



Unmasking the biomass dilemma in Serbia and Bosnia and Herzegovina

CEE

Bankwatch
Network

January 2025

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1. Introduction

1.1. About this briefing

As the Western Balkan countries look for solutions to decarbonise their economies, many towns and cities have plans to increase the use of biomass-based district heating. However, already in 2017 a World Bank study¹ found that on average, 75 per cent of the sustainable technical potential for woody biomass for heating in the region was already being used, and no more recent region-wide data is available.

The two countries with the most intensive plans are Serbia and Bosnia and Herzegovina (BiH), yet as of December 2024, neither has clearly stated its intentions in this field, despite Serbia having adopted its National Energy Climate Plan (NECP) in July.

As EU law regulating bioenergy is not yet sufficient to avoid climate and nature damage, this briefing outlines why forest biomass needs to be treated with caution in the Western Balkans, an overview of Serbia and BiH's plans, two case studies from BiH, and recommendations on how to move forward.

1.2. Forest biomass – far from climate neutral

To keep climate change to no more than 1.5°C – as called for in the Paris Agreement – emissions need to be reduced by 45 per cent by 2030 compared to 2019 levels and reach net zero by 2050.² As part of their EU accession process, the Western Balkan countries need to adopt this goal, which is part of the European Climate Law.³ And they have already adopted greenhouse gas emissions reductions targets for 2030 under the Energy Community Treaty.⁴

The net zero concept, however, allows varying interpretations of how much greenhouse gas emissions need to be reduced or eliminated. In principle, the more they can be absorbed by natural carbon sinks or carbon removal technologies, the less need there is to reduce emissions. But recent research shows that many of the scenarios outlined by the Intergovernmental Panel on Climate Change have been too optimistic on carbon dioxide removal potential, and emissions cuts must therefore be correspondingly deeper and quicker.⁵

¹ World Bank, [Biomass Based Heating in the Western Balkans: A Roadmap for sustainable development](#), *World Bank*, 2017.

² United Nations, ['For a livable climate: Net-zero commitments must be backed by credible action'](#), *United Nations*, accessed 20 December 2024.

³ European Parliament, [Regulation \(EU\) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations \(EC\) No 401/2009 and \(EU\) 2018/1999](#) ('European Climate Law'), OJ L 243, *EUR-Lex*, 1–17, 9 July 2021.

⁴ Energy Community Secretariat, [The Clean Energy Package Targets](#), *Energy Community Secretariat*, accessed 20 December 2024.

⁵ For an overview of the research, see Pippa Gallop, [Paris Alignment: why there is no more space for European public money to finance fossil fuels](#), *CEE Bankwatch Network*, 14 December 2023.

Attitudes to forest biomass largely mirror this wider issue. Decision-makers in the Western Balkans and elsewhere often see woody biomass as a promising renewable resource to reduce CO₂ emissions. Biomass is often considered a ‘carbon neutral’ source, as long as the burnt trees are replaced. But the reality is way more complicated.

So far, forests, along with other ecosystems, have been essential for extracting and storing CO₂ from the atmosphere, maintaining the carbon balance and natural water cycle. However, recent research reveals that forests' ability to mitigate CO₂ emissions may diminish as climate change intensifies, so they will not continue to be a reliable carbon sink as temperatures rise.⁶

For years, scientists have warned that burning trees for energy worsens climate change in the same way as coal and other fossil fuels.⁷ A 2017 study showed that only burning harvest residues, and occasionally salvaged trees, can bring emissions savings over a period of 25 to 50 years compared to burning fossil fuels, whereas burning whole trees often shows no carbon emissions savings even over a 100-year timespan.⁸

Moreover, data from the study shows that at the point of combustion – without lifecycle emissions – burning wood for heat emits 30 per cent more greenhouse gas emissions than coal per unit of generated energy.⁹ So felling forests, assuming they will grow back in 20 years or more, creates a dangerous ‘carbon debt’, and there is simply no more time to wait decades for trees to grow back.

This is also confirmed by an EU Joint Research Centre (JRC) report from 2021, which assessed 24 forest biomass scenarios and found that only one achieves emission savings compared to fossil fuels within one or two decades *and* poses a low risk to biodiversity: burning fine woody debris (twigs and very low-diameter branches), provided enough material is left onsite to maintain soil carbon, fertility, etc. All the other 23 scenarios either lead to no carbon savings in less than two decades, or pose a risk to biodiversity, or both.¹⁰

⁶ Max K. Lloyd et al., ‘[Isotopic clumping in wood as a proxy for photorespiration in trees](#)’, *Penn State University*, 6 November 2023, and ‘[Trees struggle to ‘breathe’ as climate warms](#)’, *Penn State University*, January 2024.

⁷ John D Sterman et al., ‘[Does replacing coal with wood lower CO₂ emissions? Dynamic lifecycle analysis of wood bioenergy](#)’, *IOP Publishing Ltd*, January 2018.

⁸ Jérôme Laganière et al., ‘[Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests](#)’, *Bioenergy*, Volume 9, Issue 2, 358-369, February 2017.

⁹ Craig Hanson and Janet Ranganathan, ‘[Insider: Why Burning Trees for Energy Harms the Climate](#)’, *World Resources Institute*, 6 December 2017.

¹⁰ Camia A. et al., [The use of woody biomass for energy purposes in the EU](#) (version annotated by the Forest Defenders Alliance), *Publications Office of the European Union*, 9, 2021. See also Forest Defenders Alliance, [Briefing on the JRC study “The use of woody biomass for energy production in the EU”](#), *Forest Defenders Alliance*, May 2021.

1.3. Biomass in the Western Balkans – an unknown quantity

Biomass is widely used for household heating in the Western Balkans, but up-to-date and reliable statistics are hard to come by. Indeed, revision of their biomass data was the main reason why some of the countries met their 2020 renewable energy targets, rather than increased solar or wind investments.¹¹

Moreover, the share of renewables — for all the Energy Community Treaty Contracting Parties, not only the Western Balkans — has to increase to 31 per cent of gross final energy consumption by 2030.¹² As of December 2024, only Serbia has a recently adopted NECP,¹³ so it is not easy to see what the region's renewable targets mean for future biomass consumption trends. For Serbia, overall primary production is expected to be 1.7 million tonnes of oil equivalent (Mtoe) of biomass in 2030 — *'close to today's level, but consumed in more efficient devices'* – and an increase in biomass district heating is expected.¹⁴

Globally, biomass demand is set to grow significantly. In 2023, the United Nations Food and Agriculture organisation¹⁵ warned of the implications of doubling solid biomass in total energy supply by 2030 — from 6 per cent to 13 per cent – based on International Energy Agency projections which foresee a further rise to 18 per cent by 2050.¹⁶

According to Global Forest Watch,¹⁷ from 2013 to 2021, 95 per cent of tree cover loss occurred in natural forests in the Western Balkans – not in plantations. Forest ecosystems are under pressure due to illegally harvested timber trading, enabled by weak monitoring and enforcement in most of the countries. The region is already experiencing climate chaos, such as forest fires, forest degradation, flash floods, droughts, land erosion and degradation, heat waves and water scarcity. Tree cover loss also leads to inability to absorb CO₂ emissions, further exacerbating the situation.

¹¹ Energy Community Secretariat, [2021 Annual Implementation Report of the Acquis under the Treaty Establishing the Energy Community](#), Energy Community Secretariat, November 2021.

¹² Energy Community Ministerial Council, [Decision 2022/02/MC-EnC on the 2030 energy and climate targets](#), Energy Community, 15 December 2022.

¹³ North Macedonia and Albania previously adopted their NECPs but they need to be updated in light of the 2030 targets adopted by the Energy Community Ministerial Council.

¹⁴ Government of the Republic of Serbia, [Integrated National Energy and Climate Plan of the Republic of Serbia for the period up to 2030 with a vision to 2050](#), English version, *Government of Serbia*, 39, 84, August 2024.

¹⁵ Food and Agriculture Organization of the United Nations, [Achieving SDG 2 without breaching the 1.5 °C threshold: A global roadmap, Part 1 – How agrifood systems transformation through accelerated climate actions will help achieving food security and nutrition, today and tomorrow](#), FAO, 2023.

¹⁶ International Energy Agency, [Net Zero by 2050: A Roadmap for the Global Energy Sector](#), International Energy Agency, October 2021.

¹⁷ Global Forest Watch database, [Interactive World Forest Map & Tree Cover Change Data](#), Global Forest Watch, accessed 30 November 2024.

2. Inadequate regulation

2.1. Insufficient regulation of biomass use in EU policies

Under the 2018 EU Renewable Energy Directive (RED II), which should have been transposed and implemented by the Energy Community countries, including the Western Balkans, by the end of 2022,¹⁸ biomass utilisation for larger installations is subject to certain sustainability criteria.

Article 29 of RED II stipulates that biomass fuels must fulfil these criteria if used in installations producing electricity, heating and cooling or fuels with a *total rated thermal input* equal to or exceeding 20 megawatts (MW) in the case of solid biomass fuels, and 2 MW in the case of gaseous biomass fuels,¹⁹ though states may apply the criteria to installations with a smaller capacity.

Both RED II and its 2023 amendments,²⁰ which are not yet binding in the Energy Community, fall short in addressing concerns related to climate and biodiversity impacts. They still allow primary woody biomass²¹ to be counted as renewable energy and to receive incentives under some circumstances, despite the negative carbon balance of burning wood other than harvest residues. They would also need a very high level of monitoring and enforcement in order to be effective, which is particularly difficult for the biomass sector, given its wide geographical dispersion.²²



¹⁸ Energy Community Secretariat, [Energy Community acquis](#), Energy Community Secretariat, accessed 20 December 2024.

¹⁹ Note that this is expressed in megawatts thermal (MWth), not electric (MWe), so the criteria apply to biomass plants generating electricity with an electrical output much lower than 20 MW.

²⁰ European Parliament, [Directive \(EU\) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive \(EU\) 2018/2001, Regulation \(EU\) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive \(EU\) 2015/652](#), OJ L, 2023/2413, *EUR-Lex*, 31 October 2023.

²¹ European Commission, [Primary woody biomass](#), European Commission, last updated 12 April 2024.

²² The 2021 JRC report (see footnote 10) admits that even within the EU, the origins of 63 million cubic metres of woody biomass burned in 2015 was unknown. This accounted for 14 per cent of total biomass energy use. The situation in the Western Balkans is likely to be much worse, given the amount of illegal logging in the region.

RED II allows wood from insufficiently regulated sources to qualify for incentives and has an inbuilt over-reliance on voluntary certification schemes, which further undermines enforcement.²³

A major issue is the EU's treatment of biomass as carbon-neutral under the EU Emissions Trading System (ETS) if it meets the RED sustainability criteria.²⁴ This accounting method ignores emissions from biomass harvesting, processing, and transport, and neglects the extended time required for forests to reabsorb the released carbon. Consequently, the actual climate impact of burning wood for energy is underestimated, and the polluter-pays principle barely applied.

These flaws call for stronger measures to align biomass policies with climate goals and forest protection efforts, both in the EU and the Western Balkans.

2.2. Limited transposition of the sustainability and GHG saving criteria

Of the Western Balkan countries, only Serbia has transposed the RED II sustainability and GHG saving criteria for biomass into its national legislation, while Montenegro and Kosovo have partially done so, but need to adopt implementing legislation.²⁵ Albania, Bosnia and Herzegovina, and North Macedonia have not adopted biomass sustainability criteria – even the insufficient ones from RED II. Until they are fully adopted, no biomass burned in installations covered by the criteria can be counted as renewable for the purposes of meeting the countries' 2030 renewable energy targets.



²³ Simon Counsell, [Mass Imbalance – Why certification of EU's biomass energy supplies under the Renewable Energy Directive is failing to protect forests](#), *Fern*, September 2024.

²⁴ [Consolidated version: Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a system for greenhouse gas emission allowance trading within the Union and amending Council Directive 96/61/EC](#), OJ L 275, 25 October 2003, Article 14, and [Consolidated version: Commission Implementing Regulation \(EU\) 2018/2066 of 19 December 2018 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council and amending Commission Regulation \(EU\) No 601/2012](#), OJ L 334, 31 December 2018, Article 38.5. [An adapted version of Commission Implementing Regulation \(EU\) 2018/2066](#) was adopted by the Energy Community Ministerial Council in 2022, with a transposition deadline of 31 December 2023.

²⁵ Energy Community Secretariat, [2024 Annual Implementation Report of the Acquis under the Treaty Establishing the Energy Community](#), *Energy Community Secretariat*, December 2024.

3. Market volatility complicates price and availability forecasts

Several Western Balkan countries were badly affected by the energy crisis of 2021 to 2022, with rising electricity prices and skyrocketing costs for different fuels including biomass. This had major impacts on the existing biomass-based heating facilities and individual consumers and was extremely profitable for wood product exporters – at least for some time.²⁶

During 2022, the Western Balkans are estimated to have produced 13.5 per cent of the fuel wood in Europe, and 8.4 of wood pellets. Average export prices were considerably higher than in 2021 – 46 per cent higher for fuelwood and 89 per cent higher for pellets.²⁷

In an effort to secure sufficient pellets for local consumers, several countries took measures to limit exports and domestic price rises.

For example, Serbia introduced export quotas for different types of raw wood from 5 August 2022 until 28 February 2023 and export restrictions on pellets from 1 December 2022 until 31 January 2023.²⁸

In June 2022, BiH also introduced a 3-month export ban for certain wood products,²⁹ and repeated a similar measure in May 2023.³⁰

North Macedonia also introduced export restrictions on certain types of wood in July 2022.³¹

Overall, in 2022 both fuel wood and pellet exports from the Western Balkans dropped in terms of quantity, though not value. Fuelwood saw a 20.3 per cent decrease and pellets a 19 per cent decline in export quantity.³²

²⁶ In 2021, the main export destinations from the Western Balkans were: 1) Italy (63.8 per cent) 2) Austria (6.9 per cent), 3) Germany (5 per cent) and 4) Hungary (3.1 per cent). [UN Comtrade plus database](#), 2022, cited in Branko Glavonjić, [Wood energy in the UNECE region with focus on the Western Balkans – Item 5](#), UNECE Committee on Forests and the Forest Industry 80th session Geneva, 2-4 November 2022.

²⁷ Branko Glavonjić, [Current trends and developments on wood energy market trends in the Western Balkans](#), *Foresta 2023*, 20-23 November 2023.

²⁸ European Commission, [Serbia 2023 report](#), *European Commission*, November 2023.

²⁹ European Commission, [Bosnia and Herzegovina 2022 report](#), *European Commission*, October 2022.

³⁰ European Commission, [Bosnia and Herzegovina 2023 report](#), *European Commission*, November 2023.

³¹ European Commission, [North Macedonia 2022 report](#), *European Commission*, October 2022.

³² Branko Glavonjić, [Current trends and developments on wood energy market trends in the Western Balkans](#).

Several countries also administratively limited retail price levels (BiH, Serbia, Montenegro, and North Macedonia)³³ and Montenegro³⁴ also reduced value-added tax rates to 7 per cent, to slow down price growth and make pellets more accessible to consumers.³⁵

Although these measures were aimed at protecting local consumers, prices in some cases remained too high for the local population, leading them into energy poverty. In the region as a whole, 1.55 million tonnes of pellets were consumed in 2022 – a slight increase of four per cent compared to 2021, but Serbia saw a large decrease in consumption.³⁶

Due to low public trust in pellets' price stability, combined with several mild winters in a row, the market has been impacted by a dramatic drop in demand, leaving stocks of pellets intact and businesses in difficulties. Although the demand-supply balance was expected to improve gradually, in April 2024, Serbia introduced an import ban on wood pellets that was extended in June for another 90 days.³⁷

Overall, the last few years show the unpredictability of the biomass market in the Western Balkans, which makes any forecasting difficult. In addition, this situation demonstrates the impact of biomass price changes on households. Decisions to use forest biomass in larger-scale facilities not only pose a risk to the climate, forests and biodiversity, but also to the availability of affordable wood for the wider public.



³³ Bioenergy Europe, [Statistical Report 2023 - Pellets](#), *Bioenergy Europe*, 45, 2023.

³⁴ Government of Montenegro, [Zakon o izmjenama i dopunama Zakona o porezu na dodatu vrijednost](#), *Official Gazette of Montenegro*, no. 49/2022, 6 May 2022.

³⁵ Bioenergy Europe, [Statistical Report 2023 - Pellets](#), *Bioenergy Europe*, 45, 2023.

³⁶ Branko Glavonjić, [Current trends and developments on wood energy market trends in the Western Balkans](#).

³⁷ European Commission, [Serbia 2024 report](#), *European Commission*, November 2024.

4. The countries' plans and biomass availability

4.1. Serbia

In late July 2024, Serbia adopted its NECP.³⁸ Among others, it plans an increase in district heating using biomass to 2.65 kilotonnes of oil equivalent (ktoe),³⁹ but also expresses concerns about the availability of sustainably harvested wood, citing this as one of the reasons why the country cannot fulfil the 2030 renewable energy target set by the Energy Community Ministerial Council.⁴⁰

*'The necessary primary production of biomass to reach this target was estimated to be 1.9 Mtoe by 2030 which is above the level the estimated sustainable potential for agricultural and forest biomass (current studies put the technical potential at the level of 1.623-1.7580 Mtoe, but sustainability criteria considerations reduce this level). The INECP national contribution requires a primary production of 1.7 Mtoe of biomass in 2030, close to today's level (...).'*⁴¹

Positively, 19.06 ktoe of solar energy is also expected to contribute to district heating,⁴² but Serbia's over-reliance on fossil gas in the sector⁴³ remains a major issue.

The Second National Forest Inventory in Serbia⁴⁴ is quite optimistic and highlights increased forest stock and yields. But its data raises several questions. Methodological changes from the first inventory – rather than actual forest growth – may account for this.⁴⁵

Without independent verification, stakeholders might distrust the findings, hindering policy consensus. Additionally, Serbia lacks valid strategic forestry plans, suggesting that governance, not just data quality, is a core issue. Increased yield estimates could risk overexploitation without safeguards prioritising sustainability.

³⁸ Government of the Republic of Serbia, [Integrated National Energy and Climate Plan of the Republic of Serbia for the period up to 2030 with a vision to 2050](#), English version, *Government of Serbia*, August 2024.

³⁹ *Ibid.*, 84. It does not state the current consumption for comparison.

⁴⁰ *Ibid.*, 39.

⁴¹ *Ibid.*

⁴² *Ibid.*, 84.

⁴³ *Ibid.*, 259.

⁴⁴ Forest Directorate of the Republic of Serbia, [National forest inventory of the Republic of Serbia](#), *Forest Directorate*, December 2023.

⁴⁵ Sara Nikolić, ['Ko pustoši srpske šume: 'Kaznena politika mora što pre da se pooštri i to radikalno'](#), *NIN*, 15 September 2024.

Serbia's 2024 energy balance reports that Serbia consumed 18.5 terawatt-hours (TWh) of forest biomass energy in 2023, with a projected increase to 19.7 TWh in 2024.⁴⁶ But the natural growth of forest biomass during the same period is estimated at 19.4 TWh,⁴⁷ indicating that its consumption is nearing or exceeding its natural replenishment. These findings suggest that Serbia's forestry plans currently exceed the technical potential for wood production, even without applying sustainability criteria.

This trend raises serious concerns, especially given that the consumption data is derived from surveys and does not fully account for illegal logging or black-market activity, both of which are prevalent in Serbia. Consequently, actual biomass consumption is likely higher than reported, casting doubt on the reliability of the data and the sustainability of current biomass usage practices.

District heating plants currently make up a relatively small share of Serbia's biomass consumption, but this could change quickly. In 2022, nearly 40,000 tonnes of wood were burnt (mostly wood chips) in Serbia's heating plants.⁴⁸



Photo: Kzenon via Canva

⁴⁶ Government of Serbia, [Odluka o utvrđivanju energetske bilansa Republike Srbije za 2024. godinu](#), *Official Gazette of the Republic of Serbia* no. 8/2024, August 2024.

⁴⁷ Jasna Petrović-Stojanović, ['Toplane na biomasu ne greju jeftinije'](#), *Politika*, 25 September 2024.

⁴⁸ District Heating Business Association of Serbia, [Izveštaj o radu sistema daljinskog grejanja u Republici Srbiji u 2022. godini](#), *District Heating Business Association of Serbia*, 54, October 2023.

Table 1. District heating plants using biomass in Serbia, 2022. Those using primarily biomass are marked in bold. Source: Author's compilation based on District Heating Business Association of Serbia.⁴⁹

Company	Heat capacity (MWth)	Pellets burnt (tonnes)	Briquettes burnt (tonnes)	Wood burnt (tonnes)	Notes
JKP Beogradske elektrane	-	935	N/A	N/A	Mostly gas
JKP Gradska toplana Kruševac	-	N/A	70	N/A	Mostly gas
JKP Gradska toplana Užice	-	165	N/A	N/A	Mostly gas
JKP Toplana Valjevo	-	20	N/A	N/A	Mostly gas
JKP Toplana Šabac	-	N/A	N/A	180	Mostly gas
JP Jedinstvo Kladovo	32.2	N/A	N/A	7,505	Mainly wood, some oil and coal
JP Toplana Priboj	23	160	N/A	7,500	Mainly wood
JKP Gradska toplana Novi Pazar	-	N/A	N/A	2,351	Mostly gas
JKP Majdanpek	19	N/A	N/A	12,835	Mostly wood
JKP Badnjevo Negotin	-	N/A	N/A	574	Mostly heavy fuel oil
JKP Toplana Knjaževac	16	N/A	N/A	3,931	Mostly wood
Energija Zlatar NV d.o.o. Nova Varoš	-	238	N/A	N/A	Mostly heavy fuel oil
JKP Drina Mali Zvornik	-	N/A	N/A	1,513	Mostly gas
Total	90.2	1,518	70	36,389	-

⁴⁹ Ibid., 45-54.

More biomass heating plants are planned, but disillusion is already setting in. 2024 research⁵⁰ based on responses from 29 district heating company representatives – accounting for 90 per cent of the total installed capacity of district heating plants in Serbia – identified the most significant constraints for the potential use of biomass for heat production. Unreliable supply, lack of a biomass market, and financial sustainability were cited as major constraints. The results indicate that larger district heating companies in Serbia do not consider biomass projects feasible due to issues with supplying large quantities of fuel.⁵¹

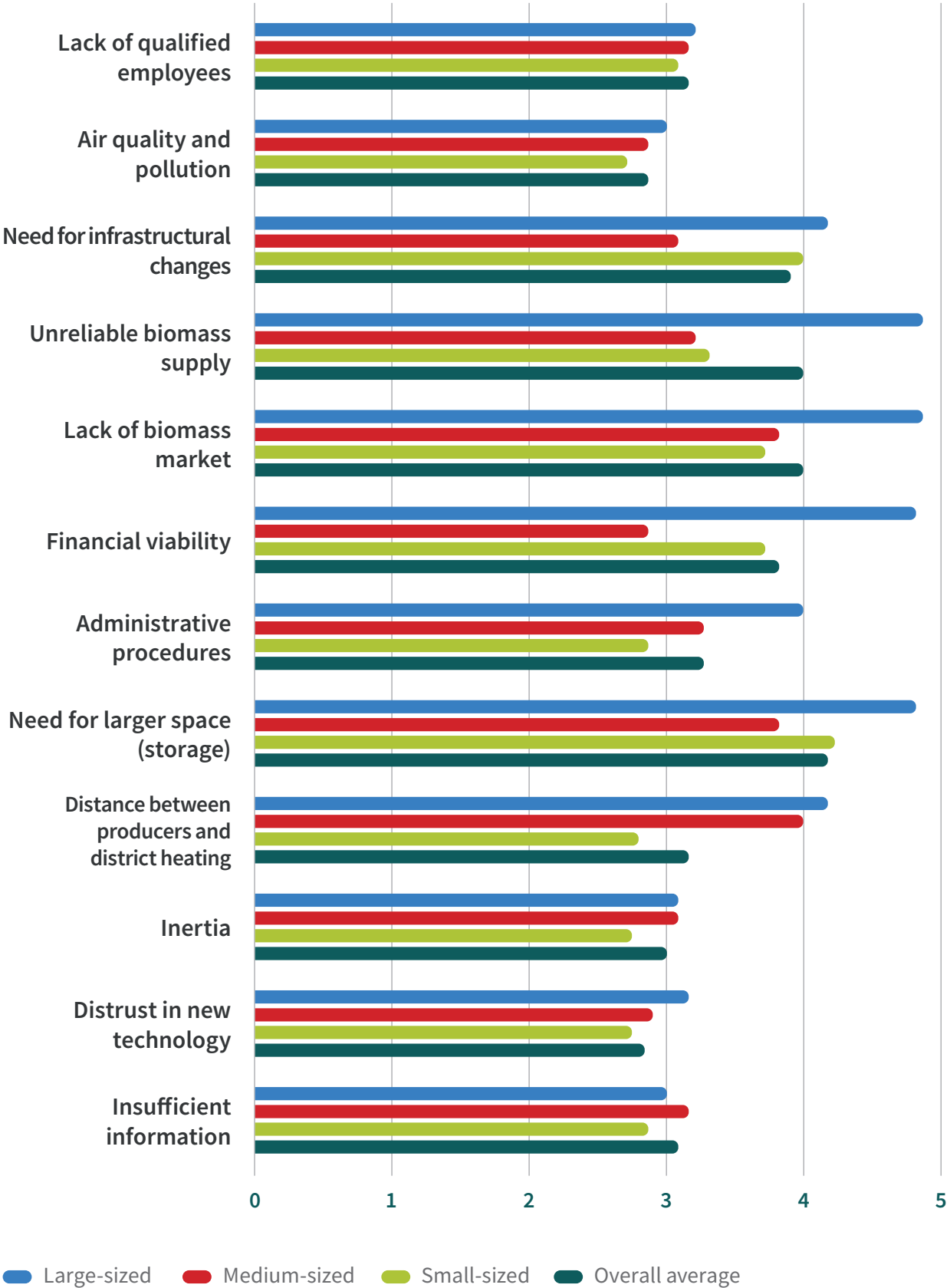


Photo: Richard Johnson via Adobe Stock

⁵⁰ Marija Živković, Dejan Ivezić, Boban Pavlović, Препреке декарбонизацији система даљинског грејања у Србији - ставови представника топлана, Faculty of Mining and Geology, Belgrade University, in District Heating Business Association of Serbia, [Зборник радова Стручно-научна конференција ТОПС 2024](#), District Heating Business Association of Serbia, 67ff, June 2024.

⁵¹ Ibid.

Figure 1. Specific biomass limitations based on responses from small, mid-sized and large district heating operators. Source: Živković et al.⁵²



⁵² Ibid.

Recent data confirms that towns in Serbia cannot rely on woody biomass for additional district heating needs. A 2023 survey of available biomass potential in Serbia⁵³ by the European Bank for Reconstruction and Development (EBRD) found that expanding biomass use in district heating beyond some already planned plants will compete with existing use by households.

‘If we consider the consumed wood for heating households (1,428.1 ktoe) as well as industrial (173.5 ktoe), commercial (20.2) and agricultural and forestry (1.9 ktoe) sectors, we can clearly see that the remaining amount of wood for these purposes is only 33.6 ktoe, i.e. 390.4 GWh.

If the strategic decision was to use wood biomass in CHP plants or in district heating systems, an acceptable way of converting the existing fuel would have to be found for the households using fuel wood.’⁵⁴

Table 2 shows several projects planning the introduction of biomass in district heating systems until 2030, which would use up almost all of this potential. Moreover, this does not include the biomass sustainability criteria introduced in the 2023 update of the EU Renewable Energy Directive,⁵⁵ nor likely future restrictions, which would reduce this potential even further.



Photo: George Clerk via Canva

⁵³ EBRD and Hill International NV, Renewable District Energy in the Western Balkans (ReDEWeB) Programme, Support for Transposition of Article 14 of Energy Efficiency Directive, Comprehensive assessment – Final Report, EBRD and Hill International NV, 2023.

⁵⁴ Ibid., 130.

⁵⁵ European Parliament, [Directive \(EU\) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive \(EU\) 2018/2001, Regulation \(EU\) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive \(EU\) 2015/652.](#)

Table 2. District heating systems (DHS) in Serbia that plan to start using wood biomass between 2023 and 2030. Source: EBRD and Hill International NV.⁵⁶

Note: The new plant in Novi Pazar scheduled for 2023 was officially opened at the end of 2022, and the plant in Vranje at the end of 2024.⁵⁷

DHS/year	2023 GWh	2024 GWh	2025 GWh	2026 GWh	2027 GWh	2028 GWh	2029 GWh	2030 GWh	TOTAL GWh
Novi Pazar	12.08	–	–	–	–	–	–	–	12.08
Kruševac	0.08	–	–	–	–	–	–	112.37	112.44
Vranje	–	28.21	–	–	–	–	–	–	28.21
Zaječar	–	35.36	–	–	–	–	–	–	35.36
Smederevo	–	–	39.49	–	–	–	–	–	39.49
Nova Varoš	–	–	10.69	–	–	–	–	–	10.69
Knjaževac	–	–	16.64	–	–	–	–	–	16.64
G. Milanovac	–	–	12.32	–	–	–	–	–	12.32
Novi Pazar	–	–	–	12.08	–	–	–	–	12.08
Bajina Bašta	–	–	–	–	–	–	12.48	–	12.48
Bor	–	–	–	–	–	–	–	77.87	77.87
Total	12.15	63.58	79.14	12.08	0.00	0.00	12.48	190.24	369.67

Among the projects in Table 2 are several with a total cost of EUR 32 million that are expected to be financed by a grant of EUR 9 million from the EU Regional Energy Efficiency Programme (REEP) under the Western Balkan Investment Framework (WBIF), a EUR 20 million loan from German development bank *Kreditanstalt für Wiederaufbau* (KfW) and a grant up to EUR 2 million on behalf of the German Government. An additional grant of EUR 925,000 is being provided by the EU Instrument for Pre-Accession Assistance (IPA).⁵⁸

⁵⁶ EBRD and Hill International NV, Renewable District Energy in the Western Balkans (ReDEWeB) Programme, Support for Transposition of Article 14 of Energy Efficiency Directive, Comprehensive assessment – Final Report, 168.

⁵⁷ Vladimir Spasić, 'Novi Pazar prebacio toplanu sa mazuta na biomasu', *Balkan Green Energy News*, 18 October 2022. Vranjenews, 'Odlazi li mazut u istoriju: U Vranju počinju sa radom kotlarnice na biomasu', *Vranjenews*, 24 December 2024.

⁵⁸ WBIF, 'Serbia moving forward with renewable energy and energy efficiency targets', *WBIF*, 27 March 2024.

These agreements on financing district heating companies' switch from fossil fuels to biomass are part of the project *Promotion of Renewable Energy – Development of the Biomass Market in Serbia*.⁵⁹

By May 2024, four biomass district heating plants in Serbia, located in Priboj, Mali Zvornik, Novi Pazar, and Majdanpek, had been completed⁶⁰ under the first phase, supported by KfW and the Swiss government, for which financing agreements were signed in 2017.⁶¹ Originally, the first phase, totalling EUR 27 million, was supposed to cover ten plants,⁶² but its ambitions seem to have been scaled back, for unknown reasons.

In May 2024, the European Commission, KfW and German government signed agreements for grants and loans worth EUR 31.9 million for the second phase, expected to cover Niš, Bajina Bašta, Prijepolje, Novi Pazar and Rača.⁶³

Due to concerns about impacts on forests, climate and air, in July 2024, a group of 41 environmental organisations from the Western Balkans, Germany, and across Europe called on KfW⁶⁴ to immediately suspend its biomass support programme in Serbia. The groups urged a shift in focus towards more sustainable energy solutions such as solar thermal, geothermal energy, heat pumps, seasonal storage as well as energy efficiency initiatives, which genuinely protect nature and public health.

4.2. Bosnia and Herzegovina

As of mid-December 2024, BiH's NECP has not yet been adopted, but a final draft is available. By 2030, it foresees additional biomass CHP capacity of 25 MWe and electricity generation of 43.15 GWh annually,⁶⁵ which would increase biomass usage from 6.14 ktoe in 2021 to 27.14 ktoe in 2030.⁶⁶

Plans to co-fire biomass and coal in two of the existing coal-fired units are also mentioned on p.13, but not explained elsewhere, despite their potentially very large wood requirements.

⁵⁹ The [Promotion of Renewable Energy – Development of the Biomass Market in Serbia](#) is funded by the German government through GIZ and KfW under the German Climate Technology Initiative (DKTI).

⁶⁰ European Commission, [Commissioner Várhelyi's statement at the signing ceremony of Biomass II project](#), *European Commission*, 14 May 2024.

⁶¹ Balkan Green Energy News, '[Serbia receives funding to start using biomass in its district heating plants](#)', *Balkan Green Energy News*, 21 June 2017.

⁶² Ibid.

⁶³ Serbian Ministry of Mining and Energy, '[Ten million euros in EU grants for the construction of new biomass heating plants in Serbia](#)', *Ministry of Mining and Energy*, 14 May 2024.

⁶⁴ CEE Bankwatch Network, '[Environmental NGOs demand halt to KfW controversial biomass investments in Serbia - Bankwatch](#)', *CEE Bankwatch Network*, 29 July 2024.

⁶⁵ Integrirani energetska i klimatski plan Bosne i Hercegovine za period do 2030. godine, Verzija 8.6, 101, July 2024.

⁶⁶ Ibid., 107.

And the use of biomass in heat-only plants is also expected to increase significantly, from 30.28 ktoe in 2021 to 48.00 ktoe in 2030.⁶⁷

No list of existing and planned heating plants and CHPs is provided in the NECP, but the following are expected to operate.

Table 3. Author's compilation of existing and planned biomass plants in BiH from various sources.

EXISTING PLANTS						
Location	Plant name	Project promoter	Capacity	Heat only or CHP	Fuel replaced	Financing
Banja Luka	Eko Toplana	Eko Toplana (51 % IEE Banja Luka, 49 % City of Banja Luka)	49 MWth	Heat	Heavy fuel oil	EBRD ⁶⁸
Banja Luka	Starčevica	Eko Toplana	10 MWth	Heat	Heavy fuel oil	Older, not known
Banja Luka	Kosmos / Kočićev vijenac	Eko Toplana	6 MWth	Heat	Heavy fuel oil	Older, not known
Prijedor	-	Toplana AD Prijedor (city-owned)	20 MWth, 1 MWe	CHP	Heavy fuel oil	EBRD, Sida ⁶⁹
Gradiška	Toplana Gradiška	Gradiška Municipality	11 MWth	Heat	Heavy fuel oil	Gradiška Municipality
Zenica	Bio Toplana Nemila	JP Grijanje Zenica	1 MWth	Heat	Biomass individual heating	Czech Development agency
Gračanica	Eko Toplana Gračanica	Eko-toplane d.o.o., originally owned by Austria's Seegen, shares transferred to Radial Ltd. in 2015.	6 MWth	Heat	Coal, heavy oil, still 11 MWth heavy oil reserve	-
PLANNED PROJECTS						
Tuzla	Tuzla 3	Elektroprivreda BiH (EPBiH)	50 MWth	CHP	Coal	EBRD considering
Pale	N/A	KP Gradske toplane a.d. Pale	10 MWth	Heat	Also using 10 MWth gas for reserve	EBRD ⁷⁰

⁶⁷ Ibid., 107, 117.

⁶⁸ EBRD, [GrCF - Banja Luka District Heating](#), EBRD, 9 March 2018.

⁶⁹ EBRD, [Prijedor District Heating](#), EBRD, 29 May 2014.

⁷⁰ EBRD, [Pale District Heating](#), EBRD, 15 September 2023.

Reliable statistics on BiH's sustainable forestry potential and current rate of cutting are not available, and the country has major problems with illegal logging and a lack of regulation and enforcement.⁷¹

Further increasing primary biomass consumption under these circumstances is not only an issue of greenhouse gas emissions and air pollution, but also implies major risks for the country's forests, despite its (still) high forest cover. Additionally, biomass transportation over long distances would increase, further exacerbating the environmental impact.

Only secondary woody biomass⁷² should be used for energy production, and only as a last resort. Therefore, the availability of such secondary biomass in BiH needs to be carefully assessed to ensure that consumption by district heating plants does not outpace the sustainable availability of secondary feedstocks, and that they are sourced locally to avoid adverse environmental effects. This includes considering energy efficiency and alternative renewable sources to reduce reliance on biomass as a primary energy source.

These findings are partially supported by the 2022 study on *Potential Impact of Biomass Cogeneration Plants on Achieving Climate Neutrality of BiH until 2050*,⁷³ albeit with completely different assumptions and conclusions. The study estimated that, if electricity and heat production in biomass CHPs is increased from a starting point of practically zero to 2.06 TWh of electricity in 2030, and 3.05 TWh in 2050,⁷⁴ BiH's current technical potential for biomass production would be nowhere near enough.

The authors put the currently available technical potential⁷⁵ at 620,000 tonnes per year,⁷⁶ and estimated that the required amount of wood biomass for electricity production for 2025 would be 411,811 tonnes. However, the required amount in 2030 would be 2,059,000 tonnes, which would represent more than three times higher demand than the existing unused technical potential of wood biomass, as shown in the table below.

⁷¹ See for example: Selma Boračić Mršo, '[A Bosnian grove is timber poachers' sweet home: The value of illegally cut forest is at least 300 million Convertible Marks](#)', *Tačno.net*, 15 April 2024; Zinaida Đelilović, '[Forests targeted by the mafia: Multi-Million Dollar Crime Involving Illegal Loggers, Interest Groups, and Politics](#)', *Žurnal*, 31 October 2024; Alena Beširević and Ingrid Gercama, '[Prevare iz mračne šume: Umjesto mina, "uklonili" 10.000 kubnih metara drveta](#)', *Naratorium*, 22 May 2023.

⁷² European Commission, '[Secondary woody biomass](#)', *European Commission*, last updated 16 April 2024.

⁷³ A. Husika, N. Zecevic and E. Dzaferovic, '[Potential Impact of Biomass Cogeneration Plants on Achieving Climate Neutrality of BiH until 2050](#)', *American Journal of Climate Change*, 11, 250-264, 2022.

⁷⁴ *Ibid.*, 260-261. 3.05 TWh would represent around one fifth of the country's projected generation in 2050.

⁷⁵ Biomass potential which is available under the current infrastructure conditions and with the current technological possibilities. It can be in the short term temporarily higher than the theoretical potential, it must however respect its constraints. Source: European Commission, '[Biomass potential](#)', *European Commission*, last updated 4 January 2021.

⁷⁶ Husika A, Zecevic, N. and Dzaferovic, E. '[Potential Impact of Biomass Cogeneration Plants on Achieving Climate Neutrality of BiH until 2050](#)', *American Journal of Climate Change*, 11, 2022, 261.

Table 4. The required annual amount of biomass until 2050 in a scenario of 2.06 TWh of biomass electricity generation in CHPs in 2030, and 3.05 TWh in 2050. Source: Husika et. al. 2022.⁷⁷

Year	Installed capacity in B CHP P (GW)	Energy in biomass E (GWh/a)	The required amount of biomass to produce electricity Q_b (1000 t/a)
2025	0.06	1371	411
2030	0.29	6856	2059
2035	0.39	9216	2767
2040	0.30	7100	2132
2045	0.37	8633	2592
2040	0.44	10,166	3053

According to the modelling results, there will be a shortfall of available wood biomass if the proposed scenario is realised. However, instead of concluding that construction of biomass facilities should be limited or halted, the authors recommend that BiH should work on increasing its technical potential for wood biomass production and that this can be increased by short rotation biomass on degraded land such as abandoned open-cast coal mines.⁷⁸

However, advocating for greater forest cutting without having a full overview of even the current situation is highly dangerous for BiH’s forests. It also does not take into account that even with regrowth, forest biomass is not carbon neutral over a timespan relevant to tackling climate change, as explained above.

Biofuelwatch’s research⁷⁹ on the planned conversion of Tuzla 3 from coal to biomass also shows that short-rotation coppicing, regardless of whether on brownfield former coal mine sites or farmland, cannot realistically meet more than a tiny fraction of the demand generated by EPBiH’s plans. Inevitably, most of the biomass will have to come from forests, which is deeply alarming in a region where illegal logging is widespread and forest degradation rampant.

⁷⁷ Ibid., 250-264.

⁷⁸ Ibid., 262.

⁷⁹ Biofuelwatch, [Short-rotation coppicing: No credible option for fuelling new biomass plants in Bosnia and Herzegovina](#), Biofuelwatch, December 2023.

5. Case studies

5.1. Banja Luka

In 2017, the EBRD supported the construction of a 49 MWth district heating plant in Banja Luka, fired by wood biomass. This initiative, under the Bank's Green Cities Framework, involved an investment worth 16.4 million with an EBRD loan amounting to EUR 8.3 million.⁸⁰ The project has encountered substantial challenges and scepticism since its inception.⁸¹

Since 2018, the company operating the plant, Eko Toplane, has faced severe issues with the regularity and consistency of biomass delivery. This problem culminated in a 58 per cent gap between supply and demand for the 2022 season.⁸² Despite contracts with forest concessionaires and governmental interventions, several suppliers failed to deliver the required biomass quantities.⁸³ Notably, the Prijedor forest management unit allegedly failed completely to fulfil its contracts.⁸⁴

In 2022, the city of Banja Luka approved a subsidy of EUR 1 million for Eko Toplane, but the company requested a minimum of EUR 2 million to operate sustainably for the rest of the year.⁸⁵ This reliance on ad-hoc subsidies raises questions about the investment's sustainability, which the EBRD initially assessed as viable.

Between 2022 and May 2024, Banja Luka allocated BAM 7 million, around EUR 3.5 million, in subsidies to Eko Toplane, yet heating costs increased by 23 per cent in the 2023-4 season, compared to an initial proposal for a 60 per cent hike.⁸⁶ With its high prices and unreliable service, 140 users requested disconnection from Eko Toplane in the first five months of 2024, compared to 202 in the same period in 2023, opting to use electric heating instead.⁸⁷

The core issue is the scarcity and instability of the biomass market. The unreliability of biomass supply chains has proven to be a critical vulnerability. Suppliers' inability to deliver consistent and adequate quantities of biomass has left Eko Toplane unable to meet the heating demands of Banja Luka, leading to financial issues and operational failures. Dependency on an unstable market has highlighted the inherent risks of relying on forest biomass as a primary energy source, demonstrating the need for more reliable and sustainable alternatives to ensure energy security and environmental sustainability.

⁸⁰ EBRD, [GrCF - Banja Luka District Heating](#), EBRD, 9 March 2018.

⁸¹ Buka, '[Banjalučani u kratkim rukavama od Nove Godine? Pogledajte kolika je količina drveta spremna za loženje u novoj toplani](#)', *Buka*, 4 December 2017.

⁸² Tatjana Čalić, '[Upitna sezona grijanja: 'Od Šuma Srpske nepovoljniji uslovi, od Grada negativan odgovor'](#)', *Buka*, 31 May 2022.

⁸³ Nezavisne novine, '[Ugrožena grijna sezona u Banjaluci alarm za buđenje nadležnih](#)', *Nezavisne novine*, 17 June 2022.

⁸⁴ Eko toplane Banja Luka, '[Ugrožena sezona grijanja u Banjaluci](#)', *Eko toplane Banja Luka*, September 2022.

⁸⁵ Dragan Sladojević, '[Eko toplane Banjaluka: Upitno hoće li od 1. januara biti grijanja](#)', *Nezavisne novine*, 24 November 2022.

⁸⁶ Milkica Milojević, '["Eco Heating Plants": Citizens Pay a High Price for Poor Heating. Millions to Private Owners from the City Budget](#)', *Fokus*, May 2024.

⁸⁷ *Ibid.*

5.2. Conversion of Unit 3 of the Tuzla coal power plant

On 8 September 2022, the EBRD and one of Bosnia and Herzegovina's entity-owned energy utilities, Elektroprivreda BiH (EPBiH), signed⁸⁸ a mandate letter formalising the Bank's commitment to consider financial support for a controversial energy project in Tuzla. This project involves converting one of the old coal-fired units at the Tuzla power plant to burn willow or other types of wood from short-rotation coppice (SRC) plantations and waste incineration.

However, this plan will not help reduce BiH's climate impact significantly and will require much more land for the SRC plantations than currently projected. It could also trigger waste imports from abroad. According to EPBiH, the company plans to turn 1,075 hectares at the Kreka, Breza, and Đurđevik mines into willow fields. However, analysis by Biofuelwatch⁸⁹ indicates that the necessary energy crops would require 6,042 hectares – 5.6 times more land area. Additionally, developing waste incineration capacity would undermine the country's need to increase recycling, which as of 2021 was virtually at zero.⁹⁰

Other options also appear to be being considered to provide the quantities of biomass needed, such as harvesting from Forest Stewardship Council (FSC) certified forests. But whatever certification BiH's forests have in theory, in reality they are poorly-governed and monitored.⁹¹ In any case, FSC standards do not guarantee the absence of greenhouse gas emissions.

In addition, despite its initial promise, the FSC has faced significant criticism and allegations of greenwashing, particularly in Belarus, where it was active until Russia's full-scale invasion of Ukraine in 2022.⁹² 14 MEPs from 9 EU Member States and 33 international NGOs from 14 countries have called for an independent investigation into the FSC's practices in the country, highlighting concerns that the FSC's certification process may be misleading and not truly reflective of sustainable forest management practices.⁹³

Even before this, in 2021, an open letter by NGOs⁹⁴ to the FSC, asserted that 'FSC is no longer fit for purpose', demanding immediate reform of the organization. Critics argue that the FSC has failed to adapt to changing environmental and market conditions, compromising its mission to promote responsible forest management. The European Union has also weighed in on the issue, underlining that the FSC cannot guarantee the legality of wood.⁹⁵

⁸⁸ Muhamed Hadžibegić, 'EP BiH and EBRD - Conversion of Block 3 of Tuzla TPP into a biomass-based plant', *FENA*, 8 September 2022.

⁸⁹ Biofuelwatch, [Short-rotation coppicing: No credible option for fuelling new biomass plants in Bosnia and Herzegovina](#), *Biofuelwatch*, December 2023.

⁹⁰ European Environment Agency, [Country Factsheet, Municipal waste management, Bosnia and Herzegovina](#), *EEA*, November 2021.

⁹¹ Jelena Jevđenić, 'Korupcija krči šumu – Za manje od godinu izvršena gola sječa na stotinama hektara površine', *Impuls*, 23 March 2024 and Sanja Mladenović Stević, Katerina Topalova, 'Ekocid i zaštita prirode u Bosni i Makedoniji', *H-Alter*, 23 September 2024.

⁹² Libereco, [We demand an independent investigation into greenwashing by FSC in Belarus](#), *Libereco*, 22 February 2024.

⁹³ *Ibid.*

⁹⁴ Earthsight, ['FSC is no longer fit for purpose'. Open letter to the FSC demands immediate reform](#), *FSC Watch*, 21 October 2022.

⁹⁵ Earthsight, ['It's official: EU says neither FSC nor Ukraine government can guarantee wood is legal'](#), *Earthsight*, 23 June 2021.

Given these shortcomings, plus the issues of greenhouse gas emissions and air pollution from forest biomass, relying on FSC-certified woody biomass residues for the Tuzla 3 project is not a viable option. Therefore, pursuing more sustainable and genuinely renewable energy alternatives, such as solar and geothermal, heat pumps, seasonal storage, and energy efficiency implementation measures are essential for meeting BiH's energy needs and climate goals without the associated negative impacts on local ecosystems and air quality.

6. Conclusions

As the Western Balkans transition to more sustainable energy systems, the fact that biomass is legally regarded as renewable under certain circumstances, and that its greenhouse gas emissions are not accounted for at the point of combustion, often leads decision-makers and experts to see it as a viable substitute for coal. However, its use, especially primary forest biomass, can lead to even higher greenhouse gas emissions than fossil fuels, and causes environmental harm, including air pollution, deforestation and biodiversity loss. To ensure biomass is used sparingly and responsibly, both local governments and international financial institutions (IFIs) must adopt a more cautious and sustainable approach.

The recommendations below aim to guide stakeholders in prioritising investments in more sustainable renewables such as solar thermal and geothermal (with reinjection and where needed, capture of gases); heat pumps, seasonal storage, and other efficient technologies, as well as energy efficiency retrofits. Small biomass installations, running on secondary woody materials only, should be planned and used only as a backup source for peak heat production. By doing so, they can ensure that energy needs are met without compromising environmental goals, contributing to a sustainable energy future for the region.



Photo: Mauro Tandoi via Unsplash

7. Recommendations

7.1. For IFIs, bilateral donors and the European Commission

- 1. Halt support for primary forest biomass:** Immediately stop promoting and financing primary forest biomass projects within programmes such as the EBRD's Green Cities and ReDE; KfW, SECO and EU support, etc.
- 2. Diversification of heat and power in Tuzla should not involve primary forest biomass.** Any woody biomass unit at the site of Tuzla 3 should only be a small-scale installation running on secondary biomass, used as a last resort during peak heat demand.
- 3. Limit biomass to secondary sources and small backup installations:** Biomass should be restricted to secondary woody biomass (e.g., wood residues, industrial offcuts, crop waste) for small-scale installations, where no viable alternatives exist and where there is a high likelihood of the feedstock still being available for the lifetime of the plant. This approach minimizes environmental harm and reduces pressure on forests.
- 4. Apply the precautionary principle:** EU IPA funding facilities, EBRD, KfW, SECO and other financiers should adopt a precautionary approach for any heating projects that may harm climate or environmental goals, especially where there is insufficient evidence to ensure sustainability. Projects relying on unsustainable biomass sources should be abandoned.
- 5. Monitor existing biomass projects more closely:** Regularly monitor and publicly report on the environmental performance of existing biomass projects, such as those in Banja Luka and Prijedor, Mali Zvornik, Negotin and others, to assess their long-term sustainability and compliance with climate and air quality standards.
- 6. Advocate for/propose integration of all primary forest biomass into the ETS:** This would take account of the latest scientific evidence on its lack of carbon neutrality over a climate-relevant timespan and help to capture its external costs.

7.2. For Western Balkan governments

- 1. End state aid for primary forest biomass projects:** This would help reduce their contribution to deforestation and biodiversity damage.
- 2. Prioritise energy efficiency and renewable solutions:** Local governments should focus on energy efficiency (e.g., building insulation) and more sustainable renewable/efficient/storage technologies (e.g., heat pumps, solar, geothermal, seasonal storage) before turning to biomass.

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