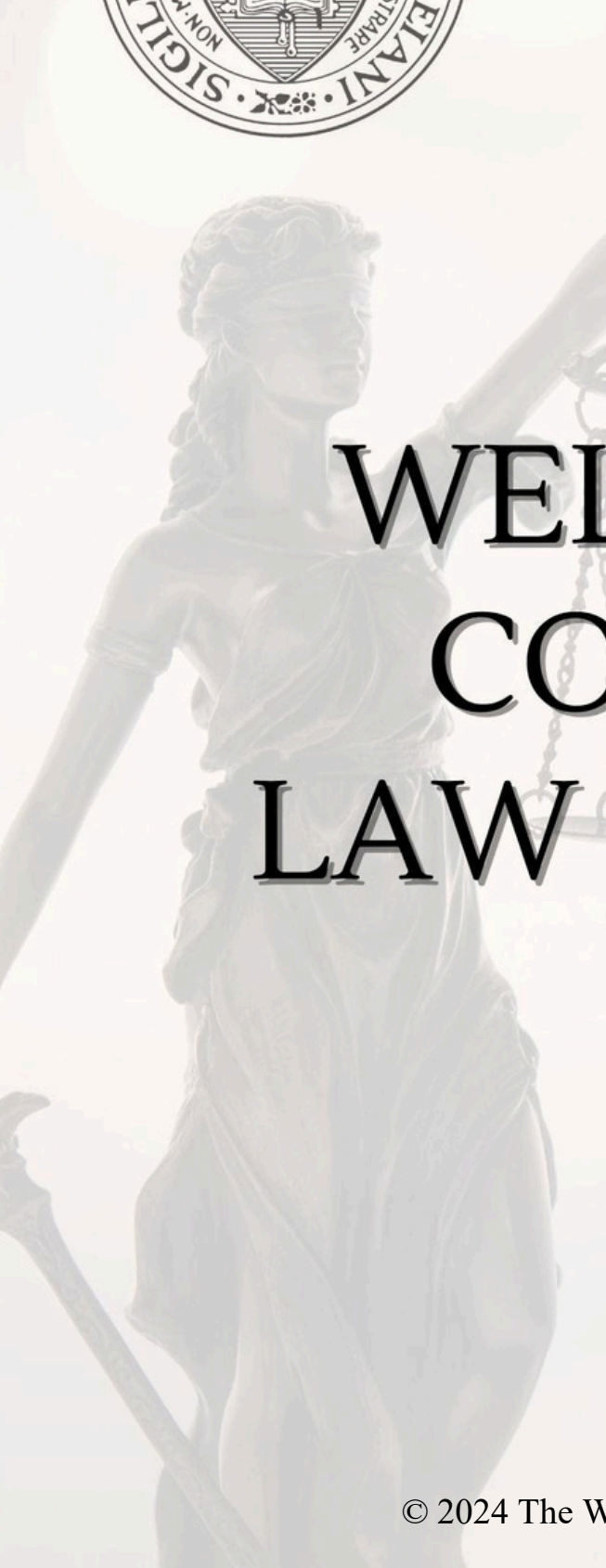


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A faint, grayscale background image of a statue of Lady Justice, blindfolded and holding scales of justice.

# THE WELLESLEY COLLEGE LAW JOURNAL

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## LETTER FROM THE PRESIDENTS

April 2024

Dear Wellesley Community,

It is our pleasure to share with you Issue 15 of the Wellesley Pre-Law Society Law Journal. We want to first thank contributors to our journal and organization. We want to thank our journal editors Margaret Huai '26 and Amy Zhang '24 for their efforts to put together this publication. A big thanks to all student authors for sharing your words and ideas with the broader community both through this journal and beyond. We would like to also thank our wonderful Executive Board for expanding and engaging with the Pre-Law community. Finally, thank you to all new and returning members of Pre-Law Society for your enthusiasm and participation in our various events. We had quite a successful year!

As seniors introduced to college amid the 2020 pandemic, we first joined Pre-Law Society when it was operating virtually. We have been involved ever since, and it has been a delight to see the org rebuild its campus community and presence over the years. This year, we saw the largest turnouts at all of our signature events, including Resumes and Ramen, Legal Internship Panel, and Tea with a Lawyer. We also saw high engagement at our newer events connecting us to other organizations within and beyond Wellesley, including a pre-professional soiree and local law school tours. As we welcome a new Executive Board to lead Pre-Law Society next year, we look forward to seeing members continue to connect and support each other in pursuing an education, career, or other interests in law.

Thank you for your support, and happy reading!

Sincerely,

Emma Lee '24 and Nerine Uyanik '24

*Wellesley College Pre-Law Journal Co-Presidents 2023-2024*

## LETTER FROM THE EDITORS

May 02 2024

Dear Wellesley Community,

Congratulations on a successful 2023-24 school year! We are so honored to have served as your law journal editors this year, and we sincerely hope that you enjoy reading this edition of the journal as much as we enjoyed editing it.

In the pages that follow, you will find a diverse array of legal perspectives and insights on a wide range of topics, reflecting the dynamism and richness of the breadth of legal research and thought at Wellesley College. The articles range from policy proposals on wood pellets to reports on African foreign policy, and each one has been carefully selected for its relevance and academic rigor.

At Wellesley Law Journal, we are committed to fostering intellectual discourse and advancing the frontiers of legal scholarship. Through our publication, we aim to provide a platform for students, academics, and practitioners alike to engage with pressing legal issues and contribute to the advancement of the law.

We would like to extend our heartfelt gratitude to all the authors who have contributed their work to this edition. Your dedication to scholarship and excellence is truly commendable, and we are honored to showcase your contributions in our journal. We would also like to express our appreciation to our Pre-Law Society Executive Board, whose support has been essential to the publication of the journal.

Finally, we would like to thank you, our readers, for your continued support and engagement. It is your enthusiasm and passion for the law that inspires us to strive for excellence in everything we do.

We hope that you find this edition of the Wellesley Law Journal both informative and inspiring. As always, we welcome your feedback and encourage you to join us in the ongoing conversation about the law and its impact on society.

Sincerely,

Margaret Huai '26 and Amy Zhang '24

*Wellesley College Pre-Law Journal Co-Editors 2023-2024*

## THE CARBON NEUTRALITY OF WOOD PELLETS: A SUGGESTION FOR POLICY REFORM

By Angelina Pil '25

Wood pellets have emerged as a significant player in the global energy landscape due to their potential to reduce reliance on fossil fuels.<sup>1</sup> Originating from various sources, including harvested trees, sawmill residues, thinning forests, and recycled materials, wood pellets represent a versatile energy option for most countries. Their widespread use underscores the importance of scrutinizing their role in the sustainable energy transition.

Supporters of wood pellets say that they can contribute to this transition by providing an easily implementable, cheap, and clean renewable fuel source. Specifically, they characterize wood pellets as carbon neutral because the practice of replanting trees after harvesting has the potential to reabsorb atmospheric carbon, potentially creating a net zero or insignificant carbon emission loop. This cycle has led European officials to declare biomass energy carbon neutral, and allows its countries to omit the carbon emissions which result from burning wood pellets in its greenhouse gas reporting.<sup>2</sup>

However, this decision was faced with high levels of criticism including a letter from over 500 scientists demanding the EU reverse their policy and cut biofuel subsidies.<sup>3</sup> Critics claim that the logging practices used do not allow for substantial reabsorption of carbon. Major wood pellet companies have already come under fire for the deforestation of biodiverse forests and the use of monoculture seeding in their replanting strategies, which absorbs less carbon than intact biodiverse forests.<sup>4</sup> Although the emissions from logging, processing, and shipping wood pellets are accounted for in the The Land-Use, Land-Use Change and Forestry, hereafter abbreviated LULUCF, sector, carbon neutrality assessments do not have to account for the greatest sources of greenhouse gas emissions: the loss of carbon in forests and the actual burning of wood pellets.<sup>5</sup> Critics such as the European Academies Science Advisory Council also argue that there is a time table inconsistency. Trees can take up to 100 years to sequester the maximum amount of carbon dioxide, yet increasingly more pellets are burned every year and their emissions are written off with future predictions of carbon reabsorption.

Moving forward, an important step in the renewable and sustainable energy transition is for stronger regulations on the source of wood pellet production as well as a more comprehensive emission accounting assessment. This would include the EU's declassification of wood pellets as a carbon neutral energy source, a step which has been continuously denied due to the EU's obligation to stop coal use by 2030.

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<sup>1</sup> Michael Cembalest, *Growing Pains: The Renewable Transition in Adolescence* 40, 40 (2023).

<sup>2</sup> Justin Catanoso, "EU votes to keep woody biomass as renewable energy, ignores climate risk", Mongabay News (Sept. 16, 2022), <https://news.mongabay.com/2022/09/eu-votes-to-keep-woody-biomass-as-renewable-energy-ignores-climate-risk/>.

<sup>3</sup> *Supra* note 102.

<sup>4</sup> Richard Matthews, "Carbon Sequestration in National Forests vs. Monoculture Plantations", Change Oracle (May 2, 2019), <https://changeoracle.com/2019/05/02/carbon-suquestration-in-natural-forests/>.

<sup>5</sup> Letter from Jean Pascal van Ypersele, Professor at Université Catholique de Louvain et. al. to Members of the European Parliament (June 4, 2018) (on file with the World Wildlife Fund European Union).

### Introduction

In the quest for sustainable energy solutions, examining the carbon neutrality of wood pellets is crucial. Climate change is progressing quickly, and the decisions governments make now regarding greenhouse gas emissions will affect generations to come. Thus, this briefly discusses the environmental impact and the carbon neutrality of the manufacture and use of wood pellets as a biofuel with a focus on the European Union (EU), due to their status as the largest producer and user of wood pellets. It delves into arguments both for and against employing wood pellets as a means to reduce carbon emissions and reliance on fossil fuels, and examines some of the regulatory issues impacting the adoption of wood pellets for both industrial and residential energy supply. In the end, suggestions are given on how to adjust policies to more effectively protect the climate.

### What are Wood Pellets?

Wood pellets can be produced from wood products of many sources including logs, branches, sawdust and even recycled untreated wood products like pallets.<sup>6</sup> The wood products are debarked and then run through a wood chipper before being ground into wood fiber. Then, if any reclaimed wood was ground, magnets are used to check for any remaining pieces of metal or nails before the wood is put into a dryer. Once the wood fiber is dried to 6% of its original moisture content, the wood is pressed into pellets and heated to release the lignin, a natural polymer found in the wood, which binds the pellet together. The resulting pellet is additive free and typically 6-8mm in diameter and 40mm long.

Wood pellets are championed over unprocessed logs or chips in industrial settings because of their low moisture content and high concentration of wood, resulting from the drying and compression procedure.<sup>7</sup> This allows them to burn hotter and longer than logs.<sup>8</sup> Production costs are overall low as well, because the lowest grade wood from a variety of sources and leftovers can be processed together. The use of the naturally-occurring lignin in the wood as a binder also helps keep costs low as alternate chemicals do not need to be bought or disposed of. Furthermore, their small standardized size is lighter and takes up less room than other wood products, making them more profitable and easier to ship internationally in large quantities. This shape also means burners can be fed automatically and are easier to meter. Lastly, wood pellets are extremely versatile in their use from industrial burners helping to fuel countries to residential heating and cooking. Pellets are burned in the same manner as coal, so industrial coal plants can easily be switched to feeding and burning wood pellets.<sup>9</sup>

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<sup>6</sup> Gildale Farms, *How Wood Pellets Are Made*, YOUTUBE (Jul. 17, 2013), <https://www.youtube.com/watch?v=g37Wba2U49I>.

<sup>7</sup> *Why Wood Pellets*, EASYHEAT WOOD PELLETS (last visited Apr. 5, 2024), <http://www.easyheatpellets.com/consumers/why-wood-pellets.html>.

<sup>8</sup> *Id.*

<sup>9</sup> “*Top tips for switching a coal-fired power plant to biomass*”, Power Engineering International (Feb. 25, 2015).

While wood pellets are more efficient than unprocessed wood, they have a lower energy density than most conventional fuel sources.<sup>10</sup> Wood pellets have an average energy density of 16 MJ/kg.<sup>11</sup> All other traditional fuel sources have higher energy densities, including coal with an average of 24 MJ/kg and with the most drastic difference being natural gas which has an energy density over three times more than wood pellets at 55 MJ/kg. That being said, wood pellets burn at a higher efficiency rate than coal at around 83%.<sup>12</sup> This difference in efficiency is not substantial enough to compensate for the difference in energy density, meaning 1kg of wood pellets produces 4.8 kWh of heat while 1 kilogram of coal can produce 8kWh of heat.

### Who Uses Wood Pellets?

The wood pellet market spans international proportions, including most of the world's global superpowers.<sup>13</sup> Globally, interest in wood pellets is rising, especially for Europe who is producing and using wood pellets for a growing portion of its nation's energy supply. The Asian market for wood pellets is increasing steadily, but is still minimal compared to European use. Africa, South America, and Oceania do not significantly consume or produce wood pellets.

The main exporter of wood pellets is the United States, which does not have a high rate of national pellet consumption due in part to the prevalence of other 'clean' fuel sources such as natural gas, followed by Russia, and Ukraine.<sup>14</sup> The main importer and user of wood pellets is the European Union, hereafter abbreviated EU, and the United Kingdom. Although Russia previously provided over 40% of the EU's wood pellets, a ban was placed on Russian wood pellets disallowing them from entering the EU pellet market as part of the Council Regulation 2022/576's response to Russia's invasion of Ukraine and the subsequent Russo-Ukrainian War. Despite this restriction, EU wood pellet demand has continued to surge, and with it American wood pellet exports. In 2022, the EU imported 5.89 million metric tons, hereafter abbreviated MMT, of wood pellets valued at \$1.32 billion. Of that 5.89MMT, 3.12 MMT were imported from the United States valued at \$682 million. The EU also increased their import of US scrap wood in 2022, likely going to wood pellet production. The prominent relationship between the EU and the US as the key players in wood pellet production and consumption garners the full attention of this issue brief.

Similar to natural gas, wood pellet use is equally common in both industrial contexts with a capacity of 5MW and residential contexts like domestic stoves and heat boilers.<sup>15</sup> The residential market for wood pellets remains relatively stable with slight fluctuations depending on weather and on fossil fuel prices.<sup>16</sup> Because fossil fuel prices have been increasing since 2021, residential demand has grown, as evident by more sales of pellet stoves and pellet boilers. These

<sup>10</sup> Figure 1. *Energy Density of Traditional Fuel Types*. Energy Education.

<sup>11</sup> *Id.*

<sup>12</sup> *Wood and Pellet Heating*, U.S. DEPARTMENT OF EDUCATION ENERGY SAVER (last visited May 2, 2024), <https://www.energy.gov/energysaver/about-energy-saver>.

<sup>13</sup> Bob Flach & Sophie Bolla, *Wood Pellets Annual* 1, 13 (Laura Geller ed. 2023).

<sup>14</sup> *Id.*

<sup>15</sup> *European Union Energy Information*, ENERDATA (last visited Mar. 29, 2024), [https://www.enerdata.net/estore/energy-market/european-union/#:~:text=Natural%20Gas%20Consumption&text=Buildings%20\(residential%20and%20services%20sector,\(25%25\)%20\(2022\)](https://www.enerdata.net/estore/energy-market/european-union/#:~:text=Natural%20Gas%20Consumption&text=Buildings%20(residential%20and%20services%20sector,(25%25)%20(2022).). *Supra* note 81.

<sup>16</sup> *Supra* note 114.

sales are supported by direct incentives for residential bioenergy in Sweden, Germany, France, Austria, Spain, the Czech Republic, Poland, and Bulgaria.<sup>17</sup> Other countries provide general support for transitioning to wood pellets through subsidizing renewable resources and incentivising the elimination of fossil fuels in the heating sector. This demand increase has caused domestic demand to outpace wood pellet production in France, despite it being the second largest producer of wood pellets in the EU, and boosted Italy's already prevalent import of wood pellets. The continued expansion of the residential market is proposed to be the main driver of growth in the wood pellet market.

For some countries in the EU, like the Netherlands, the industrial demand dominates the market through the use of large scale power plants. In 2021, the EU used 21.1 metric tonnes of oil equivalent, hereafter abbreviated Mtoe, of biomass in its industrial sector which made up 59% of the EU's overall renewable energy consumption that year.<sup>18</sup> In large, these countries are creating electricity from wood pellets to fulfill agreements supporting the energy transition to renewable sources. The third Renewable Energy Directive, hereafter abbreviated REDIII, revised in November 2023, fuels this switch by contractually binding the EU to reach 42.5% renewable energy by 2030.<sup>19</sup> Because wood pellets can be co-fired with coal and in combined heat and power, hereafter abbreviated CHP, plants, they are easily implemented into the industrial sectors of countries who are trying to transition away from coal. In fact, the Netherlands, which has the largest industrial EU market for wood pellets, announced a plan to ban coal for power production in April of 2022.<sup>20</sup> Denmark, the second largest industrial market for wood pellets in the EU, made a similar move in May 2020 to phase out coal by 2030.<sup>21</sup> Both of these countries have strongly relied on the implementation of woody biomass to complete these projects. Since national production is unable to cater to the massive scale of wood pellets burned in these countries, they become main importers of the fuel.

### **What Are Current Policies on Wood Pellets?**

EU governments recognize the role of wood pellets in the renewable energy transition and support it in various ways. For example, the Polish government offered subsidies to switch from coal-fired stoves to wood pellet or other alternative stoves as part of the Clean Air Program.<sup>22</sup> This caused biomass stoves to become the second-most popular heating stove in Poland, so when pellet prices rose in 2022, Poland subsidized the purchase of wood pellets with an offer of a one time payment of \$725 per household. In Romania, the government capped pellet prices to help support residential use of the fuel. Germany took a more mixed approach by subsidizing the replacement of heating systems to wood pellet ovens if a heat pump or solar heating system is also used as part of a 2009 law requiring a portion of buildings'

<sup>17</sup> *Bioenergy Europe Statistical Report 2023* 12, 12 (2023).

<sup>18</sup> *Biomass*, EUROPEAN COMMISSION (last visited May 2, 2024), [https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/biomass\\_en](https://energy.ec.europa.eu/topics/renewable-energy/bioenergy/biomass_en).

<sup>19</sup> *Renewable Energy Directive*, EUROPEAN COMMISSION (last visited May 2, 2024), [https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive\\_en](https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en).

<sup>20</sup> Bob Flach, *Dutch Government Lays Out New Biomass Policy* 1 (Christopher Riker ed. 2022).

<sup>21</sup> *Biomass Analysis* 56, 56 (Christopher Riker ed. 2020).

<sup>22</sup> *Supra* note 114.



heating/cooling systems to rely on renewable energy. Germany also provides financial support for the construction of heating plants from solid biomass, which includes wood pellet burners.

An important general policy supporting the substantial growth of wood pellets is the third REDIII, because it pushes the EU to quickly find renewable alternatives to traditional fossil fuels. The context of the REDIII implementation also played a crucial role in the decision to rely on wood pellets. The weaponization of energy during the Russo-Ukrainian War awakened most of the globe to the dual importance of diversifying energy sources and self-reliance within the energy sector. With this idea at the forefront of the EU's mind and the heavy restrictions placed on the Russian gas pipeline, which brought Russian imports of LNG down from providing the EU with over 40% of their LNG in 2021 to only 8% of their LNG in 2023, the EU was in a unique position of needing to quickly find a renewable energy source which was cheap, easily implementable, and could be produced in a high quantity in the EU.<sup>23</sup> Wood pellets fit into all of these categories and, thus, flourished in the EU.

The increase in attention on wood pellets meant governments had to directly address wood pellets in their policies. In REDIII, the EU classified wood biomass as renewable and emission free in the EU Emissions Trading System.<sup>24</sup> Colloquially, this means that EU countries do not have to count or consider any emissions coming from the burning of wood pellets in their emission reports. Their arguments were two-fold: the replanting of trees in harvested areas would sequester the carbon burned, and any leftover wood pellet emissions would be considered as part of the LULUCF sector instead of the energy sector. Critics immediately called out the EU for downplaying the high volume of greenhouse gasses, hereafter abbreviated GHG, released by burning wood pellets in order to avoid more expensive and complicated investments in clean renewables such as wind and solar, and the urgency of tackling climate change. Both of these claims underscore an increasingly important controversial question: are wood pellets actually carbon-neutral?

### **Forest Regeneration Sequesters Carbon Burned**

The most common argument in support of wood pellet use is that the practice of replanting trees after harvesting has the potential to reabsorb atmospheric carbon, creating a net zero or insignificant carbon emission loop. Forests are able to sequester large amounts of carbon over their lifetime by absorbing atmospheric carbon and storing it in the soil and the wood itself. Globally, forests absorb around 7.6 billion metric tonnes of carbon a year, which is around 1.5X America's 2021 annual emissions.<sup>25</sup> The amount of carbon trees can store in a given year

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<sup>23</sup> *Where does the EU's gas come from?*, EUROPEAN COUNCIL COUNCIL OF THE EUROPEAN UNION (last visited Mar. 21, 2024),

<sup>24</sup> Andrew Giorgiou, *Why the EU Considers Biomass a Zero-Emissions Energy Source and Why it Makes Sense*, BIOMASSA FEITEN (last visited May 2, 2024), <https://www.biomassafeiten.nl/2024/03/06/why-the-eu-considers-biomass-a-zero-emissions-energy-source-and-why-it-makes-sense/>.

<sup>25</sup> Goddard Digital Team, *NASA Satellites Help Quantify Forests' Impacts on Global Carbon Budget*, NASA (Feb. 3, 2021), [nasa.gov/science-research/earth-science/nasa-satellites-help-quantify-forests-impacts-on-global-carbon-budget/](https://nasa.gov/science-research/earth-science/nasa-satellites-help-quantify-forests-impacts-on-global-carbon-budget/).

depends on a variety of factors including the tree's type, health, and age, as well as the climate and location of the tree.<sup>26</sup>

Although the cycle of absorption, burning, then reabsorption of carbon seems theoretically sound, critics contend that the logging practices used do not allow for substantial reabsorption of carbon. Logging itself releases a high amount of carbon through machinery use and soil disruption, so much so that logging produces 10X more carbon emissions than that of both wildfires and natural tree death combined.<sup>27</sup> The US Geological Survey data estimated that 43 million metric tonnes of CO<sub>2</sub> equivalent were being released each year from logging on federal lands in the US, not including the carbon released from soil disruption.<sup>28</sup> Another study found that carbon is released from the soil for decades after a forest is felled despite not being routinely measured or quantified in carbon emission assessments.<sup>29</sup> Even factoring in carbon capture from replanted trees, logging still annually produces around 10% of the world's greenhouse gas emissions.<sup>30</sup>

One of the key reasons for these high emission rates is the replacement of old-growth and biodiverse forests for monoculture plantations. Enviva, the world's largest wood pellet producer, has previously come under fire for harvesting bottomlands forests, which have one of the highest tree biodiversity in all of America.<sup>31</sup> Wood suppliers have also described spraying herbicides on saplings of native tree species to allow for faster growing loblolly pine species. Many of these unique biodiverse forests are replanted as monoculture plantations of species with high levels of consistency and high speeds of growth, often pine. One of the issues with this monocultural planting is the reduced carbon sequestration abilities compared to biodiverse forests because an intact forest can remove up to 16X more atmospheric carbon than monoculture plantations.<sup>32</sup> Therefore, even when felled trees are replanted, the forest loses a large portion of its ability to reabsorb and store carbon and with it a better ability to fight climate change.

The EU requires certain sustainability criteria to be met for wood pellets, one of which is the replanting of forests felled for pellet use. This criteria is meant to ensure that the carbon emissions from burning pellets are reabsorbed by trees. An issue with this criteria is that replanted trees are cut down too young to reabsorb large or adequate amounts of carbon. On a pine tree plantation, trees are usually thinned around 12 years old, then again around 18 years old

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<sup>26</sup> *Carbon Storage by Urban Forests*, NPS (Jan. 7, 2022), <https://www.nps.gov/articles/000/uerla-trees-carbon-storage.htm#:~:text=Trees%20educate%20the%20amount%20of,and%20health%20of%20the%20trees.>

<sup>27</sup> Danna Smith, Chad Hanson, and Matthew Koehler, *Logging is the Lead Driver of Carbon Emissions from US Forests*, EARTH ISLAND JOURNAL (Apr. 4, 2019), <https://www.earthisland.org/journal/index.php/articles/entry/logging-carbon-emissions-us-forests/>.

<sup>28</sup> Daniel Rath and Carolyn Ramirez, *How Management Affects Carbon Stored in Forest Soils*, NRDC (Dec. 5, 2023), <https://www.nrdc.org/bio/daniel-rath/how-forest-management-affects-soil-carbon>.

<sup>29</sup> Chelsea L. Petrenko and Andrew J. Friedland, *Mineral soil carbon pool responses to forest clearing in Northeastern hardwood forests*, 7 GCB Bioenergy 6, 1283-1293 (2015).

<sup>30</sup> Liqing Peng, Timothy D. Searchinger, Jessica Zions, and Richard Waite, *The carbon costs of global wood harvests*, 620 Nature 1, 110-115 (2023).

<sup>31</sup> Gabriel Popkin, *There's a Booming Business in America's Forests. Some Aren't Happy About It*, THE NEW YORK TIMES (Apr. 19, 2021), <https://www.nytimes.com/2021/04/19/climate/wood-pellet-industry-climate.html>.

<sup>32</sup> *Supra* note 105 and Bonnie Waring et. al., *Forests and Decarbonization - Roles of Natural and Planted Forests*, 3 2020 1 (2020).

before being cut down at 25-40 years old.<sup>33</sup> For comparison, natural pine trees can live for hundreds to even thousands of years depending on the species and environment.<sup>34</sup> As trees age, they are able to sequester an increasing amount of carbon each year in their wood.<sup>35</sup> When trees are logged for thinning at early ages, they are unable to reach an age where there is an effective and large amount of carbon stored in their biomass. Even at ‘lumber maturity’, trees have only just begun to fulfill their potential in the reabsorption of atmospheric carbon.

Because of these various profitable logging practices, it is unrealistic to assume that the trees used to create wood pellets would be replanted and left untouched for long enough to successfully sequester an equal amount of carbon dioxide to that which is released in the processing, shipping, and burning of wood pellets. If this scenario of a net zero carbon loop did occur, the replanted trees could take up to 100 years to sequester the maximum amount of carbon dioxide, but more wood pellets would be continuously burned during this time period, leading to a time-table inconsistency.<sup>36</sup>

### **The LULUCF and the time-table inconsistency**

Another key point in the debate over the carbon-neutrality of wood pellets is that the EU requires some of the emissions involved in the life-cycle of wood pellets to be included in carbon assessments under the LULUCF sector. More specifically, the LULUCF requires businesses to account for the carbon emissions from machinery in the supply chain of wood pellets, such as harvesting and pelleting machines.<sup>37</sup> While including these emissions in carbon evaluations is incredibly important, the emissions from the middle of the wood pellet life-cycle are only trace amounts of the total emissions. In a letter to the European Parliament, a group of scientists, Pascal van Ypersele et al (2018), described why the emissions reported in the LULUCF were insufficient in portraying the true value of greenhouse gasses released into the atmosphere, “this approach [of only including LULUCF emissions] is equivalent to estimating the emissions from coal by counting emissions from coal-mining machinery but not from burning the coal itself.” As highlighted by this analogy, the omission of the reductions of carbon in the forest and of the various gasses released by wood pellets is misleading, and ultimately hurts the climate while detracting from environmental goals.

The climate is currently in an urgent crisis as global temperature begins to rise and natural disasters increase in frequency and severity. The threat of mass species extinctions and crop failures loom as an increase in just 1.5°C could have catastrophic consequences for

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<sup>33</sup> LeAndra Spicer, *How Harvested Trees Are Used*, RESOURCEWISE (SEPT. 23, 2014), <https://www.forest2market.com/blog/how-harvested-trees-are-used>.

<sup>34</sup> Jann Seal, *What is the Life Span of Pine Trees?*, HUNKER (JAN. 7, 2022), <https://www.hunker.com/12474232/what-is-the-life-span-of-pine-trees>.

<sup>35</sup> Robert T. Leverett, *Carbon sequestered and stored in young versus old forests in the Adirondacks*, ADIRONDACK COUNCIL (Feb. 15, 2023), <https://www.adirondackcouncil.org/page/blog-139/news/carbon-sequestered-and-stored-in-young-versus-old-forests-in-the-adirondacks-1533.html>.

<sup>36</sup> *Supra* note 103.

<sup>37</sup> *Supra* note 106.

humanity and the Earth at large.<sup>38</sup> The Earth has already warmed 1.1°C since the industrial age due to greenhouse gas emissions mostly from burning fossil fuels, yet we continue to release high volumes of greenhouse gasses for energy creation by burning wood pellets. Because of the lower energy density of wood pellets, “a 50-megawatt electric power plant burning wood pellets would emit 43,730 tons of carbon as carbon dioxide each year, whereas the same plant burning coal would emit 39,200 tons/year”.<sup>39</sup> This shocking difference illustrates the dangers of relying on future projections of carbon storage to dismiss current air pollution emissions, as the immediate impact of switching from coal to wood pellets is actually an increase in atmospheric carbon.<sup>40</sup>

While it is true that the trees used to create wood pellets sequester carbon, evidence suggests that it would take between 44 to 104 years for replanted trees to reabsorb the amount of carbon dioxide released from burning wood pellets from the felled forest, assuming they remain forest.<sup>41</sup> In the meantime, wood pellets are being burned at higher and higher rates, contributing to the current destruction of our climate. Although the future carbon neutrality of wood pellets can be debated, the present-day climate is too precarious for the EU to continue its wood pellet use when the new carbon debt continues to exceed net primary production, or a plant’s carbon gain. Whether or not trees will be able to re-equalize the atmospheric carbon resulting from burning wood pellets in 100 years will matter little if the planet surpasses dangerously high levels of flooding, droughts, heat waves, crop failures, and worse in the meantime. This is why policy reformation is immediately needed in the EU to update their assessment and use of wood pellets in their venture for carbon neutrality and environmental protection.

### Policy Reform in the EU

The current REDIII in the EU is a positive step towards protecting and improving the climate with goals like The Climate Law which requires the EU to be net zero in GHG emissions by 2050 (Flach & Bolla, 2023). While this goal is impressive and beneficial for the future, revisions need to be made in order to align policy with current scientific evidence regarding wood pellet emissions and the climate crisis.

The first step in this mission is to change the status of wood pellets from renewable and carbon neutral, to just renewable by requiring the emissions from burning wood pellets to be included in the EU Emissions Trading System, hereafter abbreviated EU ETS. This improvement recognizes the carbon impact of processing pellets under the LULUCF and the GHG emissions from burning them for energy in the EU ETS, while simultaneously understanding the difficulty in analyzing the full life-cycle of wood pellets, specifically the loss of forest carbon from the variety of sources wood pellets come from. This change would also encourage countries to move

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<sup>38</sup> Brad Plumer, *Climate Change is Speeding Toward Catastrophe. The Next Decade is Crucial*, U.N. Official Says, THE NEW YORK TIMES (Mar. 20, 2023), <https://www.nytimes.com/2023/03/20/climate/global-warming-ipcc-earth.html>.

<sup>39</sup> William H. Schlesinger, *Smoke, mirrors, and wooden pellets*, CARY INSTITUTE OF ECOSYSTEM STUDIES (Feb. 22, 2022), <https://www.caryinstitute.org/news-insights/blog-translational-ecology/smoke-mirrors-and-wood-pellets>.

<sup>40</sup> John D. Sterman, Lori Siegel, and Juliette N. Rooney-Varga, *Does replacing coal with wood lower CO<sub>2</sub> emissions? Dynamic lifecycle analysis of wood bioenergy*, 13 Environmental Research Letters 1 (2017).

<sup>41</sup> *Id.*

towards other forms of energy production which are carbon neutral both in the short term and the long term, such as solar, hydropower, and wind energy.

The implementation of these clean renewable energy sources would help address the current state of climate change now and into the future. The infrastructure change would likely be more difficult and expensive in the short term than the current reliance on wood pellets, but could economically benefit the EU in the future by allowing more self-reliance, preventing the need for the continual purchase of high quantities of pellets. In order to handle this shift well, the EU should focus on incentivizing electric utilities, including for heat. Job retraining could help mitigate social disturbances although not many workers are usually needed for wood pellet plants due to automation, so this transition could potentially increase job opportunities, improving the job market. To address the intermittency issue of wind and solar energy, some wood pellet use may remain necessary.

For any continual use of wood pellets, stricter requirements for sourcing should be put in place to prevent the further degradation of global forest populations. A current EU policy limits the logging of old growth forests for biofuel and the removal of subsidies of wood pellets produced from whole trees.<sup>42</sup> This policy has been critiqued for having legal loopholes, including the lack of oversight strategies and the outsourcing of wood pellet production to other countries like the US, where verification of sustainability criteria is difficult. Instead, wood pellets should be completely sourced from recycled wood, not just secondary feedstocks for which there is already a competing market outside of wood pellet production.<sup>43</sup> This concept is already enacted in some areas of the EU, such as in the main bioenergy plant of Belgium in Wallonia, where 100% of its bioenergy comes from recycled wood. This would decrease the profitability of deforestation by reducing demand for primary wood and secondary feedstocks as a whole, while also keeping wood out of landfills.

### **Conclusion**

Since wood pellets rose in popularity, debates have ensued about the environmental impact burning the fuel for energy would have. Controversy soon began when the EU determined that wood pellets were a carbon neutral fuel source. Proponents of the wood pellets described how the regeneration of the felled forest, which is required under the sustainability criteria included in certain EU policy, would reabsorb the atmospheric carbon released from burning the pellets, and any remaining carbon emissions would be accounted for under the LULUCF sector. On the other hand, critics of wood pellet carbon neutrality argue that logging practices do not allow for the full amount of carbon to be sequestered, and release more carbon dioxide than included in carbon assessments, due to the loss in carbon stored in forests. Perhaps the most crucial argument against the use of wood pellets is less about how much carbon is pulled from the atmosphere, but rather when. Because trees take so long to sequester large amounts of carbon, a time-table inconsistency arises where carbon debts resulting from wood pellet burning outcompete yearly carbon sequestration, causing high net emissions into the

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<sup>42</sup> *Supra* note 103.

<sup>43</sup> *Supra* note 114.

atmosphere. With the urgency of the climate crisis, EU policy must be reformed to address the current state of the atmosphere and wood pellet emissions, regardless of future carbon neutrality.

It would be advisable to declare wood pellets as a non carbon neutral renewable energy source and require the greenhouse gas emissions resulting from their life-cycle, including their eventual combustion, in carbon assessments. Furthermore, incentives should be provided to switch from wood pellets to cleaner, mostly emission free energy sources such as wind and solar. Finally, wood pellet use should be regulated to sourcing exclusively from recycled material in order to protect intact forests. Wood pellet use does not necessarily have to disappear completely, as it is renewable unlike fossil fuels and can help with intermittency issues arising from other energy sources, but its use should be heavily managed and minimized as much as possible in order to prevent further damage to our already delicate climate.

