

March 21, 2022

The environmental controversy surrounding wood-based biofuels

By Angelo Katsoras

Introduction

Many articles have been written analyzing whether the Russian invasion of Ukraine and subsequently tighter energy markets will make it more difficult for many countries to hit their green targets. However, beneath the headlines there is another looming challenge in this regard, particularly for Europe. It is the environmental controversy surrounding wood-based biofuels.

While biofuels can be made from a wide variety of sources ranging from organic waste to agricultural crops, the most widely used input is wood, which can be burned to fuel the generation of electricity.

Supporters of wood-based biofuels claim they are carbon neutral because the emissions released into the atmosphere are eventually offset by the replanting of trees. The fact that wood pellets can be burned in existing coal-fired power plants is viewed as another plus.

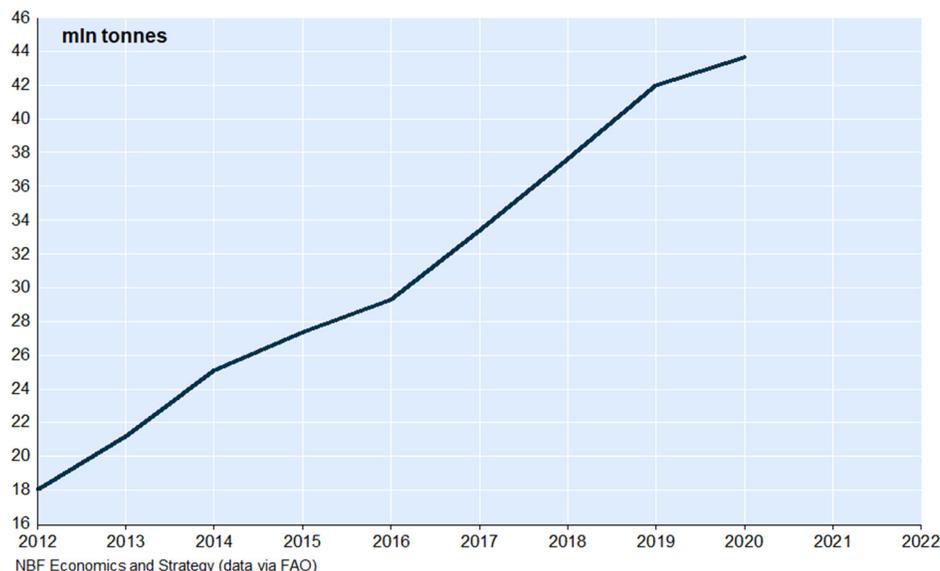
But assessing the net environmental impact of the use of wood-based biofuels is complicated by the dual purpose served by forests. Forests absorb carbon from the atmosphere. Their absorption capacity is reduced as trees are cut. Replanting trees can restore some absorption capacity but not quickly. The new trees that are added through replanting are young and need time to grow. Moreover, the burning of wood pellets to produce electricity is often not included in carbon emissions data as per current United Nations accounting for reasons explained in the report.

Recently, more and more questions are being raised about the environmental impact of burning wood for electricity generation. This report discusses some of the concerns raised by critics. It also looks at the possibility that such concerns could impact global cooperation in environmental matters.

Growing global demand

The past several years have seen global demand for wood pellets increase significantly. The dollar value of the sector was estimated at \$9.6 billion in 2020 and is expected to reach almost \$24 billion by 2028. This translates into a projected annual growth rate of 12%.¹ Europe accounted for about 75% of global demand for wood pellets in 2020.²

Annual global production of wood pellets (2012-2020)

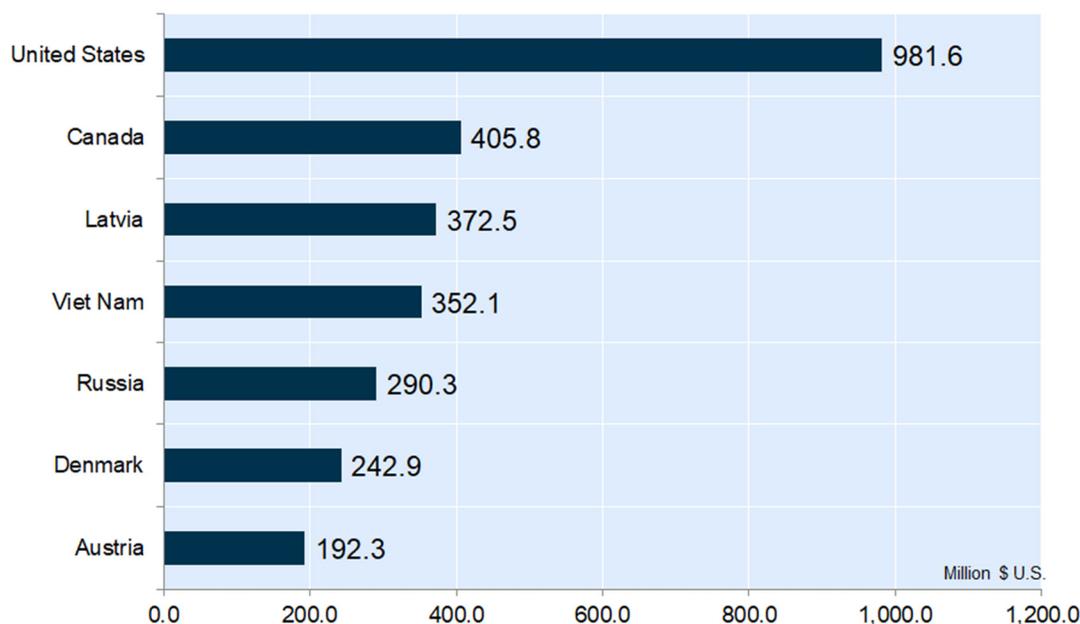


¹ "The Worldwide Wood Pellet Industry is Expected to Reach \$23+ Billion by 2028," Research & Markets, December 15, 2021

² "European Wood Pellets Markets," Wood Resources International, April 6, 2021

World: Top wood pellets exporters in 2020

Millions of U.S. dollars



NBF Economics and Strategy (data via FAO)

The EU's significant reliance on wood-based biofuels

About 22% of the EU's total energy demand is met by renewable energy, of which close to 60% is produced from biomass fuels, whose primary input is overwhelmingly wood.³ In 2021, Wood Resources International estimated that European demand for wood pellets would grow by 30-40% over the next five years.⁴

Because the EU considers biofuels to be carbon neutral, they are not subject to the rules of its carbon trading system. The ramifications of this exemption were highlighted in a recent National Geographic article, which stated: "A power plant burning coal could start burning wood pellets, and on paper its emissions—and thus its costs under the EU scheme—would appear to have plummeted."⁵ (More on this later.)

Europe imports significant amount of its wood pellets from North America on enormous ships. The pellets are then transported overland via rail. Once at power plants, they are ground into powder and used to fire boilers. The steam from this process powers turbines that produce electricity.⁶

The United States is much less reliant on wood-based biofuels

The United States relied on wood-based biofuels for only 2.3% of its annual energy consumption in 2020.⁷ However, there are indications of growing political support for this sector. For example, the recently passed infrastructure bill exempts logging for wood pellet plants from the National Environmental Policy Act, which, among other things, mandates environmental impact studies.⁸

While the Environmental Protection Agency doesn't official classify wood-based biofuels to be carbon neutral, financial support for this sector in the infrastructure bill could spark greater demand in the United States.

³ "EU eyes tighter rules for 'renewable' biomass energy – draft," Reuters, June 16, 2021, and "The Millions of Tons of Carbon Emissions That Don't Officially Exist," The New Yorker, December 8, 2021

⁴ "European Wood Pellets Markets," Wood Resources International, April 6, 2021

⁵ "Europe burns a controversial 'renewable' energy source: trees from the U.S.," National Geographic, November 11, 2021

⁶ "The 'green' row over the UK's largest renewable power plant," BBC, January 14, 2021

⁷ "Biomass explained wood and wood waste," Energy Information Administration, May 2021

⁸ How 'Green' Are Wood Pellets as a Fuel Source?, Wired, November 18, 2021

What sparked the initial demand for this fuel?

The origins of the demand for wood-based biofuels can be traced back to the 1997 United Nations Conference on Climate Change (I.P.C.C.) and its establishment of the Kyoto Protocol. The guidelines within the protocol gave the green light for certain countries to ignore the carbon emissions from burning wood in power plants because only emissions attributed to the actual cutting of the wood are counted. These emissions are assigned to the country where the logging occurred.⁹

These guidelines were issued at a time when wood-based biofuels were only a minor part of energy production. They were reportedly intended to simplify the process of measuring carbon emissions and to avoid double counting. The subsequent rise in demand for wood-based biofuels was not anticipated. In the words of William Moomaw, a professor of environmental policy at Tufts University, and lead author of several reports by the I.P.C.C.: "At the time these guidelines were drawn up, the I.P.C.C. did not imagine a situation where millions of tons of wood would be shipped four thousand miles away to be burned in another country."¹⁰

In 2009, the European Commission passed the Renewable Energy Directive implementing the Kyoto protocol guidelines. This in effect allowed the EU to classify wood-based biofuels as being carbon neutral, essentially on a par with wind and solar power.

Are wood-based biofuels really green?

Only recognizing emissions from harvesting trees means the carbon footprint from processing the lumber into vitamin-sized wood pellets, shipping them across the ocean, and burning them for fuel at the smokestack are not included in emission records.¹¹

Some argue this would be similar to only recognizing emissions associated with the extraction of fossil fuels, and not their actual consumption. Supporters point out that biomass is treated differently because trees can regrow and reabsorb the carbon emissions released. However, this argument is challenged by critics for the following reasons.

- Several policy institutes, including the European Academies' Science Advisory Council, maintain that recently planted trees can take many decades to re-absorb the carbon dioxide released by cutting and burning wood.¹² They argue that even if trees were to be re-planted at the same rate as they are cut, plantation forests are less able to absorb carbon compared with natural forests because they get logged more frequently.
- Studies (which are cited in the footnote) have concluded that burning wood at the smokestack for energy releases much more carbon dioxide per unit of electricity produced than does burning coal or gas.¹³ This is because wood is less energy dense than coal or natural gas.

It is generally agreed that biofuels made from waste wood, residues and by-products involving no additional tree harvesting are more environmentally friendly. Many supporters of the wood pellet sector claim that the majority of production comes from these sources. A growing number of scientists (including those cited in the footnote) dispute these claims, however, and contend that whole trees are often harvested.¹⁴

Altering carbon footprint measurements could radically change outcomes

The European Union and Britain, together, reduced energy-related emissions by 26% from 1990 to 2019. Chatham House, a UK-based think tank, estimated that if emissions from harvesting, transporting and burning biofuels were included in the calculation, the reduction would have been only 15%. However, this study did not factor in the long-term carbon impact of replanting forests.¹⁵

Changing how the carbon footprint of wood pellets is measured would make it more difficult for the EU to meet environmental targets. The following quotes by Frans Timmermans, Executive Vice-President for the European Green Deal, speak to this challenge:

⁹ "Woody Biomass for Power and Heat," Chatham House, February 23, 2017

¹⁰ "The Millions of Tons of Carbon Emissions That Don't Officially Exist," The New Yorker, December 8, 2021

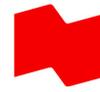
¹¹ "Europe Met a Climate Target. But Is It Burning Less Carbon?" New York Times, January 20, 2022

¹² "Emissions Trading System: Stop Perverse Climate Impact of Biomass by Radically Reforming CO₂ Accounting Rules," European Academies' Science Advisory Council, August 2020, and "Does replacing coal with wood lower CO₂ emissions? Dynamic lifecycle analysis of wood bioenergy," Environmental Research Letters, January 2018

¹³ "Europe burns a controversial 'renewable' energy source: trees from the U.S.," National Geographic, November 11, 2021, "Does replacing coal with wood lower CO₂ emissions? Dynamic lifecycle analysis of wood bioenergy," Environmental Research Letters, January 2018 and "Letter from Scientist to the EU parliament regarding forest biomass, January 14, 2018

¹⁴ "Letter regarding use Forests for Bioenergy," (A letter written by 500 scientists to world leaders), February 2021

¹⁵ "Greenhouse gas emissions from burning US-sourced woody biomass in the EU and UK," Chatham House, October 2021



1. "To be perfectly blunt with you, biomass will have to be part of our energy mix if we want to remove our dependency on fossil fuels." He then added: "I do admit that it's quite complicated to get this right."¹⁶
2. "Well, without biomass, we're not going to make it. We need biomass in the mix, but we need the right biomass in the mix. I hate the images of whole forests being cut down to be put in an incinerator. I think it's unsustainable and it's indefensible."¹⁷

The EU currently permits the use of whole trees for the production of biofuels, although it states that this practice should be minimized.¹⁸

Conclusion

If not addressed soon, the growing controversy regarding how the carbon footprint of wood-based biofuels should be measured could undermine trust in the accuracy of emissions data published by certain countries. This would be followed by accusations that some countries are being granted an unfair advantage in attaining their environmental targets, and thus making cooperation toward the green transition even more difficult.

It would also complicate the EU's plan to implement a carbon border tax, as countries would be more likely to contest the carbon footprint assigned to their product and cast doubt on the accuracy of Europe's internal emissions data. (For more information on this subject refer to the report: "Update: Is a carbon border tax inevitable?")

Indeed, the political sensitivities surrounding the carbon footprint of wood-based biofuels no doubt explain why COP26 omitted any mention of this energy source in its recent forestland declaration.¹⁹

One indicator of the risks that lie ahead for this sector was the removal of a major UK producer and user of wood pellets from the S&P Global Clean Energy Index last October over concerns about its carbon footprint. A Citibank report in December further reflected concerns about wood pellets: "We do not fundamentally see biomass as a sustainable source of energy."²⁰

One solution would be to strictly mandate that only wood-based biofuels made from waste wood, residues and by-products involving no additional harvesting can qualify as renewable energy. Under this metric, however, the quantity of wood pellets able to make the grade would likely decline, forcing countries to either pay more for these wood pellets and/or switch to other sources of renewable energy. Adding carbon capture and storage to the power plants is another option, but this would further add to operating costs.

The longer it takes to deal with this problem, the more other countries, particularly in Asia, will be tempted to take advantage of this U.N. accounting loophole to generate electricity via burning wood.

Finally, while the invasion of Ukraine has awoken Europe to the necessity of diversifying away from Russian energy, it must resist the temptation to replace some of this energy with the burning of more wood pellets.

¹⁶ "E.U.'s big climate ambitions have the scent of wood smoke," Washington Post, November 10, 2021

¹⁷ "Timmermans: EU countries need to face the consequences of higher climate goals," Euractiv, May 24, 2021

¹⁸ "The EU's biomass dilemma: can burning trees ever be green?" Financial Times, July 1, 2021

¹⁹ "Glasgow leaders' declaration on forests and land use," COP26, November 12, 2021

²⁰ "Climate change and the battle for Canada's forests," Financial Times, January 1, 2022



Economics and Strategy

Montreal Office

514-879-2529

Stéfane Marion

Chief Economist and Strategist
stefane.marion@nbc.ca

Kyle Dahms

Economist
kyle.dahms@nbc.ca

Alexandra Ducharme

Economist
alexandra.ducharme@nbc.ca

Matthieu Arseneau

Deputy Chief Economist
matthieu.arseneau@nbc.ca

Daren King

Economist
daren.king@nbc.ca

Angelo Katsoras

Geopolitical Analyst
angelo.katsoras@nbc.ca

Jocelyn Paquet

Economist
jocelyn.paquet@nbc.ca

Toronto Office

416-869-8598

Warren Lovely

Chief Rates and Public Sector Strategist
warren.lovely@nbc.ca

Taylor Schleich

Rates Strategist
taylor.schleich@nbc.ca

Alpa Atha

Fixed Income Economist
alpa.atha@nbc.ca

General

This Report was prepared by National Bank Financial, Inc. (NBF), (a Canadian investment dealer, member of IIROC), an indirect wholly owned subsidiary of National Bank of Canada. National Bank of Canada is a public company listed on the Toronto Stock Exchange.

The particulars contained herein were obtained from sources which we believe to be reliable but are not guaranteed by us and may be incomplete and may be subject to change without notice. The information is current as of the date of this document. Neither the author nor NBF assumes any obligation to update the information or advise on further developments relating to the topics or securities discussed. The opinions expressed are based upon the author(s) analysis and interpretation of these particulars and are not to be construed as a solicitation or offer to buy or sell the securities mentioned herein, and nothing in this Report constitutes a representation that any investment strategy or recommendation contained herein is suitable or appropriate to a recipient's individual circumstances. In all cases, investors should conduct their own investigation and analysis of such information before taking or omitting to take any action in relation to securities or markets that are analyzed in this Report. The Report alone is not intended to form the basis for an investment decision, or to replace any due diligence or analytical work required by you in making an investment decision.

This Report is for distribution only under such circumstances as may be permitted by applicable law. This Report is not directed at you if NBF or any affiliate distributing this Report is prohibited or restricted by any legislation or regulation in any jurisdiction from making it available to you. You should satisfy yourself before reading it that NBF is permitted to provide this Report to you under relevant legislation and regulations.

National Bank of Canada Financial Markets is a trade name used by National Bank Financial and National Bank of Canada Financial Inc.

Canadian Residents

NBF or its affiliates may engage in any trading strategies described herein for their own account or on a discretionary basis on behalf of certain clients and as market conditions change, may amend or change investment strategy including full and complete divestment. The trading interests of NBF and its affiliates may also be contrary to any opinions expressed in this Report.

NBF or its affiliates often act as financial advisor, agent or underwriter for certain issuers mentioned herein and may receive remuneration for its services. As well NBF and its affiliates and/or their officers, directors, representatives, associates, may have a position in the securities mentioned herein and may make purchases and/or sales of these securities from time to time in the open market or otherwise. NBF and its affiliates may make a market in securities mentioned in this Report. This Report may not be independent of the proprietary interests of NBF and its affiliates.

This Report is not considered a research product under Canadian law and regulation, and consequently is not governed by Canadian rules applicable to the publication and distribution of research Reports, including relevant restrictions or disclosures required to be included in research Reports.



UK Residents

This Report is a marketing document. This Report has not been prepared in accordance with EU legal requirements designed to promote the independence of investment research and it is not subject to any prohibition on dealing ahead of the dissemination of investment research. In respect of the distribution of this Report to UK residents, NBF has approved the contents (including, where necessary, for the purposes of Section 21(1) of the Financial Services and Markets Act 2000). This Report is for information purposes only and does not constitute a personal recommendation, or investment, legal or tax advice. NBF and/or its parent and/or any companies within or affiliates of the National Bank of Canada group and/or any of their directors, officers and employees may have or may have had interests or long or short positions in, and may at any time make purchases and/or sales as principal or agent, or may act or may have acted as market maker in the relevant investments or related investments discussed in this Report, or may act or have acted as investment and/or commercial banker with respect hereto. The value of investments, and the income derived from them, can go down as well as up and you may not get back the amount invested. Past performance is not a guide to future performance. If an investment is denominated in a foreign currency, rates of exchange may have an adverse effect on the value of the investment. Investments which are illiquid may be difficult to sell or realise; it may also be difficult to obtain reliable information about their value or the extent of the risks to which they are exposed. Certain transactions, including those involving futures, swaps, and other derivatives, give rise to substantial risk and are not suitable for all investors. The investments contained in this Report are not available to retail customers and this Report is not for distribution to retail clients (within the meaning of the rules of the Financial Conduct Authority). Persons who are retail clients should not act or rely upon the information in this Report. This Report does not constitute or form part of any offer for sale or subscription of or solicitation of any offer to buy or subscribe for the securities described herein nor shall it or any part of it form the basis of or be relied on in connection with any contract or commitment whatsoever.

This information is only for distribution to Eligible Counterparties and Professional Clients in the United Kingdom within the meaning of the rules of the Financial Conduct Authority. NBF is authorised and regulated by the Financial Conduct Authority and has its registered office at 70 St. Mary Axe, London, EC3A 8BE.

NBF is not authorised by the Prudential Regulation Authority and the Financial Conduct Authority to accept deposits in the United Kingdom.

U.S. Residents

With respect to the distribution of this report in the United States of America, National Bank of Canada Financial Inc. ("NBCFI") which is regulated by the Financial Industry Regulatory Authority (FINRA) and a member of the Securities Investor Protection Corporation (SIPC), an affiliate of NBF, accepts responsibility for its contents, subject to any terms set out above. To make further inquiry related to this report, or to effect any transaction, United States residents should contact their NBCFI registered representative.

This report is not a research report and is intended for Major U.S. Institutional Investors only.

This report is not subject to U.S. independence and disclosure standards applicable to research reports.

HK Residents

With respect to the distribution of this report in Hong Kong by NBC Financial Markets Asia Limited ("NBCFMA") which is licensed by the Securities and Futures Commission ("SFC") to conduct Type 1 (dealing in securities) and Type 3 (leveraged foreign exchange trading) regulated activities, the contents of this report are solely for informational purposes. It has not been approved by, reviewed by, verified by or filed with any regulator in Hong Kong. Nothing herein is a recommendation, advice, offer or solicitation to buy or sell a product or service, nor an official confirmation of any transaction. None of the products issuers, NBCFMA or its affiliates or other persons or entities named herein are obliged to notify you of changes to any information and none of the foregoing assume any loss suffered by you in reliance of such information.

The content of this report may contain information about investment products which are not authorized by SFC for offering to the public in Hong Kong and such information will only be available to, those persons who are Professional Investors (as defined in the Securities and Futures Ordinance of Hong Kong ("SFO")). If you are in any doubt as to your status you should consult a financial adviser or contact us. This material is not meant to be marketing materials and is not intended for public distribution. Please note that neither this material nor the product referred to is authorized for sale by SFC. Please refer to product prospectus for full details.

There may be conflicts of interest relating to NBCFMA or its affiliates' businesses. These activities and interests include potential multiple advisory, transactional and financial and other interests in securities and instruments that may be purchased or sold by NBCFMA or its affiliates, or in other investment vehicles which are managed by NBCFMA or its affiliates that may purchase or sell such securities and instruments.

No other entity within the National Bank of Canada group, including National Bank of Canada and National Bank Financial Inc, is licensed or registered with the SFC. Accordingly, such entities and their employees are not permitted and do not intend to: (i) carry on a business in any regulated activity in Hong Kong; (ii) hold themselves out as carrying on a business in any regulated activity in Hong Kong; or (iii) actively market their services to the Hong Kong public.

Copyright

This Report may not be reproduced in whole or in part, or further distributed or published or referred to in any manner whatsoever, nor may the information, opinions or conclusions contained in it be referred to without in each case the prior express written consent of NBF.