On the path of European integration, Serbia has accepted the obligation to implement a green energy transition, with a slow departure from coal. However, the country currently produces more than 60 percent of its electricity from lignite. Hydropower plants contribute an additional 30 percent.

Nonetheless, the benefits of lignite as a cheap fuel are diminishing. Due to its carbon footprint, it is at a disadvantage compared to renewables, such as wind, biomass and solar, supported by international institutions.

Older Serbian lignite-fired thermal power plants emit high levels of sulphur dioxide and toxic dust. They should be shut down by 2028, as Serbia moves towards a sustainable, low-carbon economy, in line with its potential EU membership. The Belgrade government, however, has no plans to exclude lignite from the energy mix, despite European aspirations. According to officials, despite a proactive approach to renewables, it is coal that ensures system stability. China Machinery Engineering Corporation, a state-owned Chinese group, is building a 350 MW lignite power plant in Kostolac, instead of the 640 MW power plant that is responsible for one of the largest sulphur emissions in the region. The new power plant will have a desulphurization unit. An open cast mine should be opened nearby, which should increase lignite production by 25 percent and supply the new power plant. The 350 MW plant and the mine are financed by a loan extended by the Chinese Eximbank, at the level of 608 million dollars.

Serbia plans to replace coal-fired capacities, scheduled for decommissioning, with 14 new wind farms by 2028. This includes a 600 MW plant in Subotica, which would be Europe’s largest onshore wind farm. Furthermore, studies by reputable European institutions have shown that Serbia has the potential to develop about 6,000 MW of solar capacity that could be profitable.

Thermal power plant decommissioning schedule

According to the Energy Transition Tracker Report, published in the middle of last year, ten units in thermal power plants in Serbia, Bosnia and Herzegovina and Montenegro should be closed by the end of 2023, based on the EU Directive on large combustion plants. This directive does not impose the shutdown of all large combustion plants, but limits them to 20 thousand kilowatt-hours from the beginning of 2018 to the end of 2023. Decommissioning is a way not to exceed the permitted emission limits of sulphur dioxide, nitrogen oxides and dust from these plants. Permanent shutdown awaits two Serbian power plants – TPP Kolubara A and Morava. The first power plant that should have been disconnected from the grid is TPP Pljevlja, in November 2020. The second on the list is TPP Kolubara A, where three units should be shut down in August 2021, while the third is TPP Kakanj in B&H, decommissioning unit 5 next year in October.

In B&H, units 4 and 3 of TPP Tuzla should be shut down in July 2022 and April 2023, respectively.

In Serbia, TPP Morava is nearing the end of its operating life, and its shutdown is expected in June 2022.
The complete shutdown of TPP Kolubara A should have been planned for December 2023. However, the extent to which this plan will be implemented remains to be seen. For now, the fate of the first power plant in the region scheduled for shutdown – TPP Pljevlja, which has reached its limit of 20,000 operating hours, is uncertain. Its environmental upgrades are planned, but NGOs are seeking a revision of the decision, given the high cost of emissions. Just as a reminder, last year Montenegro was the first in the region to start trading in CO_2 emissions. When it comes to thermal power plant shutdown plans, EPS itself has considered several scenarios in the past few years.
According to earlier announcements, this process will be completed by 1 January 2024, which is an obligation that Serbia has undertaken as part of the Energy Community. These are units with a rating of up to 300 MW, where measures to limit emissions and achieve compliance with European regulations are not cost-effective. The draft energy strategy envisaged successive decommissioning, between 2018 and 2024, of thermal capacities below 300 MW – TENT A1 and A2, TPP Morava, TPP Kolubara and Pannonian Power Plants, with an average age of over 45 years. This means that a total of 1,200 MW should be decommissioned, whose efficiency level has dropped below 30 percent. Replacement capacities need to be secured for these units. In addition, operation of power plants without a flue gas desulphurization system should be limited to 20,000 hours. The oldest and least cost-effective thermal units of EPS, planned for shutdown are TPP Kolubara A1 – A4, with a nominal capacity of 161 MW, whose actual availability is at the level of 120 MW. These units are some 55 years old and their consumption is over 1,600 kJ/KWh, which causes unfavourable financial and environmental consequences. Shutdown of these units was originally planned until 2014. When it became clear that this would not happen in the foreseen period, in accordance with the obligations imposed by the Energy Community, the deadline was moved to 2018. It is clear that it was also missed.
If the decision of the Energy Community on postponing the shutdown of obsolete thermal capacities until the end of 2023 had not been adopted, all units below 300 MW, where no measures aimed at reducing harmful emissions had been planned, should have been shut down in 2018. In 2017, local media reported that a Decree had been prepared which planned the shutdown of eight thermal units not meeting environmental requirements of the Large Combustion Plants Directive. In accordance with the Decree, by 2024, Serbia would be left without electricity produced in the Kostolac thermal power plants by units A1 and A2, TENT A1 and A2, as well as in TPP Kolubara.
EPS capacities shutdown schedule, which was then considered, predicted that until 2024, the smallest and oldest units of TPP Kolubara A1-A4 (2018/19) could be decommissioned; followed by TPP Kolubara A5 (2020); TENT A1 and A2 (2021/22); TPP Morava and TPP

Kostolac A1 (2021). In addition to TENT A1, these units are rated below 300 MW. The shutdown of the TENT A2 unit is planned for 2022, and the Kostolac B unit in 2024.
Electricity from decommissioned thermal units would be compensated by commissioning eight wind power plants, one gas-fired thermal power plant in Pancevo (whose construction should be completed in mid-2021) and by completing unit B3 of TPP Kostolac, as well as by revitalizing units in almost all hydroelectric power plants.
However, these were not final solutions, and cost-effectiveness of modernising unit A in Kostolac and one of the TENT units was re-examined. Estimated cost of these projects is around 417 million euros in total. EPS should prepare a special plan to explore opportunities for these investments. The actual decommissioning the remaining six would cost Serbia some 26 million euros. The announced and largely implemented revitalization of units TENT A and B, in all likelihood, means that this plan has been abandoned.

EPS market position

Elektroprivreda Srbije is without a doubt an electricity market leader, with 34.9 TWh of electricity produced annually and 97% market share. Private investors in new generation capacities cannot seriously undermine the position of this public company, especially having in mind that the existing wind power plants do not sell their electricity directly on the market, as EPS buys this electricity during the validity of the preferential purchase agreement.
However, according to the analysis of the Fiscal Council, EPS is currently facing two groups of problems. First, production is falling, and demand has reached production and threatens to overtake it. Another group of problems relates to environmental protection.
The report estimates that the long-term lack of investment is taking its toll: electricity production has fallen sharply in the past few years. Thus, in 2018, 3,000 GWh less was produced compared to 2013, which is a decrease of about 8%.
The causes for the decline in production are not one-time factors, but systemic problems in EPS production – production decline in thermal power plants is caused by the lack of coal of satisfactory quality. In 2018, thermal power plants produced the lowest amount of electricity in the previous 12 years (with the exception of 2014). At the same time, environmental pollution has reached upsetting proportions. EPS has had a legal obligation to reduce pollution since 2015, but modest results have been achieved in that regard. Of the 1.2 billion euros worth of projects planned since then, only a third have been realized by the end of 2019. As a result, plants with modern technology for desulphurization, denitrification and flue gas dedusting are rare.
The President of the Fiscal Council, Professor Pavle Petrović, estimates that it is necessary to launch a large investment cycle, given that domestic demand has already reached the current production capacity of EPS, and in the next decade will significantly exceed it, when consumption is expected to grow by about 3,000 GWh (ca. 10%) due to the growing needs of

the Serbian economy. In the case of a greater economic growth acceleration, an annual increase in demand of almost 20% is possible. Part of the EPS capacity is permanently obsolete and needs to be replaced with new capacity. Decommissioning of eight thermal units by 2024 means a loss of about 5% of capacity, whose annual production is about 2,000 GWh. In order to ensure energy stability in the next decade, new capacities with an annual production of 5,000 to 7,000 GWh are needed, and EPS must increase annual investments to over 600 million euros, which is almost 50% more than investments between 2015 and 2018 (350 to 400 million euros). In order to meet electricity demand and comply with environmental regulations, EPS must invest 5.6 billion euros in the medium term. Of that, over 80%, or 4.6 billion euros, should be invested into new generation capacities, while 800 million euros are needed for environmental investments – building desulphurization plants, measures to further reduce nitrogen oxide emissions, construction of a modern waste management system and wastewater treatment plant.

According to Professor Petrovic, the current strategic documents do not cover the investments necessary to make up for capacity loss and demand growth in the next decade. The key new-build projects are TPP Kostolac B3, solar and wind power plant in Kostolac. Their contribution to increasing production is some 2,400 GWh per year. The revitalization of thermal and hydropower plants and existing infrastructure requires 1.2 billion euros, contributing to the production of an additional 500 GWh. 1.2 billion euros are needed to improve the distribution network and measure the electricity consumed more precisely. This should allow losses to be reduced by 500 to 1,000 GWh. The cumulative effect of all planned investments on increasing the amount of available electricity ranges from 3,500 to 4,000 GWh, which means that at least another 1,500 to 2,000 GWh is still missing.

Moreover, to ensure normal functioning of the EPS system, it is necessary to provide sufficient coal amounts, which requires an additional 1.2 billion euros of investment.

At the same time, the fact that Serbia, according to the analysis of direct subsidies for coal and lignite production in the Contracting Parties of the Energy Community between 2018 and 2019, approved total subsidies at the level of 88.76 million euros to lignite electricity producers is worrying. The subsidies consist of direct budget transfers, a government loan for coal mines and arrears of taxes and contributions to Resavica, which is not part of EPS, and direct budget transfers to EPS, as well as a government guarantee for international loans. On average, public finance support amounted to 1.93 euros per MWh of electricity produced. Bearing in mind that the energy mix in Serbia is the same as in the early 1990s – the share of coal remained stable at 70% – it is clear that the existing strategy is not sustainable in the long run, ignoring the risks of continuing investment in coal capacity.

If Serbia became a member of the EU now, electricity production in EPS plants would become unprofitable. With annual CO_2 emissions of 25 to 30 million tons per year, EPS would pay 500 to 700 million euros per year for permits, which would mean huge losses for

the company. If EPS closes thermal power plants with a capacity of 2,000 MW by 2024, out of a total of 4,840 MW of thermal capacity in its ownership, which is quite certain at the moment, and does not secure replacement capacities for them, market position will be seriously shaken. Hydropower plants with a capacity of 3,015 MW will not be able to cover electricity consumption, given that their share in EPS production is currently around 30%. In that case, Serbia will have to turn to imports, especially in the winter and summer months, when electricity is the most expensive on regional markets. The situation is further complicated by electricity shortages in most regional countries, with the exception of Bosnia and Herzegovina.

Romania and Bulgaria, which have traditionally been net exporters in previous decades, are experiencing a number of difficulties in the electricity sector, mainly related to the survival of thermal power plants under the burden of high emission costs.

For the first time in recent history, Romania ended 2019 as a net importer of electricity, and in the first nine months of last year, imports increased by 27%. The problem with production has become so alarming that the national transmission system operator Transelectrica has warned that the physical capacity of interconnections will not be enough to import the quantities needed to cover domestic consumption. Bulgaria, hesitating on its path of green transition, is artificially keeping alive the state-owned TPP Marica East 2, and the bill for its rescue exceeded half a billion euros, while Bulgarian thermal power plants have recorded a 51% drop in production in the previous decade. On the other hand, Croatia, Hungary, Northern Macedonia and Montenegro themselves have electricity deficits and rely heavily on imports. This is a warning to EPS: if it does not urgently start investing into capacities to replace obsolete thermal power plants, there will be problems not only because Serbia will have to turn to imports – at prices dictated by the market depending on supply and demand, in a time when there is fear that supply will be smaller – it could already face the issue of where to import the necessary electricity amounts from.