ANALYSIS

CLIMATE CHANGE, ENERGY AND THE ENVIRONMENT

ENERGY TRANSITION IN SERBIA

Cohesion or collision?

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December 2020

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FRIEDRICH EBERT STIFTUNG

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Contents

Summary

Energy transition in Serbia is not just about the energy mix, the technology or emissions. It is a process that has to be preceded by a change in society that then leads to a more profound transformation of society.

Exiting lignite, large-scale exploitation of solid biomass for power, setting energy efficiency standards across energy supply chains or opening the door to rooftop solar PV installations affects the whole of society. The first two instances require changes to land use patterns over a vast territory. Decisions on deploying more wind resources or large solar plants also have socio-economic and spatial effects, although of a smaller magnitude.

Serbia has a notable record when it comes to previous energy transitions, having undergone energy transition during the rise of the lignite era, primarily in the 1970s. Fifty years down the line, with the plants at the end of their lifetime, it is time for new decisions.

Deciding on the future of lignite is probably the most important decision facing Serbian society. Locking into lignite for a prolonged period of time requires much more advanced systems to cope with the industry's inherently low productivity and its huge environmental externalities. This may happen at a time of low market prices for energy. The real trouble, however, begins when one looks beyond Serbia's borders: climate and trade policies currently appear to be unambiguous, particularly where Europe is concerned. A decision to lock into lignite for a prolonged period should be accompanied by measures to mitigate the potential consequences, including restricted openness or even isolation of the market.

Moving from lignite towards cleaner energy is a difficult task and is not comparable to any recently executed reform or transformation by Serbian society. It might be compared to the phase of the introduction of lignite and its rise in Serbia since the 1970s. The ongoing energy transition brings challenges related to security of supply, employment and energy affordability. However, we believe that Serbia will have to face the latter two in the near future in any circumstances. The phasing out of coal across the world will affect equipment supply chains and pose a risk to the security of supply. Significantly delaying the decision on energy transition in Serbia is another risky strategy as the resources required for the transition will remain unutilized and could even be lost over time.

Decisions on whether and when to deploy more wind or large-scale solar power plants are made within similar frameworks around the world, despite significant differences of conditions. The key to success in our opinion is to focus society's efforts on Serbia's specificities.

Properly targeting the extent of possible solid biomass deployment for power is comparable in complexity to deciding on lignite. Decision making in this case needs to consider the state of forests and forestry, population density, regional development, workforce skills and numbers, the environmental functions of forests including erosion prevention, flood management carbon stocking and others, marginal land availability and other factors. The quality of the decision-making process is of paramount importance for the outcome. Numerous benefits are at stake, including significant employment opportunities. At the same time, numerous risks, primarily related to mismanagement or poor design, may threaten environmental sustainability or people's livelihoods.

Deciding to put energy efficiency first appears to be a zero-regret strategy from the perspective of public goods, but requires a comprehensive cross-sectoral strategy. Here, the outcome is also very sensitive to the quality of the decision-making process.

Immediate lowering of all administrative barriers and provision of limited support to the deployment of small-scale solar PV seems to be a step that requires very little besides political will. Let the sun shining on Serbian citizens' homes mark the first step of the energy transition.

AN EXTERNAL FRAMEWORK FOR ENERGY TRANSITION IN SERBIA: COLLISION OR COHESION?

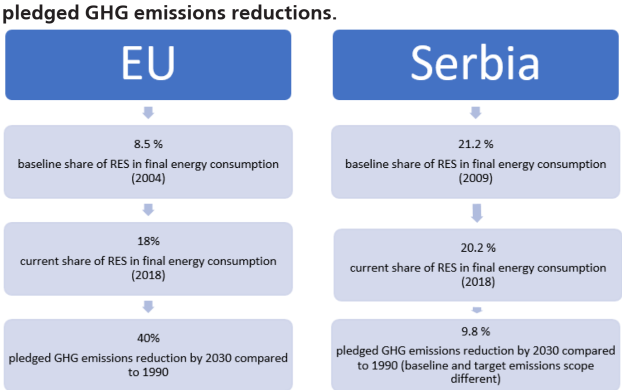
ENERGY TRANSITION AND DECARBONIZATION: THE EU AND SERBIA

Decarbonizing the global energy system is critical if global climate objectives are to be achieved (Paris Agreement, 2015). Spurred by permanent structural changes to energy supply, demand and prices, the energy transition aims to reduce energy-related greenhouse gas emissions through various forms of decarbonization. Renewable energy and energy efficiency measures can potentially achieve 90 percent of the required carbon reductions (IRENA, 2020a).

Energy transition continues to increase in importance as governments and investors prioritize environmental, social and governance factors. The key drivers of the energy transition include: a stable political vision with long-term energy transition commitments; institutional and regulatory support for decarbonization that is subsequently reflected in increased and swift penetration of renewable energy into the energy supply mix with a focus on local sources; decisive improvements in energy efficiency; and markets opening up to smaller entities, including prosumers. These drivers have been at the heart of energy transition at the EU level. In Europe, energy production and use account for more than 75 percent of the EU's greenhouse gas emissions (EC, 2018). Energy transition is therefore a pathway towards transformation of the energy sector from being fossil-based to being zero-carbon. More precisely, economies have to transit from the current energy system, which relies heavily on fossil fuels including coal, natural gas and oil, to an energy efficient system that uses renewable energy sources that do not emit carbon, such as wind, solar and biomass. The task at hand will not be easy as it requires the page to be turned on coal, letting go an industry which provided jobs for decades (Timmermans, 2020). Optimism and enthusiasm, accompanied by caution, also exist in countries that have relied heavily on coal in the past. The Polish Climate Minster believes that Central and Eastern Europe may soon be the driving force for green recovery and the implementation of EU climate ambitions (Kurtyuka, 2020).

Over the last decade, the European Union has pursued a proactive climate policy, integrating renewable technologies like solar and wind into the established energy system to a significant extent. For example, in 2018 the share of energy from renewable sources in gross final energy consumption reached 18 percent in the EU, more than double the 2004 figure of 8.5 percent and close to the 2020 target of 20 percent (Eurostat, 2018). However, it has recently become apparent that the EU needs a much deeper energy transformation if it is to decarbonize in line with the first ever universal, legally binding global climate change agreement, adopted at the Paris Climate Conference (COP21) in December 2015 by the parties to the United Nations Framework Convention on Climate Change (UNFCCC). The Paris Agreement is a bridge between today's policies and climate-neutrality by the end of the century. It commits all countries to take action on climate change. The Paris Agreement sets out a global framework to avoid dangerous climate change by limiting global warming to well below 2°C and pursuing efforts to limit it to 1.5°C. It also aims to strengthen countries' ability to deal with the impacts of climate change and support them in their efforts (Paris Agreement, 2015). The EU has been at the forefront of international efforts to fight climate change and was instrumental in brokering the Paris Agreement. The EU's Nationally Determined Contribution (NDC) under the Paris Agreement is to reduce greenhouse gas emissions by at least 40 percent by 2030 compared to 1990, under its wider 2030 climate and energy framework.

Figure 1
Renewable energy share of gross final energy consumption and pledged GHG emissions reductions.



Source: Eurostat, 2018.

Against this EU ambition, Serbia is moving very slowly towards its 2020 renewable energy target of 27 percent, standing at 20.2 percent in 2018 (Eurostat, 2018). Also, the submitted Nationally Determined Contribution (NDC), with a pledge to reduce greenhouse gas emissions by 9.8 percent by 2030 (not including emissions from the province of Kosovo) compared to 1990 levels (including emissions from the province of Kosovo) is assessed as very symbolic.

CLEAN ENERGY PACKAGE

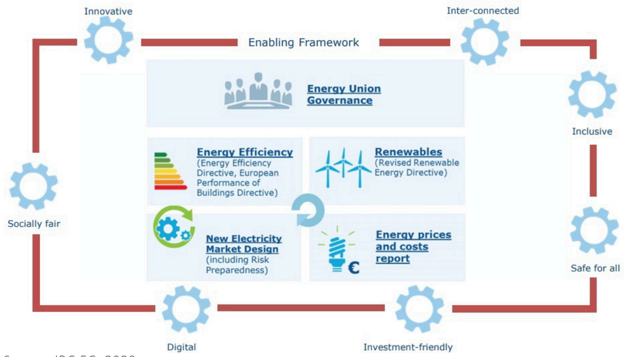
The EU continues to show global leadership in energy transition by seizing the economic and industrial opportunities offered by this global transformation and developing its own approach to energy competitiveness and security, as the EU has neither the United States' shale potential nor China's top-down investment possibilities (Tagliapietra et al., 2019). In 2019, the EU completed a comprehensive update of its energy policy framework to facilitate the transition away from fossil fuels towards cleaner energy and deliver on its Paris Agreement commitments to reduce greenhouse gas emissions through the Clean Energy for All Europeans package. The Clean Energy Package is a set of eight legislative acts on the energy performance of buildings, renewable energy, energy efficiency, governance and electricity market design. Countries have 1-2 years to transpose the new directives into national law. The new rules bring considerable benefits from consumer, environmental and economic perspectives. By coordinating these changes at the EU level, the legislation also underlines the EU's leadership in tackling global warming and provides an important contribution to the EU's long-term strategy to achieve carbon neutrality by 2050. The complexity of the Clean Energy Package is illustrated by the legislative change needed to transpose its goals into the national legislative space, consisting of four regulations and four directives (Table 1). Furthermore, the envisioned implementation requires a complete departure from the existing dynamics of the climate and energy sectors.

The Clean Energy Package is the fourth package of its kind, with each energy package increasing in scope and detail compared to the previous one. Unlike the previous energy packages, it does not include specific legislation for the gas sector, for which a separate new gas package is expected to be proposed in 2020. It builds further on the energy policy framework set by the third Energy Package and paves the way for a gradual transition away from fossil fuels and towards a carbon-neutral economy. More specifically, it updates the following EU targets for 2030:

- 40 percent cut in greenhouse gas (GHG) emissions compared to 1990 levels;
- 32 percent contribution by renewable energy sources (RES) to the EU's energy mix;
- 32.5 percent energy efficiency target, relative to a baseline scenario established in 2007.

The themes and objectives of European energy policy are presented in the image below.

Figure 2
Themes and objectives of European energy policy.



Source: JRC EC, 2020.

GREEN DEAL

The EU has gone even further in its climate and energy transition ambition, as articulated through the European Green Deal, a new EU growth strategy with the objective of transforming Europe's economy to be climate-neutral, resource-efficient and competitive by 2050. Climate action is at the heart of the European Green Deal, which encompasses a package of measures including ambitiously cutting greenhouse gas emissions, investing in research and innovation and preserving the natural environment. The Commission's communications announce initiatives covering a number of interlinked policy areas, including climate, environment, energy, transport, industry, agriculture and sustainable finance. The EU is already on track to meet its

Table 1
Clean energy legislative package. Source: EC, 2019b.

Regulations	Directives
Governance of the Energy Union Regulation (EU) 2018/1999: The Regulation sets a new governance system for the Energy Union. Each Member State is to establish an integrated 10-year National Energy and Climate Plan (NECP) for 2021 to 2030, with a longer-term view towards 2050.	Energy Performance in Buildings Directive (EU) 2018/844: The Directive sets specific provisions for better and more energy-efficient buildings.
Electricity Regulation (EU) 2019/943: The Regulation sets principles for the internal EU electricity market. It focuses mainly on the wholesale market as well as network operation.	Renewable Energy Directive (EU) 2018/2001: The Directive sets a binding target of 32% for renewable energy sources (RES) in the EU's energy mix by 2030, with a possible review for an increase in 2023.
Risk Preparedness Regulation (EU) 2019/941: The Regulation requires Member States to prepare plans to deal with potential future electricity crises.	Energy Efficiency Directive (EU) 2018/2002: The Directive sets a target of 32.5% for energy efficiency by 2030, compared to a baseline scenario established in 2007, with a possible upward revision in 2023.
ACER Regulation (EU) 2019/942: The Regulation updates the role and function of the European Union Agency for the Cooperation of Energy Regulators.	Electricity Directive (EU) 2019/944; The Directive sets rules for the generation, transmission, distribution, supply and storage of electricity. It also includes consumer empowerment and protection aspects. In addition, the market design Directive sets provisions for distribution system operators' flexibility procurement.

greenhouse gas emissions reduction target for 2020 and has put in place the key laws and measures to achieve its climate and energy targets for 2030. The ambitious vision of the European Green Deal endorses new policies that build on already existing key EU legislation and policies, such as: an EU Emissions Trading System (EU ETS) to reduce greenhouse gas emissions from the power sector, industry and flights within the EU; national targets for sectors outside emissions trading, such as transport and buildings; reduction of greenhouse gas emissions from transport, e.g. through CO2 emissions standards for vehicles; boosting energy efficiency, renewable energy and governance of member states' energy and climate policies; promotion of innovative low-carbon technologies and so on. Under the European Green Deal, all current policies related to the climate neutrality objective will be reviewed and revised in line with the increased climate ambition (EC, 2019c).

SERBIA AND THE EU ACCESSION AGENDA

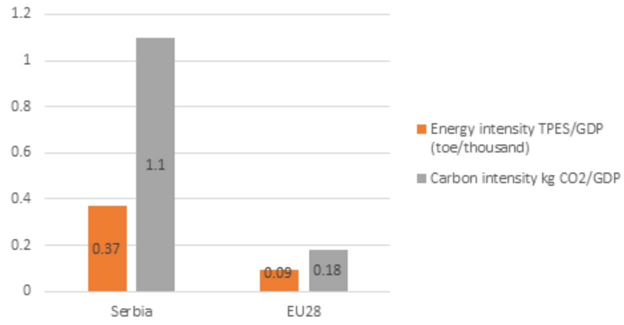
Serbia has been part of the European integration process for more than a decade, but it still lacks ambitious and robust climate and energy policies to drive energy transition forward in line with the Paris Agreement and the Clean Energy Package. The transposition and implementation of the EU energy acquis has been slower and less effective than envisioned. Despite a strong push from the EU and Energy Community, Serbia has faced great difficulties, not only in embracing energy transition but also in meeting some of the basic energy policy conditions for EU membership. This is well recorded in EU progress reports, which over the years have identified the transposition and implementation dynamic and gaps in horizontal and sectoral policies. Serbia is also still struggling with the challenges of implementing the third package. The Energy Community recommends that Serbia should start drafting integrated national energy and climate plans, as also highlighted in the EC Progress Report (EnC, 2019a; EC, 2019a), which states that the energy transition pathway needs to be ambitious to meet the soon to be adopted Energy Community targets for increased use of renewables, energy efficiency improvements and greenhouse gas emissions reductions. At the same time, the process needs to proceed in a just and inclusive manner (EnC, 2020).

The basic assumption for this integrated plan is genuine horizontal coordination, which in practice means coordination between the ministry responsible for energy and the ministry responsible for environmental protection, as well as all other relevant institutions. This process should result in an integrated approach to national climate and energy goals. At this point these integrative institutional and strategic planning processes are lacking among Serbia's key decision makers, a fact that is often overlooked in a Serbia that is still investing in coal, refraining from stringent environmental standards and neglecting the alarming levels of air pollution (Parliament of the Republic of Serbia, 2015). A slow response to an ambitious and effective climate and energy policy stands against dire predictions of the effects of climate change for the Western Balkans in general and Serbia in particular. Extreme weather events such as historic floods, more frequent droughts and heat waves have already been witnessed recently in Serbia. 2020 is the year when all parties to the Paris Agreement are expected to update their Nationally Determined Contribution (NDC), and it has become evident that a 45 percent reduction of GHG emissions by 2030 and carbon neutrality by 2050 is necessary in order to reach the goal of 2°C (1.5°C) as agreed in the Paris Agreement (Paris Agreement, 2015).

CARBON BORDER TAX: A MISSING LINK?

Given the nature and ambition of the European Green Deal, which in the energy sector overlaps significantly with the UN Agenda 2030, the big question is how this policy framework will be operationalized in Serbia given that coal represents 50 percent of the country's total primary energy supply (IEA, 2018) and it is likely that the EU will soon impose a carbon border tax, perhaps as early as 2021. This new mechanism envisages a carbon price being set for imports of certain goods from outside the EU (EC, 2020) to avoid carbon leakage and prevent competition based on carbon intensity. As the European Green Deal underlines the need for a holistic approach in which all EU actions and policies contribute to its objectives, it is prime time for Serbia to fill the existing gap and move on with energy transition. This will allow continued participation in the EU market, enhance the competitiveness of its economy and strengthen its EU membership prospects. The challenge is illustrated by Serbia's very high carbon and energy intensity and is even more relevant in the light of the EU's new policy and the mechanisms announced to achieve carbon neutrality by 2050. The EU is Serbia's main trading partner, while countries like Bosnia and Herzegovina and other parties to the Energy Community Treaty with which Serbia records trade surpluses might also be deeply affected by the introduction of the carbon border tax.

Figure 3
EU and Serbia. Carbon and energy intensity in 2017.



Source: IEA.

With a view to this intensity gap, and bearing in mind the possible balancing role of the carbon border tax, let us enter the realm of Serbian energy production, supply and consumption – the realm of shades.

Text Box 1

Covid-19 and energy transition: too early to tell

The COVID-19 lockdowns have led to a significant reduction in carbon emissions and pollution, providing a preview of the carbon reductions that have been under discussion since the Paris Agreement in 2015, with China seeing a 25 percent reduction in carbon emissions in February 2020 alone. However, these changes have come at enormous cost. The reduction in traffic globally was estimated at nearly 40 percent by early April, while in some of the hardest-hit areas like New York state it was down by nearly 50 percent (Stanley and Hardin, 2020).

Increased uptake of renewables, energy efficiency and related energy-transition measures represents a far-sighted investment amid the crisis set off by the COVID-19 pandemic. As part of short-term stimulus and recovery plans, the energy transition provides a crucial link to medium and long-term global climate and sustainability goals. Beyond renewables and decarbonization, investments in the energy system in the wake of the COVID-19 pandemic can pave the way for equitable, inclusive and resilient economies (IRENA, 2020d).

COVID-19 in the Republic of Serbia also pointed to the sustainability prospects of different renewable energy technologies. Serbia discontinued payment of incentives to the privileged producers of renewable energy, creating a market-like environment for the technologies supported by the feed-in-tariff mechanism. While solar and wind technologies continued to produce and sell electricity at market rates, biogas experienced significant difficulties, clearly showcasing the sustainability of the technologies in a market environment (UN Serbia, 2020)[1].

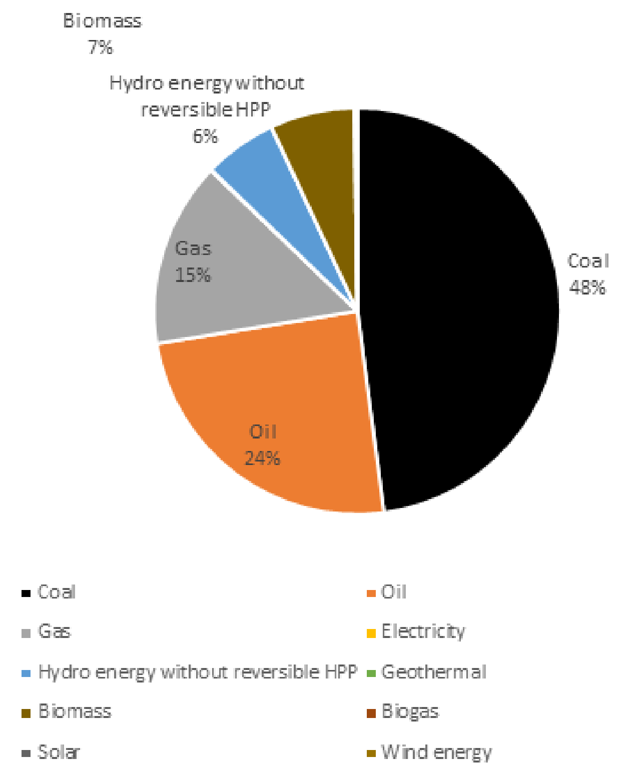
1 "Therefore, wind, solar, and small hydro power producers only had to contend with reduced income during the State of Emergency (rather than more systemic financial, business model, or liquidity issues). However, the situation was different for electricity producers from biogas"

DISCUSSION

FUELS AND TECHNOLOGIES FOR ENERGY PRODUCTION IN SERBIA

Serbia's primary energy supply, the mix of all fuels spent to produce energy in the country, is dominated by a mix of lignite and traditional renewables. The mix consists of fossil fuels used in inefficient devices (from power plants to passenger vehicles), traditional biomass and large hydro plants that still pool the lignite fleet along in electricity mix. It is unlikely that this mix can be sustainable or competitive in the mid- to long-term or provide broader social benefits by delivering employment, protecting the energy poor, ensuring clean air and preventing climate change. There are huge opportunity costs associated with maintaining the current mix. Energy transition in Serbia could be implemented with a policy mix consisting of a large number of no-regret policies.

Figure 4
Total domestic energy supply in Serbia in 2018.



Source: Government of Serbia, 2019.

In 2018, import dependency stood at 34.5 percent (Government of Serbia, 2019), displaying an increasing trend and returning to the levels seen before the privatization of Serbia's oil industry.

Coal, which represents almost half of the total primary energy supply, is consumed in an old and inefficient plant fleet. The plants are on average more than 44 years old and they are inefficient. The data on energy balance are extracted from reports prepared by the ministry responsible for energy and adopted by the government on an annual basis. For the first time, the 2018 energy balance report prepared by the Statistical Office of Serbia does not contain the total energy balance (Statistical Office of Serbia, 2020), which makes verifying government data difficult.

Natural gas represents 15% of the total domestic energy supply. 15% of requirements are domestically produced, while the remaining 85% are imported. Importing Russian gas via Hungary is still Serbia's only supply route. Projects aimed at securing an additional supply route are being developed within a complex geopolitical framework. Industry is responsible for 60% of domestic consumption, while district heating plants represent around 20%, although they are responsible for more than half of consumption during winter peaks, which puts pressure on the security of supply. Some state-owned companies that consume large quantities of natural gas are able to get away with poor payment discipline and accumulate debts, while the debts of Srbijagas are frequently socialized.

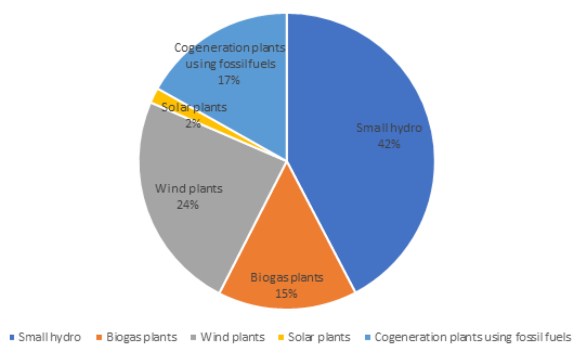
The transport sector is the largest consumer of oil. The average age of the country's vehicle fleet is 17.1 years, with the average age of passenger vehicles standing at 16.4 (Mondo, 2019). Recent data on the distribution of vehicles per emission norms is not available. Media sources have estimated that as many as 1.2 million vehicles out of 2 million, if tested, would be found to emit more pollution than their nominal standards would indicate (RTS, 2019).

Biomass is almost exclusively used in the form of fuel wood that is burnt inefficiently` in outdated devices. Although the Statistical Office of Serbia has discontinued monitoring of the number of wood stoves and ovens, it is still possible to indirectly estimate the number of devices in use. In 2018, 58.9 percent of households did not have central heating installations, while 56.6 percent used solid fuel as their main fuel for heating (Statistical Office of Serbia, 2019). We estimate that more than one million households operate solid fuel stoves or ovens as their main source of heating. The average efficiency of devices in use was measured at 32.59 percent. In comparison, standard SRPS EN 12815:2012, which covers residential cookers fired by solid fuel, specifies that the measured total efficiency from the mean of at least two test results at nominal heat output shall be greater than or equal to the manufacturer's declared value and shall equal or exceed 60 percent (E4tech, 2017).

Public policies that support achievement of the renewable energy target delivered somewhat more than 628 GWh of electricity in 2018 at a cost of approximately 62 million (Regulatory Energy Agency, 2019). The amount produced represents 1.8 percent of all electricity generated. In 2019, production increased to 1,361.8 GWh. In 2019, EPS paid privileged producers RSD 13.62 billion and collected only RSD 2.69 billion from consumers (EPS, 2020). This implies that EPS is subsidizing privileged producers and that the level of incentives in the end user price for renewable electricity needs to be increased. At the same time, the retail price in the regulated part of the market is seen as insufficient to cover the costs of operation. If a utility is unable to cover its costs and is subsidizing the privileged producer, there is little doubt that the cost of rectifying the situation will be borne by the public, whether in the form of direct state aid to the utility, a crisis in security of supply, increased health costs or a combination of those and/or other ways in which poor pricing policy will affect the public good. It is clear that the development or stagnation of the energy sector in Serbia is in the hands of the state.

The renewable energy support policy was discontinued at the end of 2019, while the new policy is still pending. Serbia was the only Energy Community contracting party that paused support for renewable energy during COVID 19.

Figure 5
Electricity production by privileged producers in 2018.

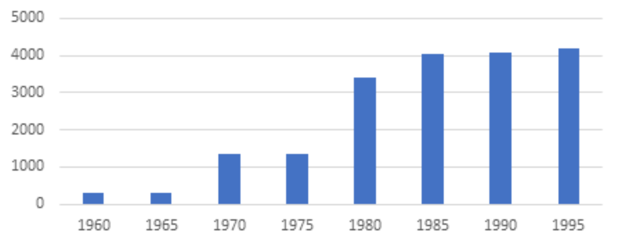


Source: Regulatory Energy Agency of Serbia, 2019.

The mix of electricity generated in 2018 with support from the feed-in tariff mechanism was dominated by production from small hydro power plants, biogas production, some wind, a negligible amount of solar electricity and even electricity produced by coal-fired cogeneration, as was also the case in some other EU states. This mix and the mechanism that supports it do not represent a nucleus from which energy transition may arise.

Serbia has already undergone one relatively quick and significant energy transition. Its lignite-fired power capacity increased more than 13 times in a 20-year period from 1965 to 1985, trebling between 1975 and 1985. This transition required political and investment decisions and had a profound effect on the economy and society as a whole.

Figure 6
Serbia's energy transition: rise of the lignite era.



DRIVERS OF THE FUTURE ENERGY MIX IN SERBIA

An almost complete shift in the use of fuels and technologies is required if Serbia wants to implement energy transition. The development of scenarios or a comprehensive literature review are beyond the scope of this paper. However, we provide a short review of the factors that decision makers need to consider.

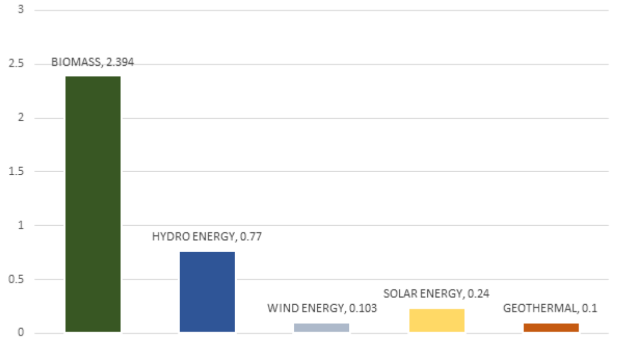
Resource Availability

There are an estimated 60 years of coal reserves remaining. The methods for estimating and classifying reserves are rarely subject to critical analysis or professional discussion in the public domain. The predominant proven and probable geological fossil fuel reserves consist of lignite and amount to 780 million tons of oil equivalent, excluding reserves on the territory of Kosovo and Metohija (Parliament of the Republic of Serbia, 2015).

Serbia is almost completely reliant on imports of natural gas, which are carried by constrained infrastructure. The decision on the future role of natural gas is strategic, while the development of additional infrastructure is accompanied by very complex geopolitical activities, which adds a lot of uncertainty to the future security and costs of supply. Strategic reliance on gas in the process of energy transition would require the development of a comprehensive menu of mitigation options that might be beyond the capacities of Serbian society. Additional deeper analysis of the value currently added to the Serbian economy by natural gas would also be required to understand whether increased consumption of natural gas has sufficient development potential. Natural gas is ultimately a fossil fuel, so pursuing ambitious climate goals is inconsistent with its strategic and wide-scale use in the mid to long term.

Renewable energy potential has been estimated and classified by various actors. The official national estimation deals with calculations of the technical potential of renewable energy sources for the production of energy in general.

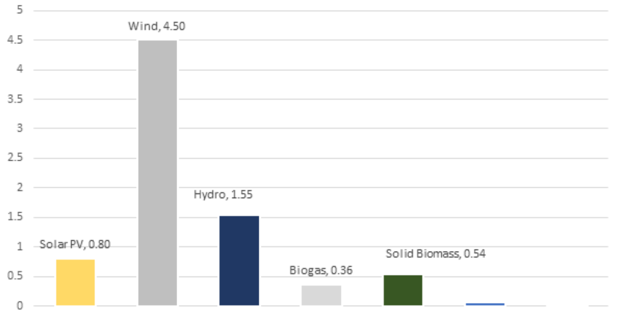
Figure 7
Overview of technical usable potential of RES (from 2012).



Source: Parliament of the Republic of Serbia, 2015

IRENA (2017) estimates the technical potential for renewable electricity production.

Figure 8
Potential for renewable-based electricity in Serbia.



Source: IRENA, 2017.

The sources show a striking difference in their estimations of the technical potential of wind energy. The Energy Strategy Document (Parliament of the Republic of Serbia, 2015) determines wind energy and solar energy potential based on the estimated technical capacity of the electrical power system to accept this energy, although the methodology used for this estimate is not explained in detail. The tools for managing system flexibility have improved significantly since this estimate was made. Also, bearing in mind the likely underestimation of the grid's absorption capacity at the time, we believe that the technical potential of wind energy can be safely valued at a much higher level than 0.103 million tons of oil equivalent. **Since wind is the most abundant resource potential for electricity production, not just in Serbia, re-assessment of wind's potential for electricity production in the national strategic framework is urgently required.**

Serbia already deploys significant hydro energy potential, which provides a substantial amount of energy and precious flexibility not just to the national system but also on a wider scale. Re-powering the existing hydropower plants, if diligently planned and executed along with careful consideration of existing plans for the expansion of large-scale hydro, may be seen as a no regret policy. **On the other hand, the proliferation of small hydropower plants is a paradigmatic policy failure that requires a focused analysis of critical mistakes made in the process. Such an analysis may serve as an excellent tool for future decision making and citizens' involvement in energy transition.**

Table 2
Data on repowering of major hydro-power plants.

HPP	Increase in capacity after re-powering (MW)	Current capacity (MW)	Comment
Đerdap I	55	1113	re-powering still in progress
Đerdap II		270	re-powering planned to start in 2021
Vlasinske HPP		129	re-powering in progress planned increase 10 MW
Pirot	-	80	
Bajina Bašta	54	420	
Pumped storage Bajina Bašta	-	614	
Zvornik	33.6	125.6	
Bistrica and Kokin Brod		124	re-powering ongoing

Source: EPS

To accommodate a significant expansion of intermittent renewable electricity like wind and solar, it is crucial to increase system flexibility. The Energy Strategy Document envisages the construction of new pumped storage hydro power plants (Bistrica and/or Đerdap III). Hydro power facilities are of vital importance for energy transition, so maintaining state ownership over such assets may represent the best possible insurance for energy transition prospects.

Unlike other renewables, biomass is a dynamic resource and its abundance may be influenced by human activities. Biomass is just a common name for a set of fuels whose different characteristics determine the technologies required to convert the biomass to energy. Exploitation of different biomass fuels is also associated with different social and environmental preconditions and externalities. Growing and exploiting woody biomass, for example, requires significant labour, while its felling reduces carbon stocks at the time of felling. Depending on the current status of forests, felling may contribute to carbon stock increase in the mid to long term, and in extreme situations even in the short term if methane emissions are present. The total area covered by coppice forests in the Republic of Serbia was estimated at 64.7 percent of all forests in 2008, accounting for some 1.5 million ha, while production losses were estimated at 3.5 million m3 with additional loss in the quality of wood (Serbian Forest Directorate, 2009). If a massive reconstruction of coppice forests is implemented, a huge influx of low-quality wood might significantly impact the market in fuels. **A multi-disciplinary ex-ante evaluation of the large-scale**

reconstruction of coppice forests with a socio-economic feasibility study, followed by an action plan for implementation should feasibility be confirmed, is an essential prerequisite for making the decision on Serbia's energy transition pathway.

Costs

More than half of the renewable capacity added in 2019 achieved lower electricity costs than new coal, while new solar and wind projects are also undercutting the cheapest and least sustainable existing coal-fired plants. Auction results show that these favourable cost trends are accelerating, reinforcing the case for phasing-out coal entirely (IRENA, 2020c).

Table 3
Costs and cost declines of certain technologies.

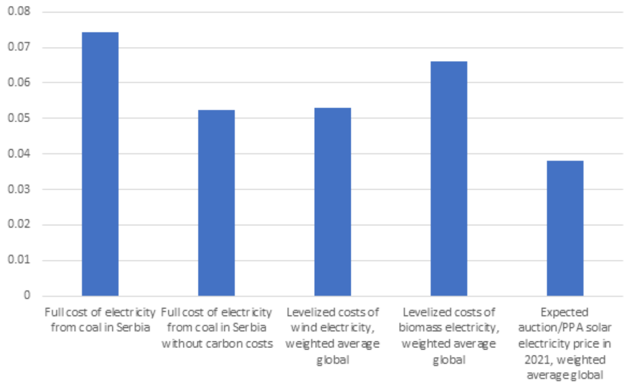
Fuel/ Technology	Levelized costs of electricity (USD/kWh)	Expected auction/PPA price in 2021 (USD/kWh)	Decline in cost technology 2010-2019 (%)
Wind	0.053	0.043	39
Solar PV	0.068	0.038	79
Hydro	0.047	N/A	- 36
Bioenergy	0.066	N/A	N/A
Fossil fuel power range	0.05-0.177	N/A	N/A

Source: IRENA, 2020a

The levelized costs of electricity from different sources represent global weighted averages. Capacity factors (depending on the technology and resource availability) and the cost of capital further affect the cost of renewable energy projects in specific locations. A recent study (New Climate Institute, 2019) estimated that measures to reduce the risk of financing wind energy projects in Serbia could reduce the cost of equity from 14.5 to 7.9 percent, while the cost of debt could be reduced from 4.6 percent to 2.3 percent. The levelized cost of electricity from a wind project could be reduced from 6.7 euro cents per kWh to 5.4 euro cents per kWh.

A recent study by the Energy Community Secretariat (EnC, 2019b) estimated the full cost of electricity from lignite at 6.75 euro cents per kWh, including carbon costs calculated at 20 per ton. It seems that lignite no longer has a cost advantage even in Serbia. The balancing costs of renewable power remain the last unknown dimension, but it is certain that those costs will not hamper its proliferation.

Figure 9
Cost and price of electricity produced with different technologies (USD/kWh).



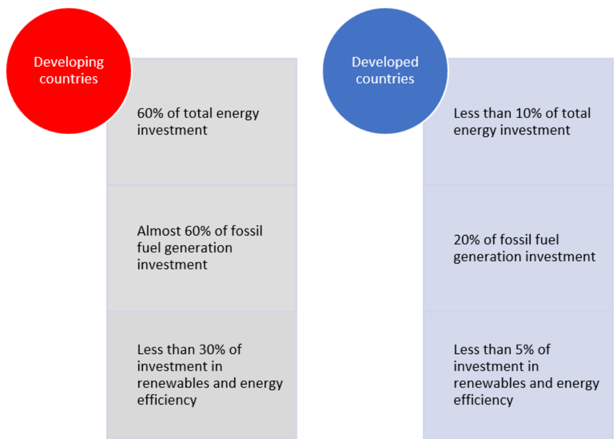
Sources: IRENA, 2020a, EnC, 2019b. EUR= 1.1 USD

Financing

Renewable power investments have offered higher returns to investors and lower volatility than fossil fuel portfolios in the past 10 years. However, a recent study finds that there are still numerous obstacles to the financing of renewables in the capital markets and that a better understanding shared by investors and policy makers is needed, even in the developed world (IEA and Imperial College Business School, 2020).

In 2019, clean energy investments[2] surpassed 600 billion dollars globally, representing more than 30 percent of all energy investments. Renewable power was the leading subsector, followed by energy efficiency (IEA, 2020).

Figure 10
The share of state-owned energy investment by sector.



Source: IEA, 2020

The share of state-owned energy investment is much higher in developing economies than in developed countries. In both groups, state-owned energy investment plays a more prominent role in fossil fuel generation than in renewables and energy efficiency.

2 Covering renewable power, renewable transport and heat, battery storage, carbon capture use and storage, energy efficiency and nuclear.

Table 4
Fuels and technologies for electricity production in Serbia: elements for SWOT analysis

Fuel/ Technology	Strengths	Weaknesses	Opportunities	Threats
Coal	Local availability Employment opportunity	Inherently low extraction productivity Inefficiency in exploitation Huge local and global externalities Aged fleet reaching end of lifetime	None	Environmental, climate and trade policies Long term power prices Low availability of finance
Large hydro	Local availability Cheap production Repowered and rehabilitated major plants Flood management Flexible provision by pumped storage	Environmental impact	Some untapped potential for further development	Climate change impacts on water availability
Wind	Local availability GHG emissions	Intermittent power source	Decreasing technology costs Regional flexibility management	
Solar	Local availability Citizens' energy production GHG emissions Could occupy marginal land well equipped with infrastructure including abandoned open pits	Intermittent power source Managing life cycle externalities	Decreasing technology costs Regional flexibility management	
Biomass	Local availability Employment opportunity Life cycle GHG emissions	Stringent sustainability management required	Technology development	Global image affects financing opportunities
Natural gas	Flexible energy carrier Lower environmental impact compared to coal	Security of supply GHG emissions Trade deficit	LNG market development Pipeline infrastructure development	Carbon neutrality requirements Geopolitical stability

It is important to note that investment in renewable energy projects under feed in tariffs is de-facto investment in government bonds and should be viewed differently from genuine private energy investment.

This is the set-up in which the sector faced the COVID 19 crisis. In its World Energy Investment Outlook 2020 (IEA, 2020) The IEA stresses the risks the crisis brings to countries where state-owned enterprises dominate the sector, such as reverting to coal promotion. The IEA also points out that liquidity constraints could well become a lasting risk for investment, especially in long-term or capital-intensive projects. At the same time, the IEA draws attention to the fact that renewable power projects, in particular solar and wind, provide cheap investment opportunities and a relatively short investment cycle. These characteristics make them suitable for investment during and after the pandemic, when the huge amount of money pumped into economies is looking for meaningful activity.

SOCIAL IMPLICATIONS OF THE FUTURE MIX: ELEMENTS FOR ANALYSIS

The IEA defines energy security as the uninterrupted availability of energy sources at an affordable price. Energy security has many aspects: long-term energy security mainly deals with timely investments to supply energy in line with economic development and environmental needs. On the other hand, short-term energy security focuses on the energy system's ability to react promptly to sudden changes in the supply-demand balance.

Table 5
Selected parameters of the lignite industry in Germany and Serbia.

	Rhineland	Lusatia	Central Germany	Germany	Serbia
Employees in lignite	8 873	7 763	1895	18 531	25 000
Installed lignite capacity [MW]	10 370	7 000	3 330	21 000	4 079
Lignite production [mill. t]	91	61	19	171	39
Electricity by lignite (gross) [TWh_el]	79	49	17	150	23
Lignite reserves [mill. t]	2 479	1 291	395	4165	536

Source: Yu, 2020 for Germany, EPS, 2020, Parliament of the Republic of Serbia, 2015 and Kennedy and Besant-Jones, 2004 for Serbia

A 2004 study (Kennedy and Besant-Jones, 2004) estimated that the labour force in a viable industry the size of the Serbian lignite industry would amount to 8,000 employees. While we do not have reliable recent data on employment in the lignite industry in Serbia, the numbers are certainly much higher than 8,000. A reduction in employment is inevitable if the competitiveness of the industry is to be pursued.

Renewable energy and energy efficiency also provide employment opportunities. The global workforce in renewable energy technologies in 2019 is estimated at 11.5

million jobs, with 3.8 million jobs in the solar industry. 38% of all renewable energy generated jobs are located in China (IRENA, 2020b). Different renewable energy technologies generate different employment structures.

Table 6
Direct, indirect and induced jobs

Jobs group	Description
Direct	jobs that are involved in producing and delivering energy products to a final consumer
Indirect	jobs related to supplying the energy industry with goods and services
Induced	jobs that are created when the compensation paid to direct and indirect employees is spent in the wider economy when procuring goods and services

Direct jobs can be further divided into jobs attributable to construction, manufacture and installation and jobs attributable to operation, maintenance and fuel processing.

The job contribution of individual projects and broader industry development is difficult to estimate without detailed studies in particular environments. In general, solar energy creates the largest quantity of jobs per installed capacity (adjusted for utilization rates to reflect that 1 MW of solar plant delivers much less energy than 1 MW of biomass plant in one year). Solar energy may create 10 times more jobs annually than coal. On the other hand, biomass plants that utilize local resources from forests or energy plants have a much more significant effect in terms of induced jobs, as the entire value chain is embedded in the local economy and involves a larger number of jobs in fuel supply activities. It is worth repeating that detailed studies of precise contexts are required to correctly quantify the job creation potential of a certain renewable energy technology.

We would like to point out the potential for indirect employment generation that may come from improved energy efficiency: a large number of households will be able to reduce their energy bills and the saved income will be shifted to demand for other goods and services, creating local employment opportunities. The magnitude of this indirect employment generation may be assessed within the framework of the preparation of the national Energy and Climate Plan through a dedicated macroeconomic study of the consequences of energy efficiency. In some instances, energy efficiency measures will improve the health conditions of household members, improving their productivity and increasing their income, which will again create additional demand for locally-produced goods and services. Household energy efficiency has great potential. While the thermal retrofit of buildings is widely recognized as an opportunity, improved energy efficiency in the heating of over a million households is frequently overlooked, despite the huge potential for savings and the short payback period on investment.

A major potential source of employment is the forestry activities that may be coordinated with the phasing out of lignite. Three types of activities may be sources of direct and indirect (due to the added value of the industry) employment:

- conversion of high coppice forests;
- establishment and management of short rotation plants;
- regeneration of over mature stands.

The area covered by coppice forests and over mature stands is very large, amounting to almost 15 per cent of the entire territory of Serbia. Marginal land availability is also significant. As already stated, forestry related activities are a possible distinctive characteristic of the Serbian energy transition. A diligent, transparent and inclusive process of assessing the feasibility of this option is vital for the success of energy transition in Serbia.

Deciding on the future of lignite is probably the most important decision that Serbian society needs to make. Locking into lignite for a prolonged period of time requires much more advanced systems to cope with the inherently low productivity of this industry and its huge environmental externalities in a possible framework of low market prices for energy. The real trouble, however, begins when one looks outside Serbia's borders: climate and trade policies currently appear unambiguous, particularly where Europe is concerned. It is difficult to project a scenario in which locking into lignite for the coming decades does not look like an inevitable disaster for the position of Serbia's economy and society. Doing so would effectively be betting on low-probability events: the discontinuation of current European policies or increased market proximity of Asia and China coupled with continued reliance on fossil fuels in those markets. A decision to lock in for a prolonged period of time should be accompanied by measures to mitigate the consequences of low openness or isolation.

Exiting lignite is a difficult task such as has not been recently undertaken by Serbian society. It might be comparable to the transformation of the Serbian energy sector and the rise of lignite in the 1970s. The transition brings challenges related to the security of supply, employment and energy affordability. However, we believe that confronting the latter two is inevitable in the near future in all possible circumstances. The phasing out of coal across the world affects equipment supply chains and also poses a risk to the security of supply.

Remaining undecided for an extended period of time is another risky strategy as the resources required for transition will remain immobilized and will perhaps eventually be lost.

Deciding on the size of solid biomass deployment for power is comparable in complexity to the decisions in the lignite sector. Decision making in this case needs to take into account the state of forests and forestry, population density, regional development, workforce skills and numbers, the environmental functions of forests – including erosion prevention, flood management and carbon stocking – marginal land availability and other factors. The outcome of actions in this sector is the most sensitive to the quality of the decision-making process. Numerous benefits are at stake, including large employment opportunities. At the same, numerous risks related primarily to mismanagement or poor design may threaten environmental sustainability or people's livelihoods.

Deciding to put energy efficiency first appears to be a zero-regret strategy from the perspective of the public good, but a comprehensive cross-sectoral strategy is required to do so. Here, the outcome is also very sensitive to the quality of the decision-making process.

The immediate lowering of all administrative barriers and the provision of limited support to the deployment of small-scale solar PV seems to be a step that requires very little besides political will. Let the sun shining on Serbian citizens' homes mark the first step of the energy transition.

REFERENCES

ACER Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators (Text with EEA relevance.) PE/83/2018/REV/1, OJ L 158, 14.6.2019, p. 22–53. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.158.01.0022.01.ENG&toc=OJ:L:2019:158:TOC.

EC, 2018. Communication from the Commission, A Clean Planet for all. A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy. Brussels, 28.11.2018. COM(2018). 773. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52018DC0773&from=EN

EC, 2019a. Commission staff working document. Serbia 2019 Report. Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 2019 Communication on EU Enlargement Policy {COM(2019) 260 final}. Brussels, 29 May 2019. https://www.mei.gov.rs/upload/documents/eu_dokumenta/godisnji_izvestaji_ek_o_napretku/Serbia_2019_Report.pdf

EC, 2019b. Clean energy for all Europeans. https://ec.europa.eu/energy/topics/energy-strategy/clean-energy-all-europeans_en#documents

EC, 2019c. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. COM/2019/640 final. The European Green Deal. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN.

EC, 2020. EU Green Deal (carbon border adjustment mechanism). https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12228-Carbon-Border-Adjustment-Mechanism

Electricity Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (Text with EEA relevance.), PE/10/2019/REV/1, OJ L 158, 14.6.2019, p. 125–199. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.158.01.0125.01.ENG&toc=OJ:L:2019:158:TOC

Energy Efficiency Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency (Text with EEA relevance.). PE/54/2018/REV/1. OJ L 328, 21.12.2018, p. 210–230. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0210.01.ENG&toc=OJ:L:2018:328:TOC

Electricity Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity (Text with EEA relevance.). PE/9/2019/REV/1. OJ L 158, 14.6.2019, p. 54–124. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.158.01.0054.01.ENG&toc=OJ:L:2019:158:TOC

EnC, 2019a. Annual Implementation Report, Energy Community Secretariat. https://energy-community.org/implementation/IR2019.html

EnC, 2019b. Rocking the Boat: What is Keeping the Energy Community's Coal Sector Afloat? https://www.euneighbours.eu/sites/default/files/publications/2020-02/EnC_Coal_Study_092019.pdf

EnC, 2020. Energy Community Secretariat's WB6 Energy Transition Tracker 07/2020. https://energy-community.org/news/Energy-Community-News/2020/07/16.html

Energy Performance in Buildings Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency (Text with EEA relevance). PE/4/2018/REV/1. OJ L 156, 19.6.2018, p. 75–91. https://eur-lex.europa.eu/legal-content/EN/TXT/?toc=OJ%3AL%3A2018%3A156%3ATOC&uri=uriserv%3AOJ.L_.2018.156.01.0075.01.ENG

EPS, 2020. Technical report 2019 http://www.eps.rs/cir/SiteAssets/Pages/tehnicki-izvestaji/TEH_Godisnjak2019_web_s.pdf

E4tech (UK) Ltd for GIZ GmbH, 2017. Follow-up survey of households in the pilot regions. Efficient firewood utilization in households http://www.bioenergy-serbia.rs/images/documents/studies/WP2_follow-up_HH_survey_final.pdf

Eurostat, 2018. Energy from renewable sources. Shares summary results 2018. https://ec.europa.eu/eurostat/web/energy/data/shares

Governance of the Energy Union Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (Text with EEA relevance.) PE/55/2018/REV/1, OJ L 328, 21.12.2018, p. 1–77. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0001.01.ENG&toc=OJ:L:2018:328:TOC

Government of Serbia, 2019. Energetski bilans Republike Srbije za 2020 (Official Gazette of the Republic of Serbia No 94/2019)

IEA and Imperial College Business School, 2020. Exploring Risk and Return in the Capital Markets https://imperialcollegelondon.box.com/s/f1r832z4apqypw0fakk1k4ya5w30961g

IEA, 2017. International energy agency, data and statistics, Serbia. Balances. https://www.iea.org/data-and-statistics/data-tables?country=SERBIA

IEA, 2020. World Energy Investment 2020, https://www.iea.org/reports/world-energy-investment-2020

IRENA, 2017. Cost-Competitive renewable power generation: Potential across South East Europe https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/IRENA_Cost-competitive_power_potential_SEE_2017.pdf.

IRENA, 2020a. Energy transition. https://www.irena.org/energytransition.

IRENA, 2020b Renewable Energy and Jobs ,Annual Review. 2020 https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Sep/IRENA_RE_Jobs_2020.pdf

IRENA, 2020c. Renewable Power Generation Costs in 2019 https://irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Power_Generation_Costs_2019.pdf.

IRENA, 2020d. The post-COVID recovery: An agenda for resilience, development and equality. https://irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Post-COVID_Recovery_2020.pdf.

JRC EC, 2020. Energy Communities in the Clean Energy Package. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwiqktyo19HqAhVR_CoKHY5EDfMQFjAAegQIBhAB&url=https%3A%2F%2Fe3p.jrc.ec.europa.eu%2Ffile%2F1957%2Fdownload%3Ftoken%3DxYQCIENO&usg=AOvVaw2tVk3KjsYxQ4czyBtv3_lk.

Kennedy D. and Besant-Jones, 2004. World Bank Framework for Development of Regional Energy Trade in South East Europe http://documents1.worldbank.org/curated/en/272791468776978759/pdf/305190Energy1TradeStrategy.pdf

Kurtyuka M., 2020. Speech on the occasion of the occasion of presentation of the Investing in the Recovery and Transition of Europe's Coal Regions, report, prepared by Blomberg. https://about.bnef.com/blog/new-report-reveals-economic-path-to-a-rapid-coal-phase-out-in-europe/.

New Climate Institute, 109. Unlocking Low Cost Renewables in South East Europe https://newclimate.org/wp-content/uploads/2019/10/Unlocking_SEE.pdf.

Mondo, 2019. Istraživanje: Koliko su stari naši automobili. Anketa. 24.04.2019. https://mondo.rs/Automobili/Vesti/a1182062/Prosecna-starost-automobila-Srbija-vozni-park.html

Pao-Yu O., 2020. Coal phase-out in Germany e Implications and policies for affected regions https://reader.elsevier.com/reader/sd/pii/S0360544220301110?token=BF673C2A5E3C2875522728101926A2780E7385FAFAC47B8D7D3C4C1F2F590254FC8B7F18694F62C3B13DD9C163310BEC.

Paris Agreement, 2015. United Nations Climate Change. https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf.

Parliament of the Republic of Serbia, 2015. Energy Sector Development Strategy of the Republic of Serbia for the period by 2025 with projections by 2030. https://www.mre.gov.rs/doc/efikasnost-izvori/23.06.02016%20ENERGY%20SECTOR%20DEVELOPMENT%20STRATEGY%20OF%20THE%20REPUBLIC%20OF%20SERBIA.pdf.

Regulatory Agency of the Republic of Serbia, 2019. Annual report 2018. http://aers.rs/Files/Izvestaji/Godisnji/Izvestaj%20Agencije%202018.pdf.

Renewable Energy Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (Text with EEA relevance.). PE/48/2018/REV/1, OJ L 328, 21.12.2018, p. 82–209. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC.

Risk Preparedness Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC (Text with EEA relevance.), PE/73/2018/REV/1, OJ L 158, 14.6.2019, p. 1–21. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2019.158.01.0001.01.ENG&toc=OJ:L:2019:158:TOC.

RTS, 2019. Kako da vaš automobil sa euro 3 položi ispit. 17.11.2019. https://www.rts.rs/page/magazine/sr/story/1882/tehnologija/3739882/kako-da-vas-automobil-sa-euro-3-motorom-polozi-ispit.html

Serbian Forest Directorate, 2009. The national forest inventory of the republic of Serbia: The growing stock of the Republic of Serbia https://www.upravazasume.gov.rs/wp-content/uploads/2015/12/The-national-forest-inventory-of-the-Republic-of-Serbia.pdf.

SQ Consult, 2018. Using carbon pricing to support coal transition in the Western Balkans, https://www.dropbox.com/s/bu4cfmtozre3mnj/Paper%20SQ%20Consult%20-%20Using%20carbon%20pricing%20to%20support%20energy%20transition%20on%20the%20Western%20Balkan.pdf?dl=0.

Stanley E.P., and Hardin, K., 2020. Deloitte Insights from 27 May 2020. Navigating the energy transition from disruption to growth. Energy and industrial companies are positioned for a lower-carbon future https://www2.deloitte.com/us/en/insights/industry/power-and-utilities/future-of-energy-us-energy-transition.html.

Statistical Office of the Republic of Serbia, 2019. Household budgetary survey, 2018 https://publikacije.stat.gov.rs/G2019/Pdf/G20195652.pdf.

Statistical Office of the Republic of Serbia, 2020. Energy balances, 2018 https://publikacije.stat.gov.rs/G2020/Pdf/G20205657.pdf.

Tagliapietra S., Zachmann G., Edenhofer O., Glachant J-M., Linares P., Loeschel A., 2019. The European Union energy transition: Key priorities for the next five years. Four priorities up to 2024 to foster the EU energy transition. Bruegel Policy brief, Issue 1. https://www.bruegel.org/wp-content/uploads/2019/07/Bruegel_Policy_Brief-2019_01.pdf.

Timmermans F., 2020. Speech on the occasion of the occasion of presentation of the Investing in the Recovery and Transition of Europe's Coal Regions, report, prepared by Blomberg. https://about.bnef.com/blog/new-report-reveals-economic-path-to-a-rapid-coal-phase-out-in-europe/.

UN Serbia, 2020. COVID-19 Socio-Economic Impact Assessment. https://www.rs.undp.org/content/serbia/en/home/library/crisis_prevention_and_recovery/covid-19-socio-economic-impact-assessment-.html

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ENERGY TRANSITION IN SERBIA

Cohesion or collision?

Deciding on the future of lignite is probably the most important decision facing Serbian society. Locking into lignite for a prolonged period of time requires much more advanced systems to cope with the industry's inherently low productivity and its huge environmental externalities. This may happen at a time of low market prices for energy. The real trouble, however, begins when one looks beyond Serbia's borders: climate and trade policies currently appear to be unambiguous, particularly where Europe is concerned. A decision to lock into lignite for a prolonged period should be accompanied by measures to mitigate the potential consequences, including restricted openness or even isolation of the market.

Moving from lignite towards cleaner energy is a difficult task and is not comparable to any recently executed reform or transformation by Serbian society. The ongoing energy transition brings challenges related to security of supply, employment, and energy affordability. However, we believe that Serbia will have to face the latter two in the near future in any circumstances. The phasing out of coal across the world will affect equipment supply chains and pose a risk to the security of supply. Significantly delaying the decision on energy transition in Serbia is another risky strategy as the resources required for the transition will remain unutilized and could even be lost over time.

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