A Climate and Biodiversity Loophole

Support for Biomass Power Undermines Global Targets —A South Korea Case

Issue Brief

SFOC
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Environmental Paper Network
BIOMASS ACTION NETWORK

A Climate and Biodiversity Loophole:
Support for Biomass Power Undermines Global Targets —A South Korea Case

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A Climate and Biodiversity Loophole:

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SFOC has a mission to accelerate the world's transition from fossil fuel to fossil free. Recognizing the urgency of the climate crisis, we work with the ambition to rapidly reduce greenhouse gas emissions and limit global warming below 1.5C.

The Biomass Action Network (BAN) is an international network which was created in 2018 under the umbrella of The Environmental Paper Network (which retains a separate workstream about pulp and paper). Since then BAN has grown to include 283 NGOs across 59 countries. BAN connects and enables collaboration between organisations from all around the world who are campaigning on forest, climate and biomass issues.

Key Takeaways

- The recently adopted Global Biodiversity Framework (GBF) and progress with the Paris Agreement call for enhanced coherence to reach climate and biodiversity targets, as enshrined in GBF Target 8 and the first Global Stocktake (GST) of 2023
- Contrary to the latest science, however, many climate pledges include burning forest biomass for energy as a mitigation option; this is a false solution with demonstrated negative consequences for the climate and biodiversity
- Under the Intergovernmental Panel on Climate Change (IPCC) Guidelines for carbon accounting, emissions from burning biomass are not calculated in the Energy sector, misleading countries to promote biomass as carbon-neutral energy
- Developed countries in particular heavily incentivize the use of biomass, sometimes on greater levels than genuine renewables, such as wind and solar, as exemplified in the case of South Korea
- Support for biomass is the textbook case of subsidies harmful for biodiversity, justified only by abusing the carbon accounting loophole, and should be subject to a substantial phase-out starting 2025 per GBF Target 18

Policy Recommendations

A. Parties to the GBF should designate direct and indirect subsidies for forest biomass as the most harmful incentives for biodiversity by 2025 and substantially phase out by 2030 per Target 18 of the GBF. Subsidies for the worst types of biomass, such as coal-and-biomass co-firing and burning of primary woody biomass, should be immediately eliminated. The updated National Biodiversity Strategies and Action Plan (NBSAP) should include time-bound plans for the removal of all harmful incentives.

B. Parties to the Paris Agreement should fully disclose CO_2 emissions from burning biomass in the Energy sector in the first Biennial Transparency Report (BTR). The updated NDC for 2035 should exclude woody biomass from the mitigation options, and the omission of CO_2 emissions from biomass in the Energy sector accounting should not be counted as emissions reduction. Moving forward, Parties should engage the UNFCCC Secretariat and IPCC to properly account for biomass emissions as fuel combustion activities.

1. Convergence of Global Climate and Biodiversity Targets

Efforts to address the pressing double crises of climate change and biodiversity loss have gained monumental traction in recent years. This is evident in milestones such as the United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement in 2015 and the Convention on Biological Diversity (CBD) Kunming-Montreal Global Biodiversity Framework (GBF) in 2022. A well-established consensus is that time is rapidly running out in terms of both the remaining carbon budget and ecological integrity. In fact, Target 8 of the GBF explicitly calls for climate change mitigation.[1]

> "Minimize the impact of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions, including through nature-based solutions and/or ecosystem-based approaches, while minimizing negative and fostering positive impacts of climate action on biodiversity."
>
> Target 8, Kunming-Montreal Global Biodiversity Framework

Following the 'Paris Agreement for Nature', the first Global Stocktake (GST) produced by the 28th Conference of Parties (COP) to the UNFCCC in 2023 reaffirmed the imperative for enhanced coherence to reach climate and biodiversity targets. The GST emphasized the importance of system-based approaches at the nature and energy nexus to achieve the Paris Agreement and GBF goals, including efforts to halt and reverse deforestation and forest degradation by 2030.[2]

> "*Further emphasizes* the importance of conserving, protecting and restoring nature and ecosystems towards achieving the Paris Agreement temperature goal, including through enhanced efforts towards halting and reversing deforestation and forest degradation by 2030, and other terrestrial and marine ecosystems acting as sinks and reservoirs of greenhouse gases and by conserving biodiversity, while ensuring social and environmental safe-

1 Convention of Biological Diversity. (2022). 15/4. *Kunming-Montreal Global Biodiversity Framework.*
2 United Nations Framework Convention on Climate Change. (2023). Decision -/CMA.5. *Outcome of the first global stocktake.*

guards, in line with the Kunming-Montreal Global Biodiversity Framework;"

Paragraph 33, Outcome of the first Global Stocktake

Similarly, the Intergovernmental Panel on Climate Change (IPCC) has highlighted that while wind and solar energy are cost-effective options to cut net emissions by 2030, reducing "the conversion of forests and other ecosystems" and promoting "ecosystem restoration, afforestation, and reforestation" can yield similar mitigation effects in the land-use sector.[3] A series of public and private sector pledges promising greater collaboration and funding for Nature-based Solutions since COP26 offers hopes of a convergence of climate and biodiversity policy action.

2. Dangerous Distractions of Forest Biomass Energy

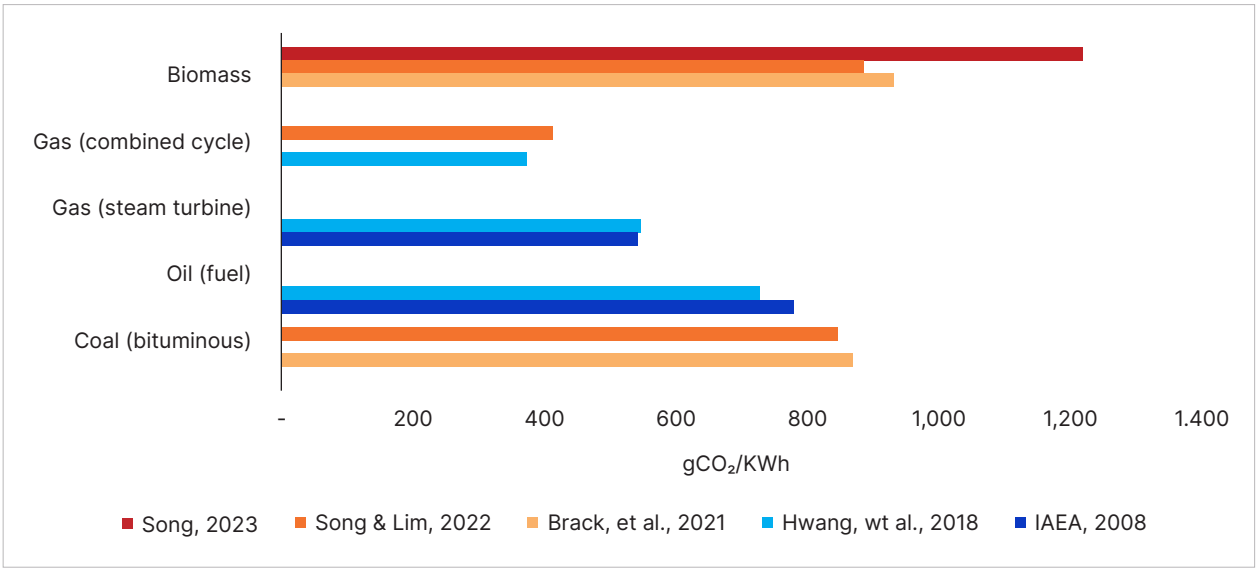
Despite the goal of scaling global renewable energy capacity, especially that of wind, solar, and battery storage, nationally determined contributions (NDCs) indicate that countries are increasingly turning to quick yet flawed fixes for the climate crisis—industrial-scale bioenergy. It is estimated that land-use changes implied in national climate pledges amount to 633 million ha, nearly twice the size of India.[4] The International Energy Agency (IEA) expects that the world's bioenergy capacity will double by 2030 and quadruple by 2050.[5]

In 2019, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) warned that while "land-based climate mitigation activities can be effective and support conservation goals," "the large-scale deployment of bioenergy plantations and afforestation of non-forest ecosystems can come with negative side effects for biodiversity and ecosystem functions."[6] Unfortunately, most countries continue to include in their climate action plans the use of not only crop-based biofuels, produced from monoculture plantations established through deforestation, but also forest biomass, the burning of wood for electricity and heat.

3 Intergovernmental Panel on Climate Change. (2023). *Climate Change 2023: Synthesis report.* Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.
4 Dooley, K., et al. (2022). *The land gap report 2022.*
5 International Energy Agency. (2023). *World energy outlook 2023.*
6 Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. (2019). *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.*

Countries promote biomass energy by arguing that burning wood can be considered carbon neutral. However, ample evidence suggests that such 'green myth' of biomass is merely a product of abusing the carbon accounting loophole that is no longer fit for purpose. Per the IPCC Guidelines, biomass emissions at the point of combustion are omitted from the Energy sector as they are assumed to be accounted for in the Land Use, Land-Use Change, and Forestry (LULUCF) sector.[7] This peculiarity creates the misconception that biomass is zero-emission energy. In practice however, burning biomass emits more carbon dioxide (CO_2) than fossil fuels per unit of energy produced (Fig. 1),[8] and the LULUCF sector often fails to capture the carbon stock loss from logging. The international civil society has repeatedly pointed out that countries must treat biomass like any other fuel.[9]

Figure 1. Carbon emissions per unit of electricity by energy source



Sources: Song, 2023; Song & Lim, 2022; Brack, et al., 2021; Hwang, et al., 2018; IAEA, 2008 (as cited in Hwang, et al., 2018); compiled by authors.

The climate and ecological consequences of forest biomass can last through years to come. Even if new trees are planted following the logging, reabsorbing the released carbon can take decades to over a century. Especially when intact

7 Intergovernmental Panel on Climate Change. (n.d.). *FAQs.* Task Force on National Greenhouse Gas Inventories.

8 Song, H. (2023). *Subsidized deforestation: 10 years of biomass power in South Korea.* Solutions for Our Climate; Song, H. & Lim, J. (2022). *Forest biomass: Burning the bridge to a renewable future.* Solutions for Our Climate; Brack, D., Birdsey, R., & Walker, W. (2021). *Greenhouse gas emissions from burning US-sourced woody biomass in the EU and UK.* Chatham House; Hwang, W., Seo, H., & Lee, M. (2018). Comparison on the CO_2 emission indices with respect to fuels for power generation in Korea based on statistical data. *Transactions of the Korean Society of Mechanical Engineers B, 42*(2).

9 Environmental Paper Network. (2023). *Biomass carbon accounting is no longer fit for purpose.*

primary or valuable secondary forests are degraded, recovering their carbon stock and ecological integrity often does not materialize.[10] Conversion of natural forests to short-rotation plantation forests for biomass fuel production is even more detrimental as repeated habitat fragmentation and destruction lead to simplified ecosystems and biodiversity loss.[11] Intensive forest management further causes soil erosion and decreased water quality, exacerbating socio-economic challenges for communities reliant on forests and land resources.[12]

Over the past two decades across the globe, large-scale biomass has resulted in severe forest degradation, carbon stock and biodiversity loss, environmental health risks, injustice towards Indigenous Peoples and local communities (IPLCs) and the Global South, and distortion of renewable and forestry markets.[13] These well-documented impacts have led thousands of scientists to publicly urge the end of the use of forest biomass,[14] a concern echoed by over 240 thousand people in Europe.[15]

Nonetheless, biomass is still falsely classified as 'renewable' and accounts for a large share of countries' energy mix, particularly in the developed world. In 2021, biomass reported 43% of all renewable energy supply in the EU (2020), 39% in the UK, 34% in Japan, and 27% in South Korea (Fig. 2).[16] With wood pellets comprising the major feedstock, the global consumption has seen a five-fold increase reaching nearly 25 million metric tons since 2010 and is expected to further rise to 55 million tons by 2030 (Figs. 3 & 4).[17]

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10 Sterman, J., et al. (2022). Does wood bioenergy help or harm the climate?. *Bulletin of the Atomic Scientists, 78*(3).

11 Friends of the Earth US, et al. (2023). *Intact Primary and Vulnerable Secondary Forests.* Protecting biodiversity from harmful financing: No go areas for the international banking sector. Briefing paper 04.

12 Food and Agriculture Organization & United Nations Environment Programme. (2020). *State of the world's forests 2020. Forests, biodiversity and people.*

13 StateoftheForest.ca. (2024). *The state of the forest In Canada: Seeing through the spin*; Song, H. (2023). *Subsidized Deforestation: 10 Years of Biomass Power in South Korea.* Solutions for Our Climate; Tran, H., Juno, E., & Arunachalam, S. (2023). Emissions of wood pelletization and bioenergy use in the United States. *Renewable Energy, 219*(2); Booth, M.S. (2022). *Burning up the carbon sink: How the EU's forest biomass policy undermines climate mitigation, and how it can be reformed.* Partnership for Policy Integrity; Kim, S., et al. (2022). *Importing deforestation: Forest-risk commodity supply chains and due diligence legislation in South Korea.* Advocates for Public Interest Law, Solutions for Our Climate, & Korean Federation for Environmental Movements.

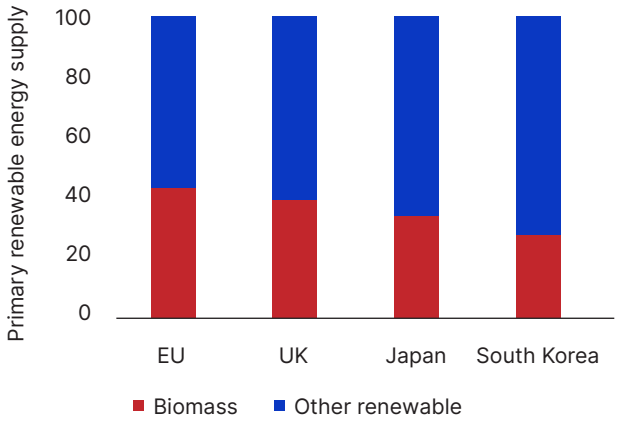
14 Pepper, E. (2022, December 6). *650+ scientists urge stop to burning trees for energy.* Expert blog. Natural Resources Defense Council; World Wide Fund for Nature. (2021, February 11). *500+ scientists tell EU to end tree burning for energy*. Press release; Partnership for Policy Integrity. (January 14, 2018). *Letter from scientists to the EU Parliament regarding forest biomass.*

15 WeMove Europe. (n.d.). *The EU must protect forests, not burn them for energy.*

16 Organisation for Economic Co-operation and Development. (2024). *Renewable energy (Indicator).* [Data set]

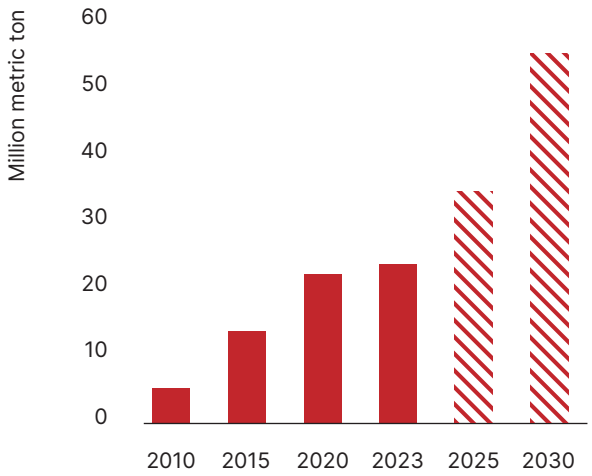
17 Strauss, W. (2024, January 8). Global wood pellet markets: 2023 in review and why industrial wood pellets are key for the future. *Canadian Biomass.*

Figure 2. Biomass energy supply in key countries in 2021



Source: OECD, 2024; the latest available data for the EU is from 2020.

Figure 3. Global wood pellet market size



Source: Strauss, 2024.

Science and empirical experience collectively show that biomass energy is a dangerous distraction from climate change mitigation and a growing threat to halting and reversing biodiversity loss. The far-reaching consequences lead to a conclusion that any public and private policy that incentivizes or subsidizes the use of biomass would be the textbook case of "most harmful subsidies" stipulated in GBF Target 18 and subject to a time-bound phase-out.[18]

18 Convention of Biological Diversity. (2022). 15/4. *Kunming-Montreal Global Biodiversity Framework.*

> "Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least $500 billion per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity."
>
> Target 18, Kunming-Montreal Global Biodiversity Framework

However, as exemplified through the case of South Korea in the following chapter, the negative impacts of biomass are completely disregarded in the government policymaking process. Furthermore, even the most harmful types of biomass receive renewable subsidies in many instances at higher levels than genuine renewables, such as wind and solar.

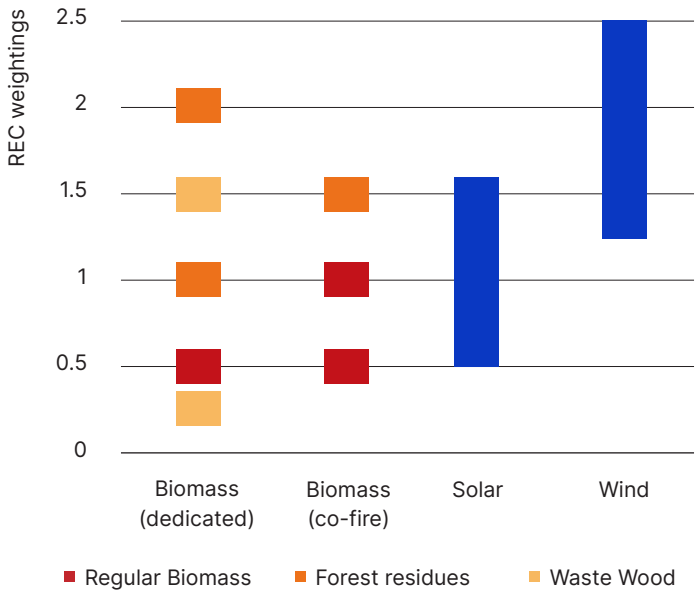
3. South Korea's Outsized Support for Biomass Power

The expansion of biomass power in South Korea is mainly driven by the Renewable Portfolio Standard (RPS). Under this scheme, indirect subsidies, known as the Renewable Energy Certificate (REC) weightings (i.e., multipliers), support the adoption of renewable energy sources, including biomass. Electricity producers can trade these certificates in the market at the prices determined by the supply and demand dynamics. However, REC revenues can vary significantly as the weightings are contingent on the energy source and the type of facility. This variability makes REC weightings the most direct and critical means through which the government manages the profitability of renewable energy.

The baseline renewable on which REC weightings are centered is mid-scale solar photovoltaic given a standard weighting of 1.0. Currently, forest biomass receives weightings up to 2.0. In particular, the highest are given to burning 'forest residues' in biomass-only power plants (2.0) and co-firing with coal in coal power plants (1.5). Regular (roundwood) biomass can also receive a weighting of up to 1.5 when burnt in biomass-only plants, and up to that of 1.0 when co-fired with coal. All these subsidies are on par with or higher than solar (0.5–1.6) and wind (1.2–2.5) (Fig. 4).[19]

19 Korea Ministry of Trade, Industry and Energy. (2023). 신 · 재생에너지 공급의무화제도 및 연료 혼합의무화제도 관리 · 운영지침. Ministry of Trade, Industry and Energy Public Notice No. 2023-158.

Figure 4. REC weightings by key electricity source in South Korea



Source: Ministry of Trade, Industry and Energy, 2023.

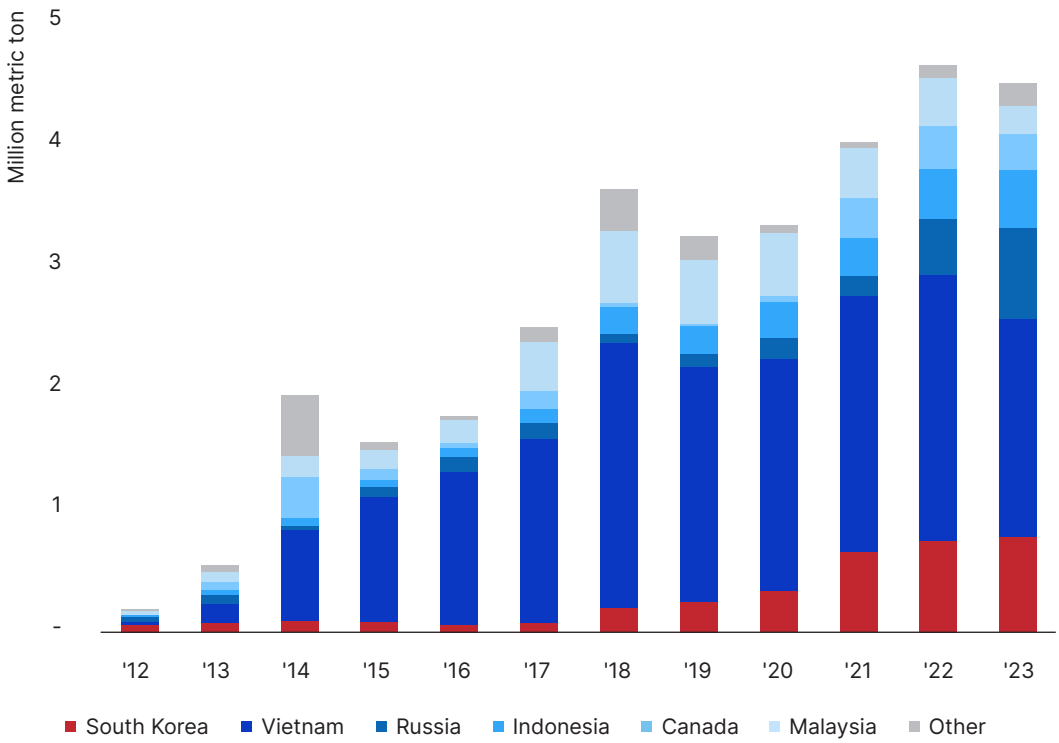
Such high weightings were made possible ironically because forest biomass stands as one of the most expensive sources of electricity, and RECs are designed to compensate for the high costs. While the global average generation cost for solar has plummeted to 11% of what it was a decade ago, the cost for biomass remained at 75%.[20] The Korea Energy Economic Institute's analyses for previous REC weighting revisions show that biomass is indeed more costly than solar and onshore wind in the Korean context as well.[21] This high cost is primarily due to the cost of wood for fuel, a valuable and limited resource whose price is only expected to rise.

At the same time, the South Korean authorities determined the weightings based on a blind assumption that biomass is zero-emissive, effectively nullifying the environmental impact section of the decision criteria, which already received only 11% of the overall consideration. Leaning into the industry's claim that logging for biomass is part of 'sustainable forest management', the government also overlooked the fact that 83% of wood pellets are sourced from around the world, including the natural and biodiverse forests of Southeast Asia and Canada. In particular, the imports of the internationally sanctioned Russian

20 International Renewable Energy Agency. (2022). *Renewable Power Generation Costs in 2022.*
21 Korea Energy Economics Institute. (2021). RPS 신재생에너지원별 기술경제성 분석 및 제도 개선 연구.

wood pellets have surged by eight-fold since the invasion of Ukraine (Fig. 5). Even 'forest residues' produced in South Korea are harvested through clear-cutting 87% of the time, and industrial grade roundwood takes up 46% of all domestic forest biomass.[22]

Figure 5. Wood pellet consumption in South Korea by country of origin

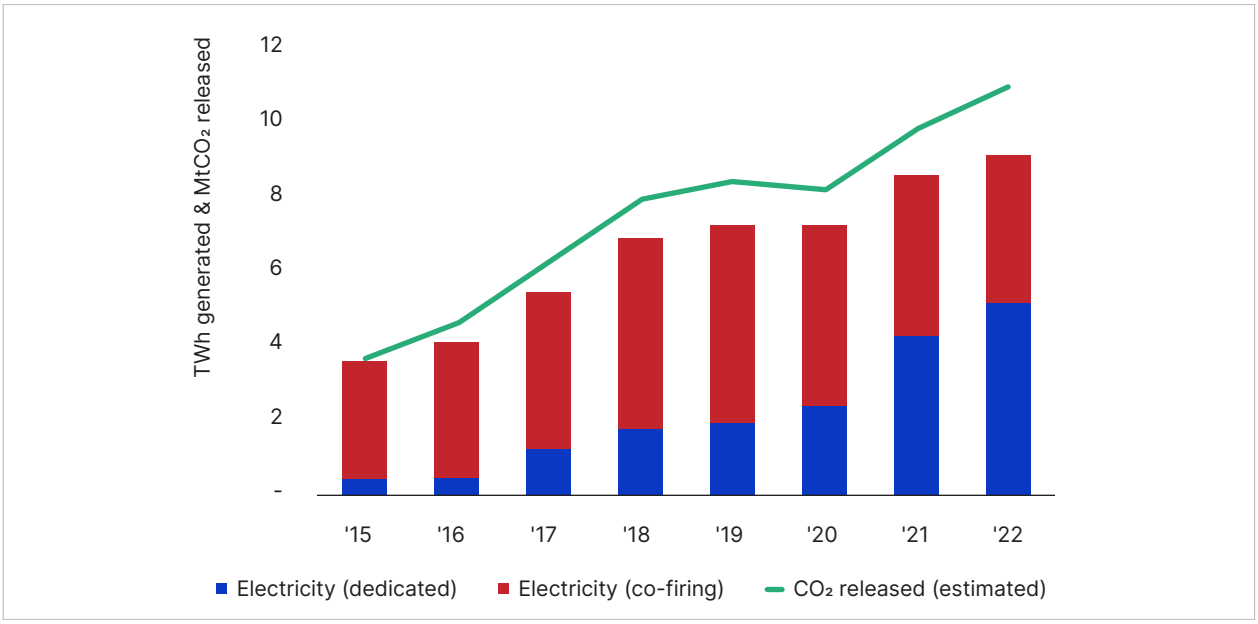


Sources: Korea Customs Service; Korea Forest Service.

Nonetheless, the high REC weightings for biomass resulted in a 42-fold increase of biomass power since the introduction of the RPS in 2012. This makes biomass the second-largest renewable electricity source in South Korea, surpassing wind by three times. It is estimated that since 2015, the country's biomass power has received 3.7 billion USD worth of RECs. In other words, burning a ton of wood received 79 USD in subsidies, and emitting a ton of CO_2 was subsidized with 59 USD. This paradox resulted in burning 50 million tons of wood and the cumulative emissions of over 70 $MtCO_2$ (Figs. 6 and 7).[23]

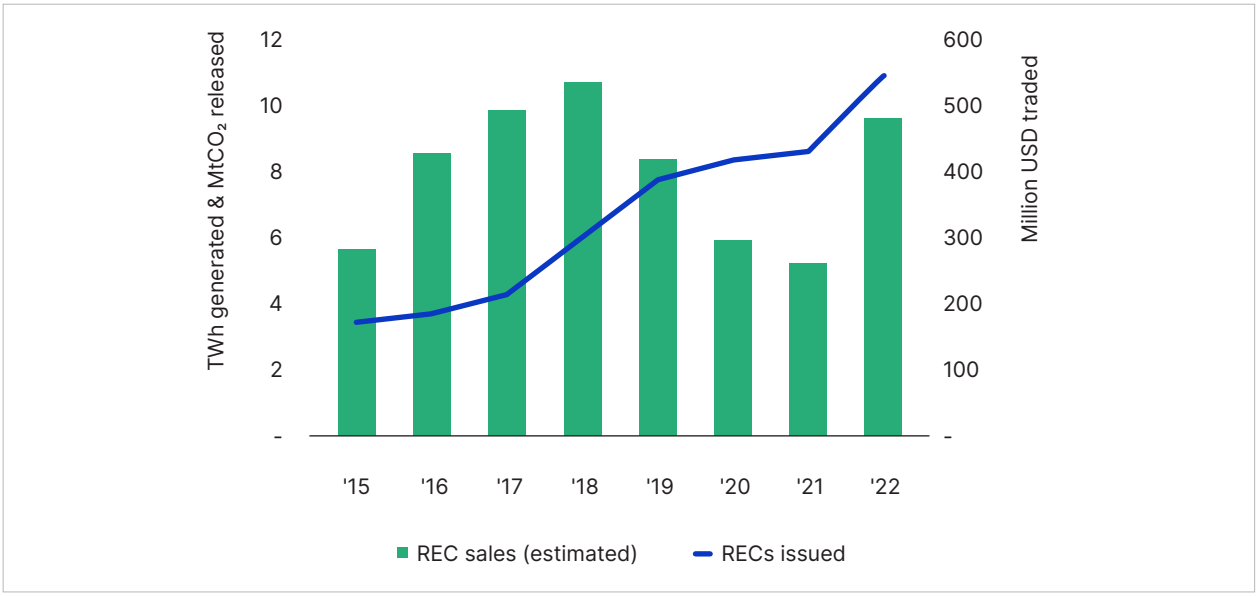
22 Korea Customs Service. (n.d.). *Trade statistics.* [Data set]; Korea Forest Service. (n.d.). *연도별 목재펠릿 생산량.*
23 Solutions for Our Climate. (2024, April 5). *Global open letter: South Korea must take the lead in climate action by eliminating renewable energy certificates for biomass power.*

Figure 6. Biomass electricity and carbon emissions in South Korea



Sources: Solutions for Our Climate, 2024; Song, 2023; compiled by authors.

Figure 7. RECs issued to biomass and estimated value in cash terms



Sources: Solutions for Our Climate, 2024; compiled by authors.

This decision-making in South Korea reaffirms the elephant in the room that it is imperative for the IPCC and UNFCCC to close the accounting loophole and address how the carbon payback period falls outside the timeline of the Paris Agreement's 1.5C temperature goal. In the meantime, the government subsidies for biomass continue to enable the climate, biodiversity, and humanitarian crises.

4. Policy Recommendations for the Climate and Biodiversity

The biomass crisis of the 21st century highlights the unforeseen consequences of the international carbon accounting rules developed in the 1990s. At that time, the world had yet to witness industrial-scale biomass use, let alone the heavy reliance across borders exploiting this accounting loophole. However, it has become evident that biomass is now one of the most heavily subsidized and rapidly growing threats to biodiversity. Policy incentives for biomass are estimated to be 15 billion EUR in the EU27, 1 billion GBP in the UK, and 400 million USD equivalent in South Korea every year.[24] The proposed bioenergy with carbon capture and storage (BECCS) project in the UK is seeking even greater 1.7 billion GBP/year subsidies.[25]

The widening discrepancies between the climate, forests, and biodiversity impacts of biomass and government harmful subsidies for it demonstrate the reality that the world is yet to see a convergence of policy solutions aligned with the global initiatives enshrined in the Paris Agreement and GBF. Fortunately, the CBD COP16 and UNFCCC COP29 in 2024 present the landmark opportunities to start closing this loophole. The author organizations of this brief, therefore, present the following policy recommendations to eliminate subsidies for biomass energy and address its abuse as a climate change mitigation solution.

A. Parties to the GBF should designate direct and indirect subsidies for forest biomass as the most harmful incentives for biodiversity by 2025 and substantially phase out by 2030 per Target 18 of the GBF. Subsidies for the worst types of biomass, such as coal-and-biomass co-firing and burning of primary woody biomass, should be immediately eliminated. The updated National Biodiversity Strategies and Action Plan (NBSAP) should include time-bound plans for the removal of all harmful incentives.

B. Parties to the Paris Agreement should fully disclose CO2 emissions from burning biomass in the Energy sector in the first Biennial Transparency Re-

24 Triomics. (2024). *Can your money do better? Redirecting harmful subsidies to foster nature & climate resilience.* WWF European Policy Office; Solutions for Our Climate. (2024, April 5). *Global open letter: South Korea must take the lead in climate action by eliminating renewable energy certificates for biomass power*; Gareth, D. (2024). *The government's support for biomass.* Department for Energy Security & Net Zero. National Audit Office.

25 Harrison, T. & MacDonald, P. (2024). *Drax's BECCS project climbs in cost to the UK public.* Ember.

port (BTR). The updated NDC for 2035 should exclude woody biomass from the mitigation options, and the omission of CO2 emissions from biomass in the Energy sector accounting should not be counted as emissions reduction. Moving forward, Parties should engage the UNFCCC Secretariat and IPCC to properly account for biomass emissions as fuel combustion activities.

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SFO°C
Solutions for Our Climate

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Solutions for Our Climate (SFOC) is an independent policy research and advocacy group that aims to make emissions trajectories across Asia compatible with the paris Agreement 1.5°C warming target.