16th October 2022

Dear Sir/Madam,

Re: Proposed loan to Elektroprivreda BiH to replace Unit 3 of Tuzla Power Plant with one or two biomass boilers

I am writing on behalf of Biofuelwatch, a UK/US non-profit organisation that undertakes research, education and advocacy related to the impacts of large-scale bioenergy.

I understand that the EBRD is currently assessing whether to grant a €50 million loan to EBiH in order to replace Unit 3 of the Tuzla coal plant with a biomass unit with one or two boilers with a total net capacity of 100 MW electricity and 200 MW heat. I would be grateful if you could share this email setting out our concerns about the proposal with the EBRD Directors and anybody else involved in deciding whether or not to approve this loan.

According to the information we have, EBiH's intended feedstock is 80% woodchips from short rotation willow coppicing (willow SRC) and 20% refuse-derived fuel (RDF). We have also read that EBiH is considering converting 1,075 hectares at the Kreka, Breza and Đurđevik mines to willow SRC.

We would like to share with you our serious concerns with this proposal:

1) 1,075 hectares of willow SRC could only meet a very small fraction of the fuel demand for such a biomass plant;
2) Growing sufficient willow SRC to provide 80% of the proposed biomass unit's fuel input would require converting up to 182,034 hectares of land to plantations and is unlikely to be feasible;
3) The most likely feedstock will therefore be either forest wood or mixed waste, both of which have serious adverse impacts when supplied and burned at such a scale;
4) Replacing this coal unit with biomass or waste will perpetuate high levels of harmful air pollution.

<u>Area of land required to meet 80% of fuel input from SRC willow:</u>

According to the European Commission's implementing decision on Best Available Techniques for Large Combustion Plants (eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017D1442&from=EN), new biomass combined heat and power plants will have a net total fuel utilisation of 73-99%. We have not seen any specifications for the unit proposed by EBiH, so we have calculated fuel and land use requirements for that full range.

With a combined heat and power capacity of 300 MW, the thermal input ranges from 303.03 MWth (99% net fuel utilisation) to 410.96 MWth (73% net fuel utilisation). At a

maximum of 8,000 operating hours a year, this comes to 2,424,240 MWth – 3,287,680 MWth thermal input annually.

The net calorific or lower heating value (NCV) of dry willow is around 10.1 GJ/t (farm-energy.extension.org/research-summary-characteristics-of-willow-biomass-chips-produced-using-a-single-pass-cut-and-chip-harvester/)). This converts to 2.805556 MWh/t

Therefore, the plant would require between 864,085 and 1,171,846 dry tonnes of willow chips a year for 100% of fuel input.

If the willow SRC yield was, as various field trials suggest, 10 dry tonnes a hectare, then the new biomass unit would require 86,409 to 117,185 hectares for 100% willow or ***69,127.2 to 93,748 ha for 80% willow.***

However, figures provided by Vattenfall indicate that the willow SRC yield, at least in the region where Vattenfall grows willow, i.e. Brandenburg, Germany and Poland, can be far lower. Vattenfall informed the NGO ROBIN WOOD e.V. in an email dated 6.9.2021, that willow SRC accounted for only 12% of the 88,000 tonnes of wood it was burning annually in Berlin, which comes to 10,600 tonnes a year. They have 2,060 hectares of SRC willow plantations (group.vattenfall.com/press-and-media/newsroom/2019/energy-crops---a-growing-business-for-vattenfall). Their average yield is therefore 5.15 tonnes (presumably dry tonnes) per hectare.

If the yield in Bosnia Herzegovina is similar to Vattenfall's, i.e. also 5.15 dry tonnes per hectare annually, then the ***land requirement for this biomass unit will be*** 167,783.5 to 227,542.9 ha for 100% willow or ***134,226.8 to 182,034.3 ha for 80% willow***.

<u>Sourcing around 900,000 tonnes of willow chips a year is not realistic:</u>

Biofuewatch has been closely following developments around SRC willow, poplar and miscanthus in the UK. Despite more than a decade of subsidies to farmers growing such energy crops, the total area under SRC remains small, with no consistent upwards trend (gov.uk/government/statistics/area-of-crops-grown-for-bioenergy-in-england-and-the-uk-2008-2020/section-2-plant-biomass-miscanthus-short-rotation-coppice-and-straw). According to a peer-reviewed study from 2017 (sciencedirect.com/science/article/abs/pii/S0960148117307255),"*planting SRP [short-rotation plantations] is currently unappealing to the majority of farmers. It is traditionally viewed as a high risk, long-term commitment with high capital costs, poor cash flow and marginal returns. Under existing economic conditions, most farmers don't recoup the investment incurred during the establishment of the crop until at least seven years after planting and don't make any profit until they have sold their crop in year 10*." If willow SRC is grown on degraded soil, such as former coal mines, there will be additional costs for fertilisers (mdpi.com/1999-4907/9/3/154).

An additional problem is the fact that willow SRC needs more water than other conventional agricultural crops (afbini.gov.uk/sites/afbini.gov.uk/files/publications/Short%20rotation%20coppice%20willow%20best%20practice%20guidlines.pdf). When rainfall is sufficient but intermittent, having good water retentive soil, i.e. good quality farmland, is important.

Therefore, willow SRC competes directly with food crops for agricultural land, with adverse effects on food security. Clearly, none of those problems have been considered by EBiH given the tiny area of reclaimed coal mines they indicate.

Sourcing of forest wood?

Meeting 80% of the total fuel input for full operation of the biomass unit from forest wood would require between 1,939,392 MWh and 2,630,144 MWh thermal input a year. Woodchips have an average net calorific value of 3.47 MWh/tonne (forestresearch.gov.uk/tools-and-resources/fthr/biomass-energy-resources/reference-biomass/facts-figures/typical-calorific-values-of-fuels/). Therefore, the biomass unit would require between 558,545 and 757,482 tonnes of woodchips (moisture content 30%). Clearly, it would become by far the largest biomass plant in Bosnia-Herzegovina and possibly in the West Balkan region, one which would have substantial impacts on local and regional wood markets and therefore also on forests and biodiversity. Given that EBiH claims they do not intend to burn forest wood, they will not have considered any of those impacts.

In case the use of forest wood is not explicitly ruled out, we would like to draw your attention to a joint letter by 500 scientists in 2021, writing about the impacts of burning forest wood. They state: "*The result of this additional wood harvest is a large initial increase in carbon emissions, creating a 'carbon debt', which increases over time as more trees are harvested for continuing bioenergy use. Regrowing trees and displacement of fossil fuels may eventually pay off this carbon debt, but regrowth takes time the world does not have to solve climate change. As numerous studies have shown, this burning of wood will increase warming for decades to centuries. That is true even when the wood replaces coal, oil or natural gas*." (woodwellclimate.org/letter-regarding-use-of-forests-for-bioenergy/).

Sourcing of mixed waste/RDF:

According to a 2021 European Environment Agency report, the recycling industry in Bosnia and Herzegovina is not well developed, with only limited volumes of recyclable waste being separately collected (eea.europa.eu/themes/waste/waste-management/municipal-waste-management-country/bosnia-and-herzegovina-municipal-waste). Permitting waste incineration for 20% let alone 100% of the capacity of the proposed new unit would run counter to the country's goal of increasing recycling and, thereby, increase greenhouse gas emissions compared to that better alternative. It also runs counter to the goal of moving towards a circular economy.

Impacts on air pollution:

Earlier this year, Human Rights Watch (HRW) warned: " Bosnia and Herzegovina's authorities have failed to tackle the country's horrific air pollution, which kills thousands of people prematurely each year and is detrimental to the health of thousands more… The country's reliance on coal and wood for heat and coal for electricity generation makes cities in Bosnia and Herzegovina some of the world's most polluted during the winter months. The country has the fifth-highest mortality rate from air pollution." HRW's publication includes several testimonies from Tuzla, regarding pollution from the Tuzla coal plant where the new biomass unit is proposed (hrw.org/news/2022/08/29/bosnia-and-herzegovina-deadly-air-pollution-killing-thousands).

Burning wood and other biomass emits comparable levels of air pollution as burning coal. However, wood combustion emits more small particulates (PM2.5) than coal combustion per unit of energy, assuming the same mitigation technologies. This is because the smallest and most harmful particles, PM2.5, account for a much higher share of PM10 compared to coal.

Looking at emissions data published by the UK's National Atmospheric Emissions Inventory, 86% of PM10 emissions of a biomass plant (Steven's Croft) are within the PM2.5 range, compared to 50% for a coal plant (Ratcliffe): naei.beis.gov.uk/data/map-large-source (2020 data). And authors of a peer-reviewed study looking at domestic fuel use (sciencedirect.com/science/article/abs/pii/S0013935122006880) also found that the share of PM2.5 within PM10 emissions from wood combustion is much higher than that from coal combustion.

Replacing coal with biomass would thus perpetuate and, as far as PM2.5 emissions are concerned, worsen already unacceptably high levels of air pollution in Tuzla.

We believe that the EBRD should support a just transition away from coal towards genuinely clean and low-carbon renewable energy sources as well as increased energy conservation through improved heat efficiency of buildings. **Bosnia-Herzegovina has a large untapped potential for solar energy, for example.**

A loan for a large new biomass unit would be a major step in the wrong direction.

Yours faithfully,

Almuth Ernsting
Biofuelwatch Co-Director