth of contracts available to build world's biggest carbon capture project at Drax. Available at: https://www.drax.com/press_release/hundreds-of-millions-of-pounds-worth-of-contracts-available-to-build-worlds-biggest-carbon-capture-project-at-drax/
- Dugan, R. 2022. The road ahead for the economy and housing. Available at: <https://www.cmhc-schl.gc.ca/en/blog/2022/road-ahead-economy-housing>
- ECB (European Central Bank). 2022. Economic Bulletin, Issue 5, 2022. Available at: <https://www.ecb.europa.eu/pub/economic-bulletin/html/eb202205.en.html>
- EIA. 2022a. The United States Department of Energy, Energy Information Administration (EIA). 2022a. Total Energy, Annual Energy Review. Available at: <https://www.eia.gov/totalenergy/data/annual/>
- EIA. 2022b. The United States Department of Energy, Energy Information Administration (EIA). 2022b. Monthly densified biomass fuel report (EIA 63C). Available at: <https://www.eia.gov/biofuels/biomass/>
- Ellson, J. 2022. Canada officially launches challenge on U.S. duties on softwood lumber. Available at: <https://www.woodbusiness.ca/canada-officially-launches-challenge-on-u-s-duties-on-softwood-lumber>
- EN plus. 2022. Databases. Available at: <https://enplus-pellets.eu/en-in/certifications-en-in/producer-en-in.html>
- Enerkem. 2021. Enerkem achieves a major breakthrough by producing sustainable aviation fuel from local forest biomass. Available at: <https://enerkem.com/news-release/enerkem-achieves-a-major-breakthrough-by-producing-sustainable-aviation-fuel-from-local-forest-biomass/>
- Environment and Climate Change, Canada (ECCC). 2022. Clean Fuel Standard: proposed regulatory approach. Ottawa, Canada: Environment and Climate Change Canada. Available at: <https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/pricing-pollution/Clean-fuel-standard-proposed-regulatory-approach.pdf>
- EPF (European Panel Federation). 2022. European Panel Federation annual report 2021-2022.
- Euroconstruct. 2013. 75th Euroconstruct Summer Report, Summer 2022. June. Copenhagen, Denmark. Euroconstruct.
- Euroconstruct. 2022a. 93rd Euroconstruct Summer Report, Summer 2022. June. Warsaw, Poland. Euroconstruct.
- EUROCONSTRUCT. 2022b. Press release. Available at https://euroconstruct.org/ec/press/pr2022_93
- European Commission Expert Group. 2020. 2nd Meeting of the "expert group/multi-stakeholder platform on protecting and restoring the world's forests (EUTR/FLEGT)". Available at: <https://ec.europa.eu/transparency/expert-groups-register/screen/meetings/consult?lang=en&fromExpertGroups=true&meetingId=23097>
- European Commission. 2020. A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives. Accessed 16 August 2022. EUR-Lex: Access to European Union Law. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603122220757&uri=CELEX:52020DC0662>
- European Commission. 2021a. New EU forest strategy for 2030. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0572&from=EN>
- European Commission. 2021b. Biodiversity strategy for 2030. Accessed 15 August 2022. European Commission - Environment. Available at: https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en

- European Commission. 2021c. Land use and forestry regulation for 2021-2030. Climate Action. Accessed 16 August 2022. Available at: https://ec.europa.eu/clima/eu-action/forests-and-agriculture/land-use-and-forestry-regulation-2021-2030_en
- European Commission. 2022a. A European Green Deal. Accessed 15 August 2022. Available at: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
- European Commission. 2022b. Recovery plan for Europe. Accessed 15 August 2022. European Commission. Available at: https://ec.europa.eu/info/strategy/recovery-plan-europe_en
- European Commission. 2022c. REPowerEU: Joint European action for more affordable, secure and sustainable energy. Accessed 16 August 2022. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511
- European Commission. 2022d. Renovation wave. Available at: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en
- European Council. 2022. Council Regulation (EU) 2022/576 of 8 April 2022 amending Regulation (EU) No 833/2014 concerning restrictive measures in view of Russia's actions destabilising the situation in Ukraine. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_2022.111.01.0001.01.ENG&toc=OJ%3AL%3A2022%3A111%3ATOC
- European Council. 2022. Council Regulation (EU) 2022/576 of 8 April 2022 amending Regulation (EU) No 833/2014 concerning restrictive measures in view of Russia's actions destabilising the situation in Ukraine. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_2022.111.01.0001.01.ENG&toc=OJ%3AL%3A2022%3A111%3ATOC
- European Organisation of the Sawmill Industry. 2022. Annual Report of the European Sawmill Industry 2021-2022 Available at https://www.eos-oes.eu/en/sawmill_industry_annual_reports.php
- European Parliament. 2022a. Compromise Amendments 2021/0218(COD). Available at: https://www.europarl.europa.eu/meetdocs/2014_2019/plmrep/COMMITTEES/ENVI/DV/2022/05-16/CAs_RED_FINAL_EN.pdf
- European Parliament. 2022a. REPORT on the proposal for a directive of the European Parliament and of the Council amending Directive (EU) 2018/2001 of the European Parliament and of the Council, Regulation (EU) 2018/1999 of the European Parliament and of the Council and Directive 98/70/EC of the European Parliament and of the Council as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652. Available at: www.europarl.europa.eu/doceo/document/A-9-2022-0208_EN.html
- European Union. 2022. New European Bauhaus. Accessed 16 August 2022. About the initiative. Available at: https://europa.eu/new-european-bauhaus/about/about-initiative_en
- Eurostat. 2022a. House sales index of number of transactions (2015=100) - annual data. Available at: https://ec.europa.eu/eurostat/web/products-datasets/-/prc_hpi_hsna
- Eurostat. 2022b. Eurostat euroindicators. August. Available at: <https://ec.europa.eu/eurostat/documents/2995521/14675412/4-18082022-BP-EN.pdf>
- Eurostat. 2022c. Easy Comext Database of International Trade at CN8 level. Available at <https://ec.europa.eu/eurostat/web/main/data/database>
- FAOSTAT. 2021. Forest data. Available at: www.fao.org/faostat/en/#data/FO.
- Federal Register, 2022. Notices. Vol. 87, No. 152. August 9. Available at: <https://www.govinfo.gov/content/pkg/FR-2022-08-09/pdf/2022-17066.pdf>
- FEP. 2022. European Federation of the Parquet Industry. The European parquet market progressed significantly in 2021 and reached level not seen since 10 years. Available at: https://drive.google.com/file/d/14BCDwWF1_J_PQ3VA-Eqj9OHNQwWDe05Y/view
- Flach, B., Bolla, S. 2022. EU Wood Pellet Annual. US Department of Agriculture, Foreign Agricultural Service Report E42022-0049. Available at: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=EU%20Wood%20Pellet%20Annual_The%20Hague_European%20Union_E42022-0049.pdf
- Forest2Market. 2022. Paper-Polymer-Plastic: A New 'Rock Paper Scissors' Game For the Packaging Sector. 14 July 2022. Available at: <https://www.forest2market.com/blog/paper-polymer-plastics-a-new-rock-paper-scissors-game-for-packaging-professionals>

- Forisk Wood Fiber Review, FAO, APA, Forisk North American Capacity Database. Available at: <https://forisk.com/blog/2022/04/17/pulpwood-cost-drivers-in-north-america-a-primer/>
- FSC (Forest Stewardship Council). 2022a. Facts and figures. Available at: <https://fsc.org/en/facts-figures>
- FSC (Forest Stewardship Council). 2022b. Available at: <https://fsc.org/en/newsfeed/no-fsc-material-from-russia-and-belarus-until-the-invasion-ends>
- Glavonjić B. 2022. Personal communication
- Global Affairs Canada. 2021. Statement on WTO panel ruling against U.S. duties on Canadian softwood lumber. Available at: www.canada.ca/en/global-affairs/news/2021.html
- Hardwood Market Report. 2021. Various issues. Hardwood Market Report. Memphis, TN.
- Hogue, R. 2022. Bottom still a ways away for Canada's housing market. Available at: <https://thoughtleadership.rbc.com/bottom-still-a-ways-away-for-canadas-housing-market>
- Ibá. 2022 Associação Brasileira de Celulose e Papel (Ibá). Available at: www.iba.org/pt/dados-e-estatisticas/cenarios-iba
- IMF (International Monetary Fund). 2022. International Monetary Fund data exchange rates. Available at: <https://data.imf.org/?sk=388DFA60-1D26-4ADE-B505-A05A558D9A42>
- Infor (Chilean Customs data). 2022. Available at: www.infor.cl
- Institute for Statistics of Albania (INSTAT). 2022. Databases. Available at: <http://www.instat.gov.al/en/>
- Investopedia. 2022. Basis Point (BPS) Explained for Interest Rates and Investments. Available at: <https://www.investopedia.com/terms/b/basispoint.asp>
- Joint Research Centre. 2021. JRC Science for Policy Report. Forest reference levels under Regulation (EU) 2018/841 for the period 2021–2025 Overview and main findings of the technical assessment. Available at: file:///C:/Users/steierer/Downloads/fri_assessment_jrc_science-to-policy_topublication_1_1.pdf
- Lang, A. 2021. Recent Pulp Mill Expansions and Closures. 3 August 2021. Available at: <https://forisk.com/blog/2021/08/03/recent-pulp-mill-expansions-and-closures/>
- Lang, A. 2022. Sawmill Investment Update: Map of U.S. South Expansions. 22 June 2022. Available at: <https://forisk.com/blog/2022/06/22/sawmill-investment-update-map-of-u-s-south-expansions/>
- LUKE/Natural Resources Institute Finland. 2022. Forest statistics. Available at <https://www.luke.fi/en/statistics>
- Luppold, W and M Bumgardner. 2021. The northern hardwood resource: a market perspective. Presentation at the Northern Hardwood Conference. Virtual. June 15, 2021.
- Luppold, WG and MS Bumgardner. 2022. Analyzing changes in the U.S. wood furniture industry from 1997 to 2019: production, net imports, and consumption. *BioResources*. 17(1):939-951.
- MBA (Mortgage Bankers Association). 2022a. MBA mortgage finance forecast. July. Available at: www.mba.org
- MBA (Mortgage Bankers Association). 2022b. MBA mortgage finance forecast. August. Available at: www.mba.org
- Ministry of the National Economy of the Republic of Kazakhstan Committee on Statistics. 2022. About housing stock Republic of Kazakhstan. Available at: <http://stat.gov.kz>
- NAHB. 2022. June Inflation Reading the Highest since 1981. 13 July 2022. Available at: <https://eyeonhousing.org/2022/07/june-inflation-reading-the-highest-since-1981/>
- National Bureau of Statistics of the Republic of Moldova. 2022. Social statistics, dwelling stock. Available at: https://statistica.gov.md/public/files/publicatii_electronice/Anuar_Statistic/2021/Anuar_statistic_editia_2021.pdf
- National Statistical Committee of the Kyrgyz Republic. 2022. Kyrgyzstan brief statistical handbook 2019-2021. Available at: <http://www.stat.kg/media/publicationarchive/672efdec-dda1-400c-96b4-f0508d24d220.pdf>
- National Statistics Office of Georgia Statistical Committee of Georgia. 2022. Statistical yearbook of Georgia 2021. Available at: https://geostat.ge/media/42476/Yearbook_2021.pdf

- New Economy Journal, 2022. List of wood products whose export is prohibited for the next 60 days; Available at: <https://novaekonomija.rs/vesti-iz-zemlje/lista-proizvoda-od-drveta-%C4%8Dije-je-izvoz-zabranjen-narednih-60-dana>
- PEFC (Programme for the Endorsement of Forest Certification). 2021. Public consultation: Dutch forest certification system. Accessed 5 August 2022. Available at: <https://www.pefc.org/news/public-consultation-dutch-forest-certification-system>
- PEFC (Programme for the Endorsement of Forest Certification). 2022a. PEFC global statistics. Data: December 2021. Available at: <https://cdn.pefc.org/pefc.org/media/2022-03/b33a1b64-6d71-4dd1-a3dc-ede164221d2a/eaba7ece-0afd-56fa-bce9-b5ab265c95a4.pdf>
- PEFC (Programme for the Endorsement of Forest Certification). 2022b. Press release with FSC. Double certification FSC and PEFC – 2021 estimation. March 2022. Available at: <https://cdn.pefc.org/pefc.org/media/2022-03/e8c7aab3-8ead-4290-ad20-16f53de0a3f1/6d51e062-7233-53e3-9da0-a63ef63f99a1.pdf>
- PEFC (Programme for the Endorsement of Forest Certification). 2022c. Timber from Russia and Belarus considered 'conflict timber'. Accessed 3 August 2022. Available at: <https://pefc.org/news/timber-from-russia-and-belarus-considered-conflict-timber>
- PEFC (Programme for the Endorsement of Forest Certification). 2022d. UK Forest Certification System submitted for assessment. Accessed 5 August 2022. Available at: <https://www.pefc.org/news/uk-forest-certification-system-submitted-for-assessment>
- PPPC (Pulp and Paper Products Council). 2022. PPPC's Monthly Flash Reports on the market pulp, printing and writing, and newsprint sectors. Available at: <https://www.pppc.org/info/index.html>
- PwC. 2022. Emerging trends in real estate 2022*: Europe 2022, road to recovery. Available at: <https://www.pwc.com/gx/en/industries/financial-services/asset-management/emerging-trends-real-estate/europe-2022.html>
- Random Lengths. 2022a. Random Lengths Weekly Report. Available at: www.randomlengths.com
- Random Lengths. 2022b. Random Lengths yearbook 2021. Available at: www.randomlengths.com
- RBC (Royal Bank of Canada). 2022. Quarterly economic update. Available at: www.rbc.com/economics/economic-reports/pdf
- Reuters. 2022. WTO awards Canada future right to impose duties on U.S. goods. Available at: <https://www.reuters.com/markets/wto-awards-canada-future-right-impose-duties-us-goods-2022-07-13/>
- Russ Taylor Global. 2022. Internal databases.
- Sarajevo Times. 2022. BiH temporarily bans the Export of Firewood. Available at: <https://sarajevotimes.com/bih-temporarily-bans-the-export-of-firewood/>
- Scotia Bank. 2022. Global real estate trends. Available at: www.scotiabank.com
- SEENEWS. 2022. Serbia suspends firewood exports to ensure stable supply. <https://seenews.com/news/serbia-suspends-firewood-exports-to-ensure-stable-supply-786158>
- SFI (Sustainable Forestry Initiative). 2022. SFI URBAN AND COMMUNITY FOREST SUSTAINABILITY STANDARD DEVELOPMENT. Accessed 5 August 2022. Available at: <https://forests.org/standard-development-process/>
- Slovenian Forestry Institute; Ljubljana. 2022. Databases. Available at: <https://www.gozdis.si/en/>
- Softwood Lumber Board. 2022. 2022 Q1 Quarterly Investment Update. Available at: <https://softwoodlumberboard.org/slb-programs-generated-487-million-board-feet-of-demand-in-q1-2022-slb-q1-report-now-available/>
- State Statistical Committee of the Republic of Azerbaijan. 2022. Construction. Available at: <https://stat.gov.az/source/construction/?lang=en>
- State Statistical Office of the Republic of North Macedonia. 2022. Databases. Available at: http://www.stat.gov.mk/Default_en.aspx
- State Statistics Service of Ukraine. 2021. Housing stock by regions in 2019 and 2020. Available at: <https://ukrstat.gov.ua/>
- Statistical Committee of the Republic of Armenia. 2022. Construction. Available at: <https://www.armstat.am/file/doc/99526853.pdf>
- Statistical Office of Montenegro. 2022. Databases. Available at: <https://www.monstat.org/eng/>

- Statistical Office of the Republic of Serbia.2022. Databases. Available at: <https://www.stat.gov.rs/en-US/>
- Statistical Office of the Republic of Slovenia.2022. Databases. Available at: <https://www.stat.si/StatWeb/en>
- Statistics Canada. 2022a. Canadian International Merchandise Trade Web Application. Ottawa, Canada, Available at: <https://www150.statcan.gc.ca/n1/pub/71-607-x/71-607-x2021004-eng.htm>
- Statistics Canada. 2022b. Lumber production, shipments, and stocks by species. <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1610001701>
- Statistics Canada. 2022c. Table 25-10-0031-01 - Consumption of solid wood waste and spent pulping liquor for energy production, annual. Ottawa, Canada. Available at: <https://doi.org/10.25318/2510003101-eng>
- Statistics Canada. 2022d. Canadian International Merchandise Trade Database Table 980-0044. Available at: www.statcan.gc.ca.
- Swedish Energy Agency. 2022. Årskrönika 2021 summerar svängig energimarknad Available at: <http://www.energimyndigheten.se/om-oss/press/prenumerera/laget-pa-energimarknaderna/de-globala-energimarknaderna/arskronika-2021-summarar-svängig-energimarknad/>
- TD Bank. 2022. Long-term forecast. Available at: <https://economics.td.com/us-long-term-forecast>
- The State Committee of the Republic of Uzbekistan on Statistics. 2022. Quarterly reports 2021, 2022. Available at: <https://stat.uz/en/quarterly-reports>
- Trade Data Monitor 2022. <https://www.tdmlogin.com/tdm/index.html>
- TwoSides. 2022. Paper or Plastic? In a Circular Economy, the Answer is Clear. 11 July 2022. Available at: <https://twosidesna.org/US/paper-or-plastic-in-a-circular-economy-the-answer-is-clear/>
- UK Forest Research. 2022. UK Wood Production and Trade: provisional figures. Available at: <https://www.forestresearch.gov.uk/tools-and-resources/statistics/statistics-by-topic/timber-statistics/uk-wood-production-and-trade-provisional-figures>
- UN Comtrade. 2021. UN Comtrade database. Available at: <https://comtrade.un.org/db>.
- UN Comtrade. 2022. UN Comtrade database. New York. Available at: <http://comtrade.un.org/db>
- UNECE/FAO database. 2021. Available at: www.unece.org/forests/fpm/onlinedata.html
- UNECE/FAO. 2021. Forest products annual market review 2020-2021. Available at: <https://unece.org/forests/fpamr2021>
- United Nations (UN). 2022. Resolution adopted by the General Assembly on 2 March 2022. A/RES/ES-11/1. Available at: https://digitallibrary.un.org/record/3965290/files/A_RES_ES-11_1-EN.pdf
- University of Belgrade-Faculty of Forestry. 2022. Timber Trade Centre internal database. Belgrade
- US Bureau of Labor Statistics. 2022. Databases, tables & calculators by subject, prices-producer, commodity data. <https://www.bls.gov/data>
- US Census Bureau. 2022a. New residential construction in July 2022. Available at: <https://www.census.gov/construction/nrc/pdf/newresconst.pdf>
- US Census Bureau. 2022b. Value of construction put in place at a glance, monthly construction spending, July 2022. Available at: <https://www.census.gov/construction/c30/pdf/release.pdf>
- US Census Bureau. 2022c. US housing starts. Available at: www.census.gov
- US Census Bureau. 2022da. New residential construction. <https://www.census.gov/construction/nrc/index>
- US Census Bureau. 2022eb. Construction spending. https://www.census.gov/construction/c30/historical_data.html
- US Federal Reserve Bank of St. Louis. 2022. Industrial production, total index. <https://fred.stlouisfed.org/series/INDPROs>
- US Securities and Exchange Commission (SEC). 2022. SEC Proposes to Enhance Disclosures by Certain Investment Advisers and Investment Companies About ESG Investment Practices. 25 May 2022. Available at: <https://www.sec.gov/news/press-release/2022-92>
- USDA- FAS. 2022a. USDA Foreign Agricultural Service. Global agricultural trade system. Available at: <https://apps.fas.usda.gov/gats>



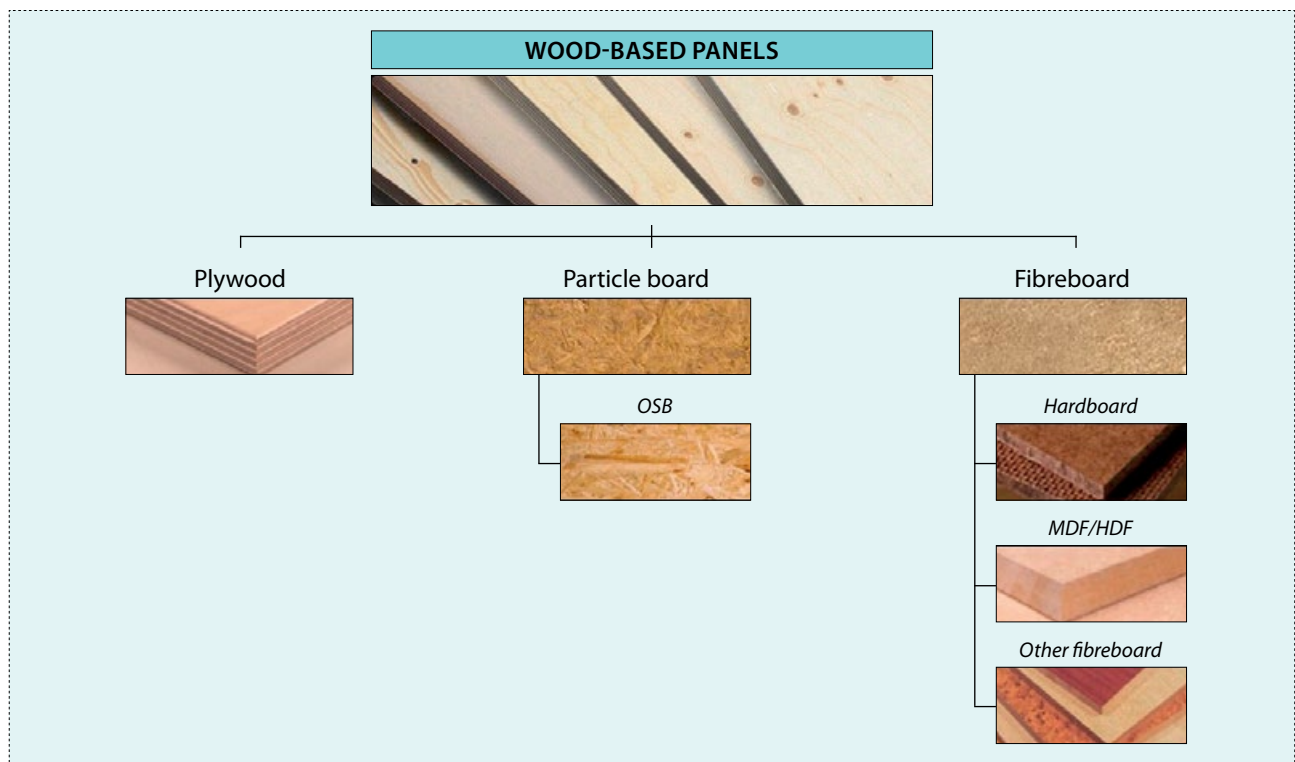
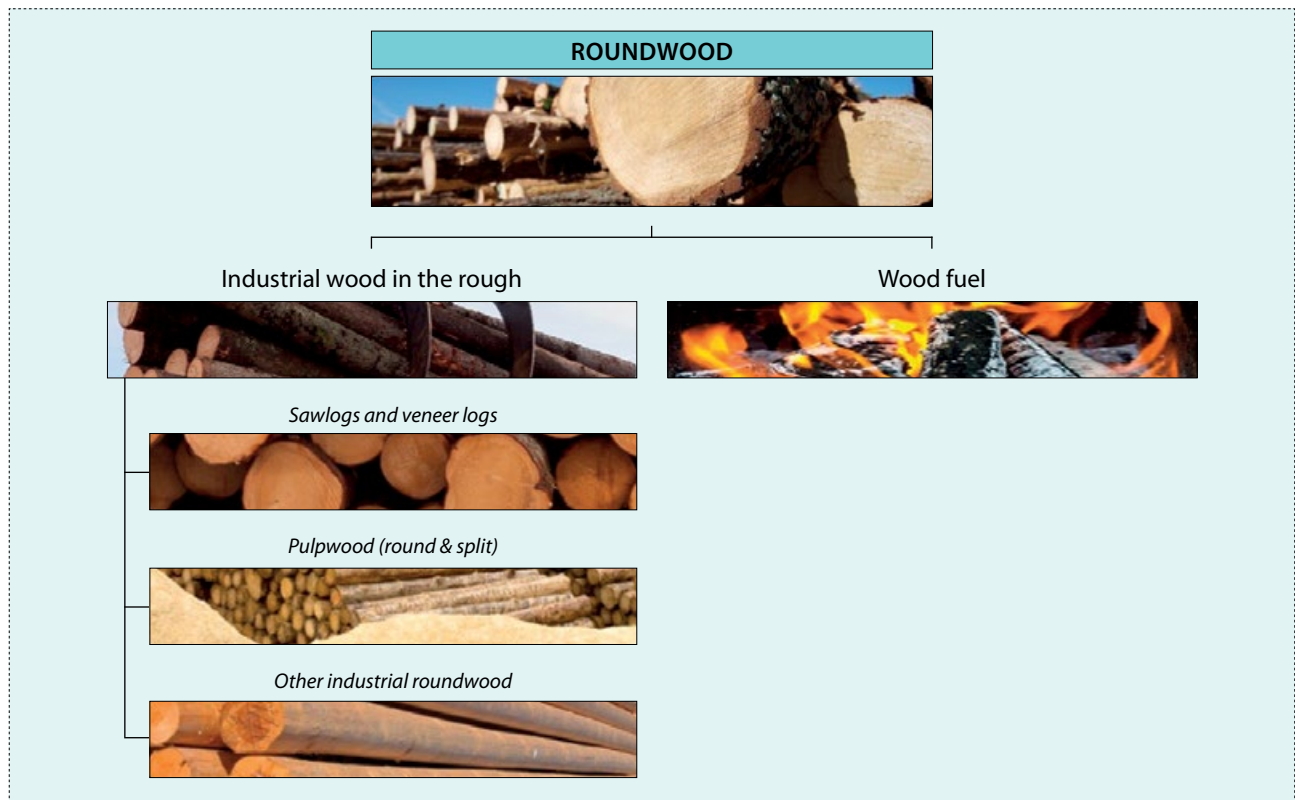
ANNEXES

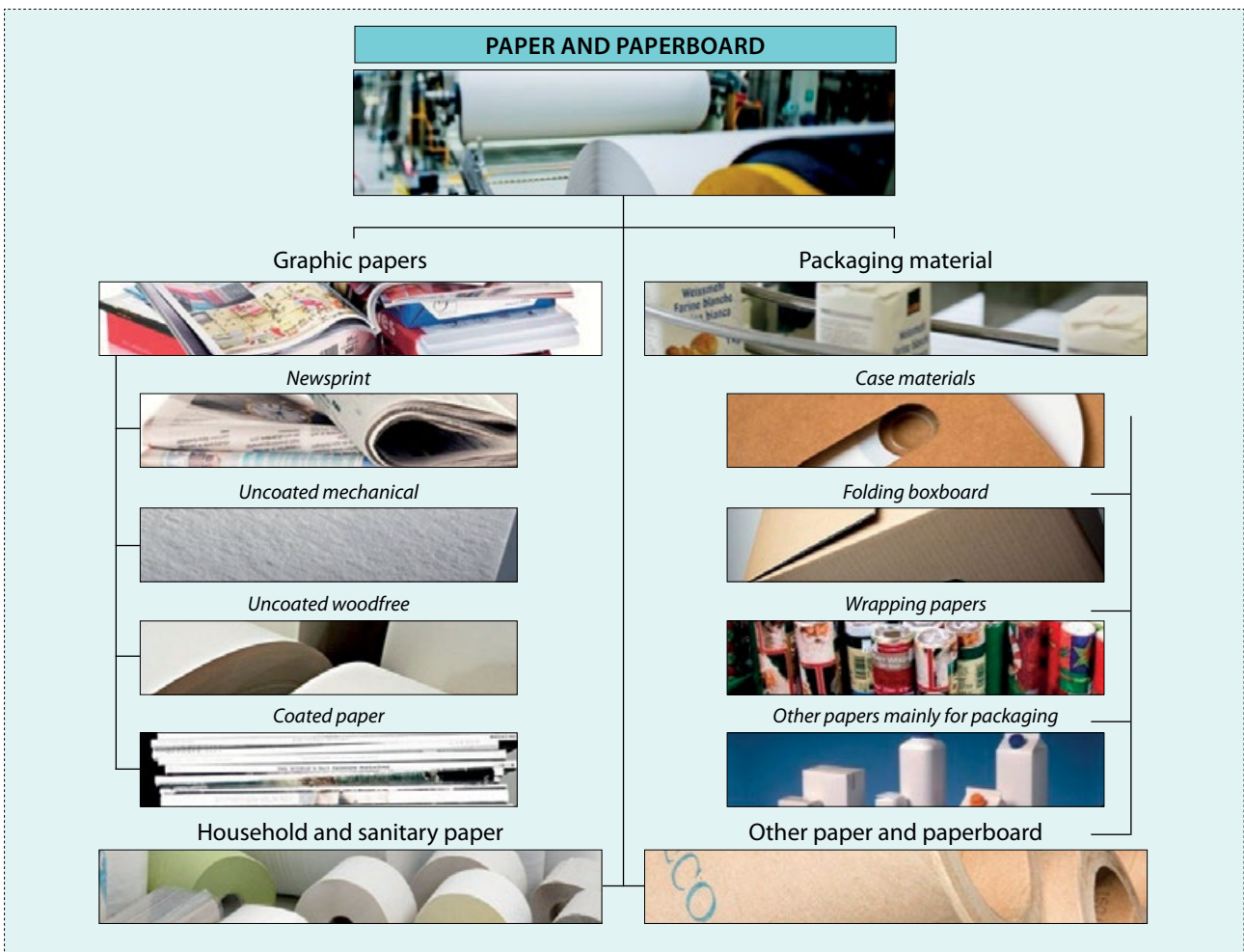
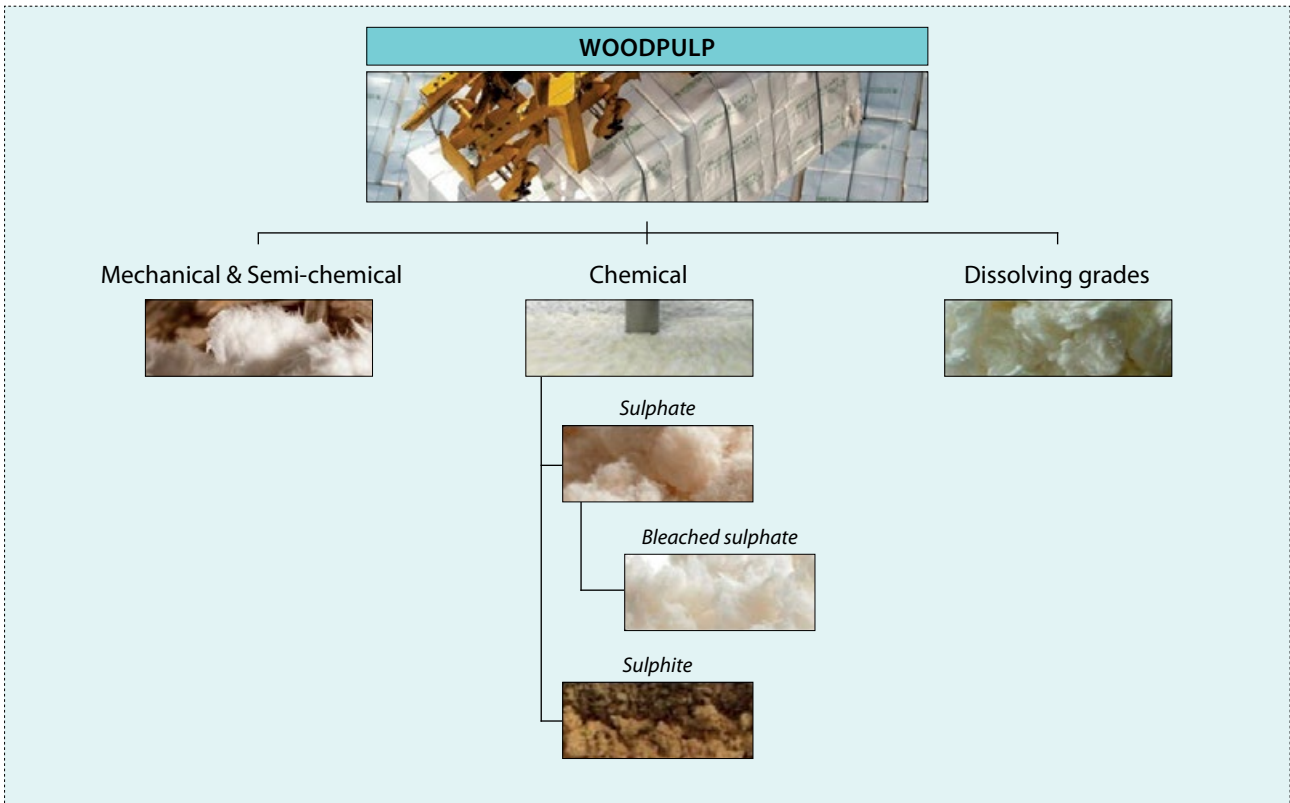
COMPONENTS OF WOOD PRODUCTS GROUPS	56
Roundwood	56
Wood-based panels	56
Woodpulp	57
Paper and paperboard	57
COUNTRIES IN THE UNECE REGION AND ITS SUBREGIONS	58
LIST OF AUTHORS	59
SOME FACTS ABOUT THE EUROPEAN FORESTRY COMMISSION	60
SOME FACTS ABOUT THE COMMITTEE ON FORESTS AND THE FOREST INDUSTRY	61
UNECE/FAO PUBLICATIONS	62

COMPONENTS OF WOOD PRODUCTS GROUPS

(Based on Joint Forest Sector Questionnaire nomenclature)

The diagrams below show the important breakdowns of the major groups of primary forest products. In addition, some sub-items (all roundwood products; sawnwood; and veneer and plywood) are further divided into softwood and hardwood. Items that do not fit into listed aggregates are not shown. These are wood charcoal; wood chips and particles; wood residues; recovered wood; pellets and agglomerates; sawnwood; veneer; other pulp; and recovered paper.





Sources for images in these diagrams are databanks of Metsä Group (2012), Raunio Saha (2012), Stora Enso (2012) and UPM (2012).

COUNTRIES IN THE UNECE REGION AND ITS SUBREGIONS

Eastern Europe, Caucasus and Central Asia	European Union		Europe (other countries)
Armenia Azerbaijan Belarus Georgia Kazakhstan Kyrgyzstan Republic of Moldova Russian Federation Tajikistan Turkmenistan Ukraine Uzbekistan	Austria Belgium Bulgaria Croatia Cyprus Czech Republic Denmark Estonia Finland France Germany Greece Hungary Ireland	Italy Latvia Lithuania Luxembourg Malta Netherlands Poland Portugal Romania Slovakia Slovenia Spain Sweden	Albania Andorra Bosnia and Herzegovina Iceland Israel Liechtenstein Monaco Montenegro North Macedonia Norway San Marino Serbia Switzerland Türkiye United Kingdom of Great Britain and Northern Ireland
North America			
Canada United States of America			

LIST OF AUTHORS

<i>Given name</i>	<i>Family name</i>	<i>Chapter(s)</i>	<i>Affiliation</i>	<i>Email address</i>
Orifjon	Abidov	4	European Panel Federation, Brussels, Belgium	orifjon.abidov@europanel.org
Francisco	Aguilar	6	Swedish University of Agricultural Sciences, (SLU), Uppsala, Sweden	francisco.aguilar@slu.se
Eduard	Akim	5	State Technological University of Plant Polymers, St Petersburg, Russian Federation	akim-ed@mail.ru
Delton	Alderman	1	USDA Forest Service, Princeton, West Virginia, United States of America	delton.r.alderman@usda.gov
Diego	Benedetti	3	European Organisation of the Sawmill Industry (EOS), Belgium	diego.benedetti@eos-oes.eu
Consuelo	Brandeis	6	USDA Forest Service, Knoxville, Tennessee, United States of America	consuelo.brandeis@usda.gov
Matthew	Bumgardner	3	USDA Forest Service, Delaware, Ohio, United States of America	matthew.bumgardner@usda.gov
Ivan	Eastin	4	University of Washington, Seattle, Washington, United States of America	eastin@uw.edu
Kathryn	Fernholz	1	Dovetail Partners, Minneapolis, Minnesota, United States of America	katie@dovetailinc.org
Branko	Glavonjić	6	Faculty of Forestry, Belgrade State University, Belgrade, Serbia	branko.glavonjic@sfb.bg.ac.rs
Antti	Koskinen	2	AFRY management consulting, Vantaa, Finland	antti.koskinen@afry.com
Bernard	Lombard	5	Confederation of European Paper Industries (CEPI), Belgium	b.lombard@cepi.org
Warren	Mabee	6	Queens University, Kingston, Ontario, Canada	warren.mabee@queensu.ca
José	Palacín	1	UNECE, Geneva, Switzerland	jose.palacin@un.org
Russ	Taylor	2	Russtaylorglobal.com, Vancouver, British Columbia, Canada	russtaylor@russtaylorglobal.com
Michel	Valois	5	Valois Vision Marketing, Vancouver, British Columbia, Canada	michel@valoisvision.com
Johan	Vinterbäck	6	Swedish Energy Agency, Eskilstuna, Sweden	johan.vinterback@energimyndigheten.se
Jeremy	Wall	1	Deputy leader of the Team of Specialists on Sustainable Forest Products, United Kingdom	jauerl@telenet.be

SOME FACTS ABOUT THE EUROPEAN FORESTRY COMMISSION

The European Forestry Commission (EFC), which was created in 1947, is one of six regional forestry commissions established by FAO to provide a policy and technical forum for countries to discuss and address forest issues on a regional basis.

The purpose of the EFC is to advise on the formulation of forest policies and to review and coordinate their implementation at the regional level; exchange information; advise on suitable practices and actions to address technical and economic problems (generally through special subsidiary bodies); and make appropriate recommendations in relation to the foregoing. The EFC meets every two years and its official languages are English, French and Spanish.

The EFC has a number of associated subsidiary bodies, including the Working Party on the Management of Mountain Watersheds; the UNECE/FAO Working Party on Forest Statistics, Economics and Management; and seven UNECE/FAO Teams of Specialists. The Committee on Mediterranean Forestry Issues (*Silva Mediterranea*) informs the EFC.

FAO encourages the wide participation of government officials from forestry and other sectors as well as representatives of international, regional and subregional organizations that deal with forest-related issues in the region, including non-governmental organizations and the private sector. Accordingly, the EFC is open to all members and associate members whose territories are situated wholly or in part in the European Region or who are responsible for the international relations of any non-self-governing territory in that region. Membership comprises such eligible member nations as have notified the Director-General of their desire to be considered as members.

The EFC is one of the technical commissions serving the FAO Regional Office for Europe and Central Asia (REU), and the EFC Secretary is based in Geneva. EFC work is regulated by its Rules of Procedures, which were adopted by the FAO Conference in 1961 and amended at the Eighteenth Session of the EFC in 1977.



SOME FACTS ABOUT THE COMMITTEE ON FORESTS AND THE FOREST INDUSTRY

The UNECE Committee on Forests and the Forest Industry (COFFI) is a principal subsidiary body of the UNECE based in Geneva. It constitutes a forum for cooperation and consultation between member countries on forestry, the forest industry and forest product matters. All countries of Europe and the EECCA, as well as the United States, Canada and Israel, are members of the UNECE and participate in its work.

The UNECE Committee on Forests and the Forest Industry shall, within the context of sustainable development, provide member countries with the information and services needed for policymaking and decision-making with regard to their forest and forest industry sectors, including the trade and use of forest products and, where appropriate, it will formulate recommendations addressed to member governments and interested organizations. To this end, it shall:

1. with the active participation of member countries, undertake short-, medium- and long-term analyses of developments in, and having an impact on, the sector, including those developments offering possibilities for facilitating international trade and for enhancing the protection of the environment;
2. in support of these analyses, collect, store and disseminate statistics relating to the sector, and carry out activities to improve their quality and comparability;
3. provide a framework for cooperation, for example by organizing seminars, workshops and ad hoc meetings and setting up time-limited ad hoc groups, for the exchange of economic, environmental and technical information between governments and other institutions of member countries required for the development and implementation of policies leading to the sustainable development of the sector and the protection of the environment in their respective countries;
4. carry out tasks identified by the UNECE or the Committee on Forests and the Forest Industry as being of priority, including the facilitation of subregional cooperation and activities in support of the economies in transition of central and eastern Europe and of the countries of the region that are developing from an economic perspective; and
5. keep under review its structure and priorities and cooperate with other international and intergovernmental organizations active in the sector, particularly FAO and its European Forestry Commission and the International Labour Organization, in order to ensure complementarity and avoid duplication, thereby optimizing the use of resources.

More information about the work of the EFC and COFFI may be obtained by contacting:

UNECE/FAO Forestry and Timber Section
Forests, Land and Housing Division
United Nations Economic Commission for Europe/
Food and Agriculture Organization of the United Nations
Palais des Nations
CH-1211 Geneva 10, Switzerland

info.ECE-FAOforests@un.org

www.unece.org/forests

UNECE/FAO PUBLICATIONS

Geneva Timber and Forest Study Papers

Reporting on Forests and Sustainable Forest Management in the Caucasus and Central Asia	ECE/TIM/SP/53
Forest Products Annual Market Review 2020-2021	ECE/TIM/SP/52
Forest Sector Outlook Study, 2020-2040	ECE/TIM/SP/51
Forest Products Annual Market Review 2019-2020	ECE/TIM/SP/50
Forests in a Circular Economy	ECE/TIM/SP/49
Forest Products Annual Market Review 2018-2019	ECE/TIM/SP/48
State of Forests of the Caucasus and Central Asia	ECE/TIM/SP/47
Forest Products Annual Market Review 2017-2018	ECE/TIM/SP/46
Forests and Water	ECE/TIM/SP/44
Forest Ownership in the ECE Region	ECE/TIM/SP/43
Wood Energy in the ECE Region	ECE/TIM/SP/42
Forest Products Annual Market Review 2016-2017	ECE/TIM/SP/41
Forest Products Annual Market Review 2015-2016	ECE/TIM/SP/40
Forest Products Annual Market Review 2014-2015	ECE/TIM/SP/39
Promoting sustainable building materials and the implications on the use of wood in buildings	ECE/TIM/SP/38
Forests in the ECE Region: Trends and Challenges in Achieving the Global Objectives on Forests	ECE/TIM/SP/37
Forest Products Annual Market Review 2013-2014	ECE/TIM/SP/36
Rovaniemi Action Plan for the Forest Sector in a Green Economy	ECE/TIM/SP/35
The Value of Forests: Payments for Ecosystem Services in a Green Economy	ECE/TIM/SP/34
Forest Products Annual Market Review 2012-2013	ECE/TIM/SP/33
The Lviv Forum on Forests in a Green Economy	ECE/TIM/SP/32
Forests and Economic Development: A Driver for the Green Economy in the ECE Region	ECE/TIM/SP/31
Forest Products Annual Market Review 2011-2012	ECE/TIM/SP/30
The North American Forest Sector Outlook Study 2006-2030	ECE/TIM/SP/29
European Forest Sector Outlook Study 2010-2030	ECE/TIM/SP/28
Forest Products Annual Market Review 2010-2011	ECE/TIM/SP/27
Private Forest Ownership in Europe	ECE/TIM/SP/26
Forest Products Annual Market Review 2009-2010	ECE/TIM/SP/25
Forest Products Annual Market Review 2008-2009	ECE/TIM/SP/24
Forest Products Annual Market Review 2007-2008	ECE/TIM/SP/23
Forest Products Annual Market Review 2006-2007	ECE/TIM/SP/22
Forest Products Annual Market Review, 2005-2006	ECE/TIM/SP/21
European Forest Sector Outlook Study: 1960 – 2000 – 2020, Main Report	ECE/TIM/SP/20
Forest policies and institutions of Europe, 1998-2000	ECE/TIM/SP/19
Forest and Forest Products Country Profile: Russian Federation <i>(Country profiles also exist on Albania, Armenia, Belarus, Bulgaria, former Czech and Slovak Federal Republic, Estonia, Georgia, Hungary, Lithuania, Poland, Romania, Republic of Moldova, Slovenia and Ukraine)</i>	ECE/TIM/SP/18
Forest resources of Europe, CIS, North America, Australia, Japan and New Zealand	ECE/TIM/SP/17

Note: Additional market-related information is available in electronic format at www.unece.org/forests.

Geneva Timber and Forest Discussion Papers (original language only)

COVID-19 Impacts on the Forest Sector in Countries in the Western Balkans	*ECE/TIM/DP/89
COVID-19 Impacts on the Forest Sector in Countries in Eastern Europe, Caucasus and Central Asia	*ECE/TIM/DP/88
Forest Landscape Restoration in Eastern and South-East Europe	ECE/TIM/DP/87
Overview of the State of Forests and Forest Management in Uzbekistan	ECE/TIM/DP/85
Overview of the State of Forests and Forest Management in Turkmenistan	ECE/TIM/DP/84
Overview of the State of Forests and Forest Management in Tajikistan	ECE/TIM/DP/83
Overview of the State of Forests and Forest Management in Kyrgyzstan	ECE/TIM/DP/82
Overview of the State of Forests and Forest Management in Kazakhstan	ECE/TIM/DP/81
Overview of the State of Forests and Forest Management in Georgia	ECE/TIM/DP/80
Overview of the State of Forests and Forest Management in Azerbaijan	ECE/TIM/DP/79
Overview of the State of Forests and Forest Management in Armenia	ECE/TIM/DP/78
Guidelines on the Promotion of Green Jobs in Forestry	ECE/TIM/DP/77
Forest Sector Workforce in the UNECE Region	ECE/TIM/DP/76
Rovaniemi Action Plan for the Forest Sector in a Green Economy: Mid-term Review	ECE/TIM/DP/75
Trends in green jobs in the forest sector in the UNECE region	ECE/TIM/DP/74
Guidelines for the Development of a Criteria and Indicator Set for Sustainable Forest Management	ECE/TIM/DP/73
Forest Landscape Restoration in the Caucasus and Central Asia	ECE/TIM/DP/72
Green Jobs in the Forest Sector	*ECE/TIM/DP/71
Measuring the Value of Forests in a Green Economy	*ECE/TIM/DP/70
Forecast of the Committee on Forests and the Forest Industry: Forest Products Production and Trade 2016-2018	*ECE/TIM/DP/69
Forecast of the Committee on Forests and the Forest Industry: Forest Products Production and Trade 2015-2017	*ECE/TIM/DP/68
ECE Committee on Forests and the Forest Industry and European Forestry Commission: 70 years working in the Service of Forests and people	ECE/TIM/DP/67
Pilot project on the System for the Evaluation of the Management of Forests (SEMAFOR)	ECE/TIM/DP/66
Comparative assessment of wood biomass for energy in Europe	*ECE/TIM/DP/65
Forecast of the Committee on Forests and the Forest Industry: Forest Products Production and Trade 2014-2016	ECE/TIM/DP/64
Forecast of the Committee on Forests and the Forest Industry: Forest Products Production and Trade 2013-2015	ECE/TIM/DP/63
Competitiveness of the European Forest Sector	ECE/TIM/DP/62
Forecast of the Committee on Forests and the Forest Industry: Forest Products Production and Trade 2012-2014	ECE/TIM/DP/61
Forecast of the Committee on Forests and the Forest Industry: Forest Products Production and Trade 2011-2013	ECE/TIM/DP/60
Econometric Modelling and Projections of Wood Products Demand, Supply and Trade in Europe	ECE/TIM/DP/59
Swedish Forest Sector Outlook Study	ECE/TIM/DP/58
The Importance of China's Forest Products Markets to the UNECE Region	ECE/TIM/DP/57
Good Practice Guidance on Sustainable Mobilisation of Wood: Proceedings from the Grenoble Workshop	*ECE/TIM/DP/56
Harvested Wood Products in the Context of Climate Change Policies: Workshop Proceedings - 2008	*ECE/TIM/DP/55
The Forest Sector in the Green Economy	ECE/TIM/DP/54
National Wood Resources Balances: Workshop Proceedings	*ECE/TIM/DP/53
Potential Wood Supply in Europe	*ECE/TIM/DP/52
Wood Availability and Demand in Europe	*ECE/TIM/DP/51
Forest Products Conversion Factors for the UNECE Region	ECE/TIM/DP/49
Mobilizing Wood Resources: Can Europe's Forests Satisfy the Increasing Demand for Raw Material and Energy Under Sustainable Forest Management? Workshop Proceedings - January 2007	*ECE/TIM/DP/48
European Forest Sector Outlook Study: Trends 2000-2005 Compared to the EFSOS Scenarios	ECE/TIM/DP/47
Forest and Forest Products Country Profile; Tajikistan	*ECE/TIM/DP/46
Forest and Forest Products Country Profile: Uzbekistan	ECE/TIM/DP/45
Forest Certification – Do Governments Have a Role?	ECE/TIM/DP/44
International Forest Sector Institutions and Policy Instruments for Europe: A Source Book	ECE/TIM/DP/43
Forests, Wood and Energy: Policy Interactions	ECE/TIM/DP/42
Outlook for the Development of European Forest Resources	ECE/TIM/DP/41

Forest and Forest Products Country Profile: Serbia and Montenegro	ECE/TIM/DP/40
Forest Certification Update for the UNECE Region, 2003	ECE/TIM/DP/39
Forest and Forest Products Country Profile: Republic of Bulgaria	ECE/TIM/DP/38
Forest Legislation in Europe: How 23 Countries Approach the Obligation to Reforest, Public Access and Use of Non-Wood Forest Products	ECE/TIM/DP/37
Value-Added Wood Products Markets, 2001-2003	ECE/TIM/DP/36
Trends in the Tropical Timber Trade, 2002-2003	ECE/TIM/DP/35
Biological Diversity, Tree Species Composition and Environmental Protection in the Regional FRA-2000	ECE/TIM/DP/33
Forestry and Forest Products Country Profile: Ukraine	ECE/TIM/DP/32
The Development of European Forest Resources, 1950 To 2000: a Better Information Base	ECE/TIM/DP/31
Modelling and Projections of Forest Products Demand, Supply and Trade in Europe	ECE/TIM/DP/30
Employment Trends and Prospects in the European Forest Sector	ECE/TIM/DP/29
Forestry Cooperation with Countries in Transition	ECE/TIM/DP/28
Russian Federation Forest Sector Outlook Study	ECE/TIM/DP/27
Forest and Forest Products Country Profile: Georgia	ECE/TIM/DP/26
Forest certification update for the UNECE region, summer 2002	ECE/TIM/DP/25
Forecasts of economic growth in OECD and central and eastern European countries for the period 2000-2040	ECE/TIM/DP/24
Forest Certification update for the UNECE Region, summer 2001	ECE/TIM/DP/23
Structural, Compositional and Functional Aspects of Forest Biodiversity in Europe	ECE/TIM/DP/22
Markets for secondary processed wood products, 1990-2000	ECE/TIM/DP/21
Forest certification update for the UNECE Region, summer 2000	ECE/TIM/DP/20
Trade and environment issues in the forest and forest products sector	ECE/TIM/DP/19
Multiple use forestry	ECE/TIM/DP/18
Forest certification update for the UNECE Region, summer 1999	ECE/TIM/DP/17
A summary of "The competitive climate for wood products and paper packaging: the factors causing substitution with emphasis on environmental promotions"	ECE/TIM/DP/16
Recycling, energy and market interactions	ECE/TIM/DP/15
The status of forest certification in the UNECE region	ECE/TIM/DP/14
The role of women on forest properties in Haute-Savoie (France): Initial research	ECE/TIM/DP/13
Interim report on the Implementation of Resolution H3 of the Helsinki Ministerial Conference on the protection of forests in Europe (Results of the second enquiry)	ECE/TIM/DP/12
Manual on acute forest damage	ECE/TIM/DP/7

* signifies electronic publication only

Many of the above publications can be downloaded free of charge at:

www.unece.org/forests

Publications and subscriptions are available through United Nations Publications Offices as follows:

Sales and Marketing Section, Room DC2-853
 United Nations
 2 United Nations Plaza
 New York, NY 10017
 United States of America
 Fax: + 1 212 963 3489

E-mail: publications@un.org

Web site: <https://shop.un.org/>



Forest Products Annual Market Review 2021-2022

The *Forest Products Annual Market Review 2021-2022* provides a comprehensive analysis of markets in the UNECE region and reports on the main market influences beyond the region. It covers an overview on policies and economic developments, the markets trends of the main primary processed products as well as housing and wood energy. Statistics-based chapters analyse the markets for saw softwood, sawn hardwood, wood-based panels, paper, paperboard and woodpulp and wood energy. Underlying the analysis is a comprehensive collection of data. The *Review* highlights the role of sustainable forest products in international markets, discusses policies concerning forests and forest products, assesses and the main trends and drivers, and analyses the effects of the current economic situation on forest product markets.

The *Review* forms the basis of the Market Discussions held at annual sessions of the UNECE Committee on Forests and the Forest Industry, and it provides valuable objective information for other policymakers, researchers and investors.

Further information on forest product markets, as well as on the UNECE Committee on Forests and the Forest Industry and the FAO European Forestry Commission, is available at: www.unece.org/forests.

The *Review* has an extensive statistical annex, which is available at: www.unece.org/forests/fpamr2022-annex.

Information Service
United Nations Economic Commission for Europe

Palais des Nations
CH - 1211 Geneva 10, Switzerland
Telephone: +41(0)22 917 12 34
Fax: +41(0)22 917 05 05
E-mail: unece_info@un.org
Website: <http://www.unece.org>

ISBN 978-92-1-117318-5



9 789211 173185