BAROMETER OF THE COUNTRIES' READINESS FOR SUSTAINABLE ENERGY TRANSITION

„PERFECT STORM“

UNCONTROLLED DECARBONIZATION OF THE ELECTRICITY SECTOR IN THE WESTERN BALKANS

„Periculum in mora“

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In memoriam

„As in any other transition, not all answers are available today. But we need to be optimistic. There are enough answers indicating that we are already moving in the right direction, and we believe to develop the rest along the way. "

Prof. Slavko Krajcar, PhD, FER Zagreb (1951-2021)[1]

FOREWORD

The current state of the energy transition in Bosnia and Herzegovina, Serbia, and Montenegro (Western Balkans countries covered in this study - the Region) can best be described by quoting one of the greatest historians of the Roman Empire, Titus Livius: *"Danger lies in the hesitation."* This means that "*in everyday life, at work and in war, hesitation usually means loss and defeat, and often with a fatal outcome*." In the current policy environment, despite the declarative commitment to transition, most political decision makers and a significant number of professionals in the region believe that decarbonization, especially in the electricity sector, is not a desirable direction for the development of the energy sector. Consequently, they hesitate to implement reforms and make decisions necessary to embark on this radical process of transforming technical, economic, and social systems. As a result, planning of the energy transition, including the development of the national energy and climate plans, is approached without a clear and common vision for development of the energy system in the coming decades.

The implementation of the energy sector reform commitments by the members of the Energy Community has generally proceeded hesitantly and sluggishly. The question is: Why? Do the causes lie in habit of local authorities to easily accept commitments, without a real intention to implement them, or are the institutional capacities of the states to implement long and complex reform processes insufficient? Or both these aspects of the (un)readiness of countries for the energy transition are causes for the evident lack of progress of the countries in the Region in a generational undertaking to achieve climate neutrality in Europe by 2050.

The study "Barometer of Countries' Readiness for Sustainable Energy Transition" was launched on the assumption that key decarbonization processes will highly likely spread to the countries of the Region over the next ten years, with the intention of ensuring sustainability of this transition. The objective of the project is to develop a tool that will enable local actors (public opinion makers, policy makers and decision makers) to continuously and systematically monitor and (self)assess the readiness of countries to manage energy transition, which would help ensure that this complex transformation process unfolds in a sustainable manner. The first time the Barometer has been prepared in 2021 for the three countries of the Western Balkans (BiH, Serbia, and Montenegro). The intention is that, from 2022, the Barometer will cover all countries in this European region.

[1] https://lider.media/poslovna-scena/hrvatska/in-memoriam-slavko-krajcar-137348

The report "Barometer of the Countries' Readiness for Sustainable Energy Transition" entitled "Perfect Storm - Uncontrolled Decarbonization of the Electricity Sector in the Western Balkans" is an output of the study conducted in 2021 by NERDA, ASOR, and CLEAN think-tanks, members of the Southeast Europe Energy Transition Think-Tank Network - SE3T[2]. The research methodology included individual interviews (12 structured interviews conducted in a preparation phase for the questionary) and a survey (114 participants from Bosnia and Herzegovina (BiH), Serbia (SRB), and Montenegro (MNE) responded to 23 questions with over 100 sub-questions). The representatives of the following groups of local actors took part in the study:

1. Governments, ministries, and parliaments (BiH 5, SRB 1, MNE 2)
2. System regulators and system operators (BiH 14, SRB 1, MNE 1)
3. Electric power utilities and independent power producers (BiH 14, SRB 9, MNE 5)
4. Academic community (BiH 10, SRB 4, MNE 4)
5. Independent consultants and developers (BiH 18, SRB 13, MNE 1)
6. Non-governmental organizations and media (BiH 5, SRB 4, MNE 3)

The purpose of the Barometer is to create a tool that will assist local experts and institutional actors to continuously (self)assess and monitor the readiness of countries to manage the process of sustainable energy transition in the Western Balkans. State readiness means political commitment to energy transition, a defined and accepted vision, and a roadmap of decarbonization, as well as the human and institutional capacities to lead/participate in this complex process of transformation of technical, economic, and social systems. The intention is that the Barometer will be prepared annually and that from 2022 it will cover all countries in the Region.

Involvement of a significant number of local experts and actors from the government sector and civil society in the study provided the "in-depth" understanding of the underlying causes of barriers and obstacles to the energy transition. A summary of the views by country was prepared by a small group of experts (authors of the Report). The report is written in the format of answers to frequently asked questions about the energy transition, which are grouped in the following thematic areas:

1. Decarbonization of the electric power system and transitioning away from the use of coal,
2. Readiness of countries to manage the energy transition process,
3. Barriers, opponents, and major stakeholders of the energy transition,
4. Increase in the use of renewable energy sources and their integration,
5. Economics of the energy transition and electricity markets.

[2] https://www.se3t.net/

For each thematic area, responses presented in the report were drawn from the analysis of the participants' views. Where the views are aligned, the analysis of responses is presented by country as well as for the Region as a whole.

The general conclusion is that the readiness of the countries covered in this study for sustainable energy transition is not at the necessary level for successful management of this complex transition process.

Although the commitment that the development of the electricity sector until 2030 will be centered around the concept of energy transition is generally endorsed, in the countries of the Region there is still no sense of urgency regarding implementing the process of decarbonization of electricity generation. This means that the opportunities offered by the energy transition have not been properly understood, but instead that the decarbonization process (primarily the phasing-out of coal) is mainly perceived in terms of its accompanying technical challenges and socio-economic problems. *This is why the start of the energy transition process has stalled.* In a way, the transition is viewed as an obligation imposed by EU institutions to create markets for "their" products. As this transition will unfold very quickly (the key processes will take place over the next ten years), any delay in joining this process poses great risks. *Delays in starting the transition will subsequently require implementation of complex reforms in a very short period, which may make the process difficult to manage. In economically weak countries of the Region this might result in a perfect storm scenario with predictable heavy socio-economic effects*. Hence the choice of the Latin saying "*Periculum in mora*" ("The danger is in a delay") as the epigraph for the 2021 edition of the Barometer.

According to the participants in the study, the key institutional actors (governments and parliaments) are not ready to take the lead in the energy transition process. Public institutions are embarking on the transition planning process (i.e., drafting national energy and climate plans - NECPs) without a clear vision and without ownership over the decarbonization process. The participants believe that:

- institutions lack a broader picture of the energy transition as a key component of "green development" and the third industrial revolution,
- institutional capacity to lead complex, long-term transformation processes, such as the energy transition, is insufficient, meaning that decarbonization might happen in an uncontrolled (without the real ownership of the process) and chaotic (with major socio-economic consequences) manner,
- the decision-making process of state institutions in planning the energy transition is not transparent, which makes it impossible to reach the broader social consensus necessary for successful implementation of the energy transition.

The most important economic actors (public power companies) are also not ready to act as the main drivers of the transition because:

- they lack both a long-term vision aligned with the principles of the energy transition, and appropriate restructuring plans,
- their current financial positions are not satisfactory,
- they lack the skills to operate successfully in the electricity markets,
- they cannot afford to invest in new power generation facilities without state aid.

In fact, it has become evident that state institutions and public power companies are, at this point, the sources of most opposition to and obstructionism of the reform processes. Study participants expect that private investors will emerge as the major stakeholders of the transition.

Increase in the use of renewable energy sources (RES), especially wind power plants, large solar and hydro power plants is, in principle, supported. *Study participants are also committed to launching the energy transition immediately.* However, they consider that decarbonisation of the electricity sector for the most part means increasing the share of the RES in power generation, but not a reduction in the use of coal. *Effectively, most study participants (more than two-thirds in BiH and Serbia and more than one-third in Montenegro) believe that the coal phase-out process will not happen before 2050.* This attitude implies that increased RES production is expected to cover the planned increase in consumption and that a significant part of "green energy" will be exported. This approach does not contribute to a reduction of CO2 emissions as RES production is not expected to "supplant" coal–based electricity generation. The study also identified numerous technical, administrative, and economic barriers to the accelerated development of RES. Integration of a larger share of variable energy sources - wind power plants (WPP) and solar photovoltaic power plants (SPV) is perceived as particularly problematic. A general position among the participants is that the regional cooperation, especially in the form of connecting the balancing markets, would contribute to a more efficient integration of variable RES.

Study participants expressed a significant degree of support for the development of distributed production, particularly from small solar power plants that are used to meet own consumption needs (prosumers). While a number of technical, regulatory, and economic challenges to integration of distributed generators have been identified, the economic benefits brought by prosumers are seen to outweigh the negative impact on suppliers' and distribution system operators' revenues.

Liberalization of the electricity sector ("the first energy transition") was implemented in EU countries before the launch of the decarbonization process ("the second energy transition"). Transposition of the EU legislation from the second and third energy packages in the countries of the Region has not yet been completed. Participants believe that, at this point, electricity markets do not satisfy all functions of competitive trading (e.g., they do not promote competition, do not provide information necessary for making investment decisions nor for introducing market-based incentives for RES). Study participants also believe that the functioning of the markets is hampered by cross-subsidization of prices for households, i.e., by maintaining unrealistically low prices (below the marginal costs of thermal power plants) for the regulated customers. Analyses show that liquid electricity markets can only emerge through connecting with EU markets (e.g., the SEEPEX stock market). Since the introduction of the ETS system compatible with the EU ETS is a precondition for connecting the markets from the Region with the EU integrated market, it is unrealistic to expect that the markets of Energy Community members will be connected to the EU market in the next 3-5 years. This will certainly make the integration of RES more difficult.

In the economies with a low GDP/p.c., as in the countries of the Region, the key question is how the energy transition will be financed. Participants expect that the development of RES will be mainly financed by private capital (through large commercial projects and prosumers) and partly by low interest sovereign borrowing. Evidently, international financial institutions, and the EU funds in particular, are expected to financially support construction of the necessary network infrastructure for an electricity system with a large share of variable RES. Let us not forget that the potential of hydropower plants in the Region to provide flexibility services, both for national electricity systems and those in the Southeast, Central and Eastern Europe, can only be fulfilled if the necessary infrastructure is built and through regional coordination. International development funds, and in particular the EU IPA III fund, are expected to provide crucial support for projects of just transition and economic restructuring of the mining regions. Preparation and implementation of these projects should begin immediately because the economic activity and employment in the coal mines will certainly start declining soon.

INTRODUCTION

By signing the *Sofia Declaration* and accepting the *Green Agenda for the Western Balkans in November 2020*[3] and by adopting the energy package *"Clean Energy for All Europeans"*[4] and the corresponding *Decarbonization Roadmap*[5] at the 19th Ministerial Council of the Energy Community in November 2021, countries of the Western Balkans (hereinafter "the Region") expressed their political commitment to join the European Union (EU) in realizing the vision of *"Europe - the First Climate-Neutral Continent by 2050."* The declaration launched the energy transition process in the Region, and this process will be supported, among other things, through the *Economic and Investment Plan for the Western Balkans.*[6] The energy transition requires a radical shift in the organization and functioning of the energy sector and implementation of structural reforms, and therefore it represents a huge challenge for the countries of the Region. Decarbonization of the electricity sector will be especially difficult. The modalities and the pace of meeting the political commitment to climate neutrality the countries of the Region should define in their *National Energy and Climate Plans (NECPs),* which are currently being drafted.

In the past, the members of the Energy Community (EnC) had agreed to carry out the energy sector reforms within the process of implementation of the second and third energy package of the EU *acquis communautaire*. However, the conclusions of the third *"Energy Transition Tracker"*[7] report of the EnC Secretariat indicate that the reforms are not being implemented at the planned rate. In general, the countries of the Region lag significantly behind in terms of institutional readiness to implement the energy transition.[8] Studies

[3] https://www.rcc.int/docs/546/sofia-declaration-on-the-green-agenda-for-the-western-balkans-rn
[4] https://www.energy-community.org/news/Energy-Community-News/2021/11/30.html
[5] https://www.energy-community.org/events/2021/11/MC.html
[6] https://ec.europa.eu/commission/presscorner/detail/en/IP_20_1811
[7] https://energy-community.org/news/Energy-Community-News/2021/06/29.html
[8] https://www.weforum.org/reports/fostering-effective-energy-transition-2021

conducted by international organizations[9] searched for the reasons "*why the EnC members easily assume obligations that they subsequently implement very slowly or not at all.*" Identifying obstacles and causes of *"delays in implementation of the reforms in the energy sector"* in the Region is a prerequisite for understanding the future dynamic of the energy transition process. The goal of the 2021 *"Barometer of Countries' Readiness for Sustainable Energy Transition"* report (hereinafter "the Barometer") is to assess the readiness of the key actors in the electricity sector to lead the process of the sustainable energy transition based on the views of the local actors (public opinion makers, policy makers, and decision makers). The electricity sector was chosen because of its importance for national economies and because of the complexity of its decarbonization process. Based on the study's findings, the expert team which coordinated the development of the Barometer recommends essential steps and measures to initiate substantive decarbonization of the electricity sector and to ensure that this complex transformation process is conducted in a systematic way.

The survey which encompassed invited representatives of key social actors (hereinafter "participants") from Bosnia and Herzegovina (BiH), Serbia (SRB), and Montenegro (MNE) served as a basis for developing the 2021 Barometer. Participants' attitudes were assessed through semi-structured interviews (12 interviews were conducted in preparation of the structure of the questionnaire) and a survey (the number of respondents in BiH, Serbia, and Montenegro was 66, 32, and 16, respectively). Results of the study obtained from the survey (questions and statistics of participants' responses/attitudes) are available in electronic form on the website: www.nerda.ba.

Representatives of the following groups of local actors took part in the research:

1. Governments, Ministries and Parliaments (BiH 5, SRB 1, MNE 2)
2. Regulators and system operators (BiH 14, SRB 1, MNE 1)
3. Electric power industries and private operators (BiH 14, SRB 9, MNE 5)
4. Academic Community (BiH 10, SRB 4, MNE 5)
5. Independent consultants and developers (BiH 18, SRB 13, MNE 1)
6. Non-governmental organizations and media (BiH 5, SRB 4, MNE 3)

Involvement of a large number of local experts and actors from the government sector and civil society (over 120), who often expressed opposing views, provided the "in-depth" understanding of different perceptions of the causes which impose barriers and obstacles to the energy transition. A summary of their views, by country and individual group, was prepared by a small group of national experts (authors of the Report) who developed the methodology and coordinated the implementation of the study.

The purpose of the Barometer is to create a tool that will help local experts to continuously assess and monitor countries' readiness to manage the process of sustainable energy transition in the countries of the Region. It encompasses political commitment to the energy transition, a defined and accepted vision, and a roadmap of decarbonization, and human and institutional capacities to lead/participate in this complex process of

[9] Such as the analysis of the Friedrich Ebert Stiftung „The Political Economy of Energy Transition in Southeast Europe – Barriers and Obstacles", 2021, available at: https://library.fes.de/pdf-files/bueros/sarajevo/18313.pdf

transformation of technical, economic, and social systems. The intention is that the Barometer will be prepared annually and that from 2022 it will cover all countries in the Region.

The results of the study were presented at national workshops in all countries of the Region, as well as in specialized media (e.g., on the Balkan Green Energy News portal). Excerpts from the research were presented at professional conferences and in the mainstream electronic and print media. This continuous dissemination campaign ensured that the local professional and public were aware of the 2021 study results, but it also promoted a dialogue and attracted feedbacks from the actors whose readiness was assessed. The objective of this report is to share the study's results with other stakeholders who may influence the course of the energy transition in the Region.

Since the authors of the Barometer intend to encourage a fact-based dialogue on the energy transition, the content of the 2021 Barometer is presented in the format of answers to frequently asked questions in professional and public discussions, especially on decarbonization of electricity generation – reduction in the use of coal and increase in the use of renewable energy.

The answers are grouped in the following thematic areas:

- Decarbonization of the electric power system and transitioning away from the use of coal,
- Readiness of countries to manage the energy transition process,
- Barriers, opponents, and major stakeholders of the energy transition,
- Increase in the use of renewable energy sources and their integration,
- Economics of the energy transition and electricity markets,
- Conclusions and potential future areas for research.

DECARBONIZATION OF THE ELECTRICITY SECTOR AND COAL PHASE-OUT

The countries of the Western Balkans, covered in this study, to a considerable extent rely on generation of electricity from domestic coal (on average, thermal power plants account for 68% of output in Serbia, 63% in BiH[10] and 44% in Montenegro). Thermal power plants employ a large number of workers – which includes both coal miners (15,459 in Serbia, 14,472 in BiH, 750 in Montenegro) and thermal power plants immediate employees (2,931 in Serbia, 2,466 in BiH and 171 in Montenegro[11]).

In effect, the economy of the countries of the Region, as it developed in the 1970s, remains largely based on the electricity sector, with coal mines and thermal power plants as its backbone. Although operating thermal power plants and coal mines is uneconomical and is only sustained with government subsidies, the current way of doing business benefits many different stakeholders: consumers who pay low regulated prices, employees in the sector,

[10] Bosnia and Herzegovina is an electricity exporter: approximately 50% of thermal power plant production is exported, mainly to EU countries.

[11] https://thegreentank.gr/en/2022/01/11/just-transition-fund-western-balkans/

local mining communities, governments, related companies, and political parties in power. So it is logical that decarbonization of the power industry is resisted by numerous social actors in the Region. In general, miners, as symbols of industrial development, still enjoy considerable public support and solidarity, which makes the process of mine restructuring only more complex. Electricity generation from a thermal power plant is also considered a key factor of ensuring the stability of supply. This is why decarbonisation opponents portray the energy transition process as an expensive imposed obligation (by the EU) which will mainly lead to job losses and create a dependence on electricity imports . For all above reasons, the advocacy for energy transition, and above all the decarbonisation of electricity production, should be structured as a dialogue based on verifiable facts and strong arguments. Consequently, in developing this thematic area of the Barometer the goal was to find out how the experts and active participants in the energy sector perceive the current situation and the prospects of the thermal power sector. The study participants' views on this topic are summarized below.

Why is it necessary to reduce the use of coal for electricity generation in the countries of the Region?

1. Because the existing thermal power plants, which are nearing the end of their useful life, are the biggest environmental polluters. It is increasingly likely that difficulties of keeping them in operation (for technical, environmental, and economic reasons) will increase at an accelerating rate in the near future.
2. Because the current operations of most thermal power plants and coal mines are uneconomical and require state subsidies. Investments necessary to meet the requirements of the EU Large Combustion Plants Directive (LCPD) and Industrial Emissions Directive (IED) will further raise the cost of electricity generation in thermal power plants as well as of specific CO2 emissions.
3. Investments in new thermal power plants are not economically because their Levelized Cost of Electricity (LCOE), even when excluding the costs for CO2 emissions, are higher than the current LCOE for wind and solar power plants. The expected further decrease in prices of technologies for these renewable energy sources indicates that the coal-fired power plant technology needs to be replaced with these future technologies.[12]
4. Also the introduction of a payment mechanism for costs of CO2 emission rights will make the continued operations of existing and the construction of new coal-fired power plants even more uneconomical.[13] If the introduction of the CO2 pricing system is delayed, electricity exports from the Region to the EU will be encumbered with cross-border charges envisaged under the Carbon Border Adjustment Mechanism (CBAM) scheme.
5. Because in the Paris Agreement and on the basis of the Sofia Declaration, the countries of the Region committed to the decarbonisation of their energy sectors, and in the first place to ending the use of coal for electricity generation, in order to join the generational project: *"Europe the First Climate-Neutral Continent by 2050".* Clearly it

[12] It is now obvious that the concept of replacing old and inefficient thermal power plants with new, "replacement" capacities is not economically viable. It is also no longer possible to secure financing for construction of facilities of this type.

[13] A statement by one of the study participants is unequivocal: "The introduction of the requirement to pay for CO2 emission rights is the last nail in the coffin of coal-fired power plants in the Region."

will no longer be possible to feign the implementation of the reforms - to make commitments without following through. The countries of the Region must join these processes as soon as possible because it is the only way for their sustainable economic development.

6. Because the decarbonization of the energy sector, i.e., the energy transition, constitutes a key component of the third industrial revolution[14] and of the post-pandemic green recovery process in the developed world, both of which are already in full swing in Europe in line with the EU Green Deal.[15]

The above arguments, which show the economic justification for a reduction and ultimate cessation of coal-fired electricity generation, have been derived from the responses to Question 12 in the Questionnaire on the greatest challenges to thermal power plants operating in an open regional market. Choosing the date when the use of coal for electricity generation will end is deemed the start of the planning process of the decarbonization of the electricity sector.

Investments in thermal power plants and coal mines - a declining industry, are investments in the past

In the last quarter of 2021, technical, environmental, and economic problems in the thermal power sector emerged simultaneously across the Region. In Serbia, the extremely poor quality of coal from the Kolubara mine caused a radical reduction in output of the Nikola Tesla thermal power plant, which made large emergency imports of electricity necessary at a time when its price on the benchmark regional HUPX stock exchange was at a record high. In Montenegro, the Pljevlja thermal power plant remained in operation despite the commitment to stop production at the end of 2020 in accordance with the LCPD directive. In other countries of the Region, thermal power plant operators are also failing to meet the requirements of the LCPD Directive, i.e., they are not adhering to the national plans for pollutant emission reduction. In BiH, a strike at the Kreka coal mine revealed the company's catastrophic financial position, with accumulated losses exceed the value of its capital. These examples are just the tip of an iceberg of troubles in the thermal power sector caused by the poor state of coal mines and/or certain thermal power plant units. The risks in production from thermal power plants will increase in the coming period. This reveales the absurdity of the entire concept in ensuring the safe power supply process in the Region to be based on the production of electricity from coal.

What would be the appropriate time and the pace for implementing the process of decarbonization of electricity generation?

A generally accepted view in the countries of the Region is that the energy transition is inevitable. In responding to Question 16 in the Questionnaire, survey participants agreed that the development of production until 2030 should be based on:

[14] https://www.amazon.com/Third-Industrial-Revolution-Lateral-Transforming/dp/0230341977
[15] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

- *accelerated and organized reduction of coal use for electricity generation (MNE 81%, BiH 79%, SRB 58%) and*
- *accelerated development of renewable energy sources (BiH 95%, MNE 93%, SRB 84%).*

Evidently, most experts are of the opinion that the transition should commence as soon as possible, provided that it is sustainable and managed. This view is echoed by responses to Question 15 of the Questionnaire:

> *"Given the impact of the COVID-19 pandemic on the economy and society, do you think that the coal phase-out should be postponed, continued at the planned pace or accelerated as much as possible?"*

because more than 50% of study participants in all countries believe that, despite the pandemic, the transition should happen as quickly as possible, provided it remains a just transition. The views presented above can support making a strategic decision to embark on the process of energy transition, as a development opportunity, since the current situation is evidently unsustainable and must be ameliorated urgently. Participants believe that the energy transition should start immediately, in part because the energy sector transformation requires substantial shifts in awareness and behavior of citizens, which takes time. Considerable time is needed particularly to ensure that the transition is just – with regard to the restructuring of mining regions.

In theory, individuals and groups experience the following psychological phases when facing a transition process:

a. Dealing with the unsustainability of the existing situation and accepting the inevitability and urgency of change
b. Adopting a vision of a desired (future) situation and developing a transition plan,
c. Undergoing the transition and accepting the new situation.

These phases are iterative, and phases b. and c. are particularly interconnected, which holds true especially for complex transformation processes, such as energy transition, when it is impossible to have a completely clear vision of the future and a precise plan for implementation of the transition process.
Phase a. is crucial for starting the transition. Our research led to the conclusion that the countries of the Region are in phase a., because there is still no sense of urgency about implementing the decarbonisation process. This means that the opportunities inherent in the energy transition are not detected, but that decarbonisation (and primarily the coal phase-out) is predominantly perceived in terms of its challenges and socio-economic problems it creates. This is the reason for delaying the start of the energy transition. In a way, the transition is seen as a process imposed by EU institutions to create markets for their products. Although historically the Region has not been at the forefront of technological revolutions, but rather a late adopter of changes, as this transition will happen very quickly (the key processes will take place in the next ten years), any delay in joining this process creates great risks.

A key indicator of the commitment of countries to the transition of the electricity sector is to determine the date of the Coal Phase-Out. The responses of the study participants to Question 11 in the Questionnaire are very revealing in this regard:

> *"Given the commitments made in the Paris Climate Agreement and the Sofia Declaration, when do you expect your country to completely abandon the use of coal for electricity production?"*

The attitudes of participants from BiH and Serbia are that coal will be used for electricity generation until 2050 (BiH 37%, SRB 31%) and even after 2050 (SRB 59%, BiH 36%). 90% of participants in Serbia, and 71% in BiH believe that their countries will not phase-out coal in the next 20-30 years. In Montenegro, this view is shared by only 37% of study participants. Although there are still no official decisions of the state authorities in Montenegro, participants believe that the country will phase-out coal in 2030 or at the latest in 2035. The commitment of the Montenegrin government to an earlier coal phase-out is supported by 37% of participants, which indicates a complete polarization of views on this issue. In BiH, the target year is 2050, but the government adopted no official position. In Serbia, there is no discussion at all about reducing the use and phasing-out of coal for electricity generation, as if decarbonization is just about the development of renewable energy sources. *The answer to this question revealed the contradictory attitude of study participants in all countries in that they: a. support the renewable sources based development by 2030, but b. do not expect coal to be phased-out so quickly.*

Comparing the study results from 2019 and 2021, we find that in 2021 the construction of new/replacement thermal power plants is no longer supported, while this had been the dominant "state concept of decarbonization" in 2019. Also, the level of support for the reconstruction and modernization of existing thermal power plants to enable co-firing of coal and biomass, which represents the current concept for keeping thermal power plants and coal mines in operation, is insignificant (BiH 21%) or negligible (SRB 3%).

In the research conducted in 2019, as part of preparations for development of the 2021 Barometer, the following commitments to scenarios and the pace of decarbonization were identified:

- The *gradual decarbonisation* scenario with a continuous increase in the share of renewable sources, starting in 2021, with no new construction of thermal power plants and with the modernization of some existing ones in order to maintain the energy security and meet the EU LCPD and IED directives, was supported by 92% participants in Montenegro, 63% in BiH, and 53% in Serbia. Therefore, in 2019 this was the experts' preferred scenario;
- The *delayed decarbonization* scenario, with the start of intensive development of renewable energy sources only after 2030, with the focus on investments in construction of replacement capacities and modernization of existing thermal power plants by 2030, was supported by 41% participants in Serbia, 37% in BiH, and 8% in Montenegro. The support for the construction of replacement thermal plants was particularly strong in BiH and Serbia.
- In Serbia, 6% of participants think that intensive construction of the renewable sources facilities should only start after 2040 and that the energy transition will be driven by markets, reduced costs of wind and solar power technologies, and high costs of CO2 emissions. In conclusion, a strong opposition to decarbonisation was detected only in Serbia and even there only among an insignificant minority of respondents.

What could be the reason for the predominant attitude among the study participants that coal should be phased out (only) around 2050? A potential explanation is that the construction of new thermal power plants turned out to be economically very risky and the construction of wind and solar power plants is now a preferred option. But due to the challenges of integrating these variable sources, some parts of the professional public believe that thermal power plants should remain in operation as balancing/reserve capacities. The complexity of socio-economic problems related to the closure of coal mines is certainly another argument for the use of coal to continue, although with progressive reductions. As no goals or roadmaps for decarbonisation have been adopted, and there is no confidence that the governments will effectively implement transition plans, some participants doubt that the necessary renewable capacities will be built on time. And, naturally there are still opponents of the energy transition who consider it an unnecessary and extremely costly shift in the concept of the electricity sector, beyond the capacity of the Region's weak economies.

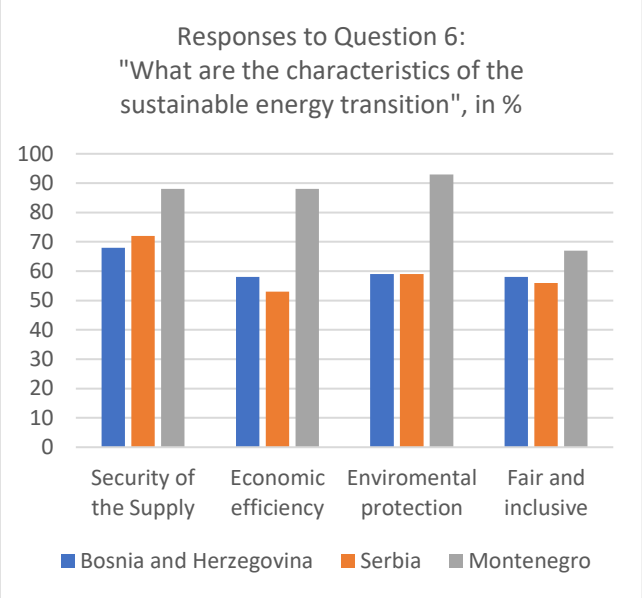
What are the characteristics of the sustainable energy transition in the Region?

There are numerous debates among experts about the sustainability of the energy transition process, both from the standpoint of the starting economic and financial positions of the countries of the Region and the speed (trajectory) of achieving the decarbonization of the electricity sector. Question 6 in the Questionnaire sought to identify participants' understanding of the concept of sustainable energy transition.

The public increasingly focuses on the negative impact of variable renewable energy sources – vRES (wind and solar power plants) on providing the security of the supply, both short-term and seasonal power and energy balancing. In such considerations, it is mostly the impact of vRES on balancing the national systems that is being assessed without taking into

account the regional integration aspect. The issue of balancing and flexibility of national and regional power systems requires more detailed research[16] and is beyond the scope of this report.

Study participants fully/mostly agree that sustainable energy transition is a process which closely follows the requirements of security of supply and environmental protection, and which takes place in the most cost-effective way. They also agree that the transition should be just (to cause the least socio-economic disruption) and should be implemented with active participation of citizens and businesses (to be inclusive). Participants from Montenegro express significant support for these components of a sustainable transition.



An important component of the transition (phase b.) implies articulation of a clear vision of the desirable characteristics of the future power system. To better understand the participants' vision (Question 5 in the Questionnaire), they were asked to rate the importance of system characteristics in the Region in 2050, i.e.: Decarbonization, Digitization, Decentralization, Demonopolization, and Democratization of the sector (5D characteristics of the energy transition). The views of participants from Bosnia and Herzegovina and Serbia on this issue cannot be generalized (response frequencies generally have a normal distribution around the average value of 3). This indicates that there is no agreement on the essence of the radical transformation of the electricity sector that will be brought about by decentralization, demonopolization, and democratization. The views of the participants in Montenegro suggest that they expect the above three D-characteristics of the transition will have a significantly impact on the system. Study participants from all countries expect that, state-owned power utilities will continue to play major role even in 2050. Private ownership, especially by foreign investors, over generation capacities is generally wiewed with a degree of suspicion. Electricity is still considered a public good that belongs to all citizens.

READINESS OF THE COUNTRIES TO MANAGE THE PROCESS OF ENERGY TRANSITION

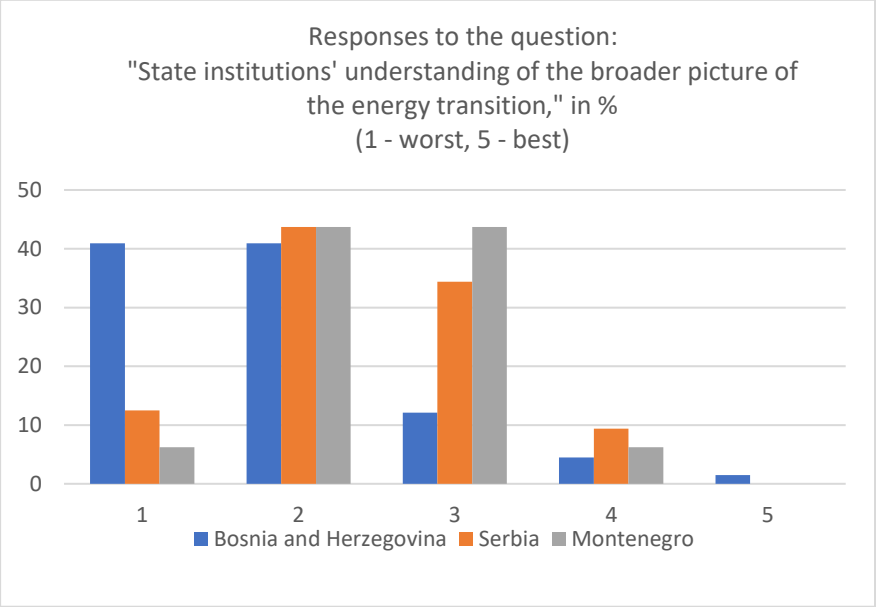
State institutions (governments and ministries, parliaments, operators, and regulators of the electricity system) need to create an enabling environment for implementation of the energy transition. The speed of decarbonisation and the future concept of the sector will

[16] The Energy Community Secretariat initiated a relevant study on the flexibility of the regional system: https://www.energy-community.org/news/Energy-Community-News/2021/06/16.html

largely depend on the attitude of the public power utilities as the most important actors in the sector. There are other private and non-governmental actors that need to be actively involved in the transition. This section of the Barometer summarizes participants' perceptions of the current situation in the sector, especially in the public power utilities, as well as an assessment of the ability of key actors to advocate for and manage a sustainable energy transition.

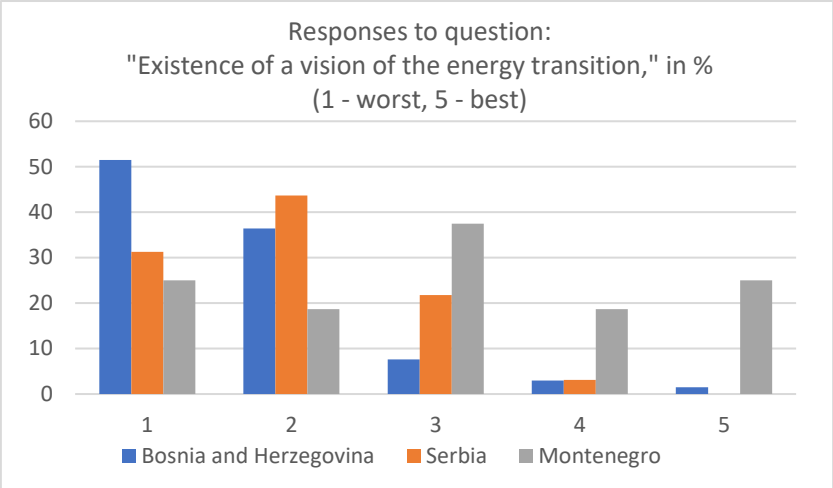
What is the level of readiness of state institutions to manage the energy transition?

The activities of state institutions will largely determine the character and speed of the transition. Therefore, in Question 3 of the Questionnaire the participants were asked to rate the institutional readiness to encourage and direct the transition processes in accordance with a „top-down“ approach. The figures below show the responses to the sub-questions (listed in the diagram headings) by country.



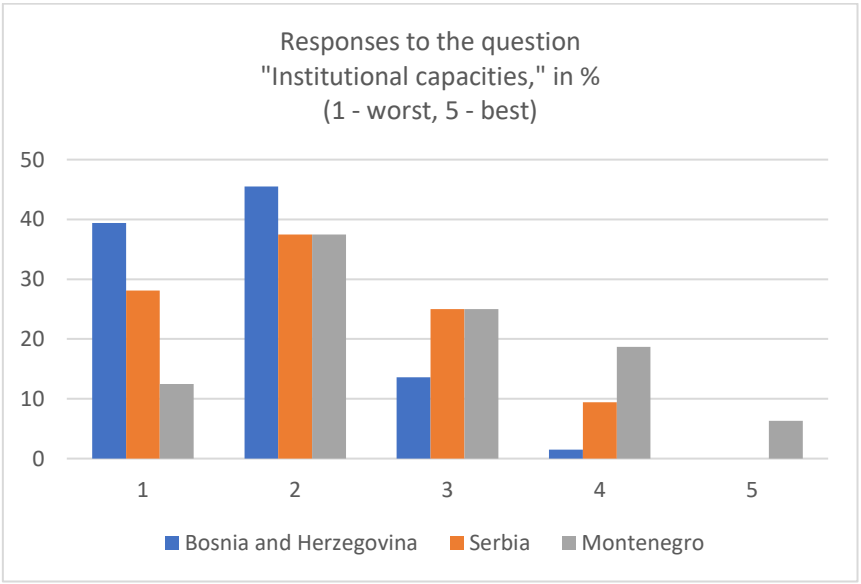
Responses to Sub-Question 3a – Understanding of the broader picture of the energy transition

The responses to this sub-question clearly show that participants believe that institutions do not have a broader picture of energy transition as a key component of the "green growth" and the third industrial revolution and that they do not see the urgency of this process. For this reason, representatives of the institutions mostly emphasize challenges and fail to consider opportunities created by the energy transition. This is one of the reasons why the start of the transition is being delayed. Survey participants' assessment of this issue is particularly negative for the institutions in Bosnia and Herzegovina.



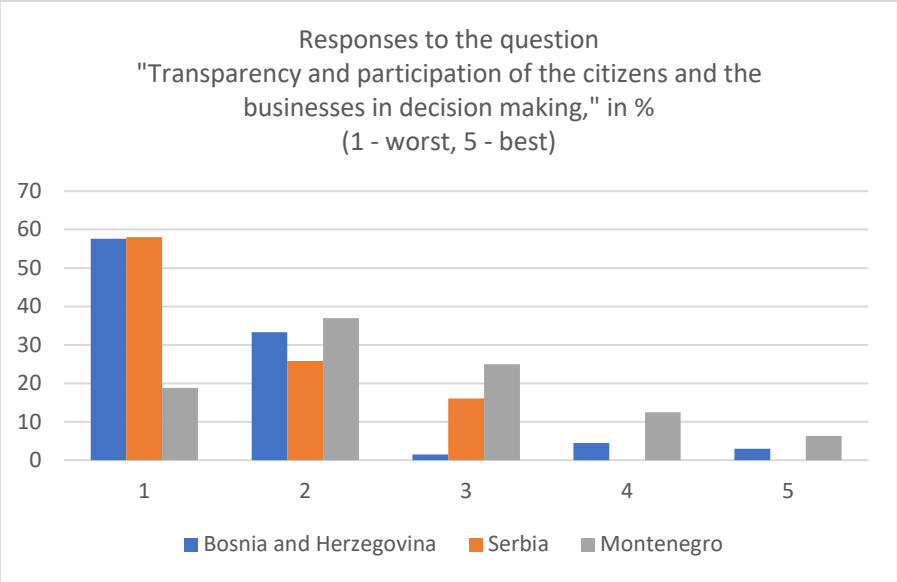
Responses to Sub-Question 3b - Existence of a vision of the energy transition

Responses to this sub-question indicate that the countries of the Region are starting the energy transition process without a clear vision. Without a vision accepted by most social actors it is difficult to make consistent decarbonisation plans and this will become a significant issue in developing national energy and climate plans. Again, the attitudes of the participants from Bosnia and Herzegovina are extremely negative, while the attitudes of participants from Montenegro about the vision and consistency of the plans of their national institutions for energy transition are more positive.



Responses to Sub-Question 3c – Institutional capacities to implement the transition process

Over 2/3 of the participants (considered as consensus) from all countries believe that the institutional capacity to lead complex, long-term transformation processes, such as the energy transition, is inadequate. Insufficient capacity of state institutions has been identified as the most significant weakness for managing the energy transition. This institutional unreadiness indicates that decarbonisation could be spontaneous (without a real management of the process) and chaotic (with great socio-economic consequences).



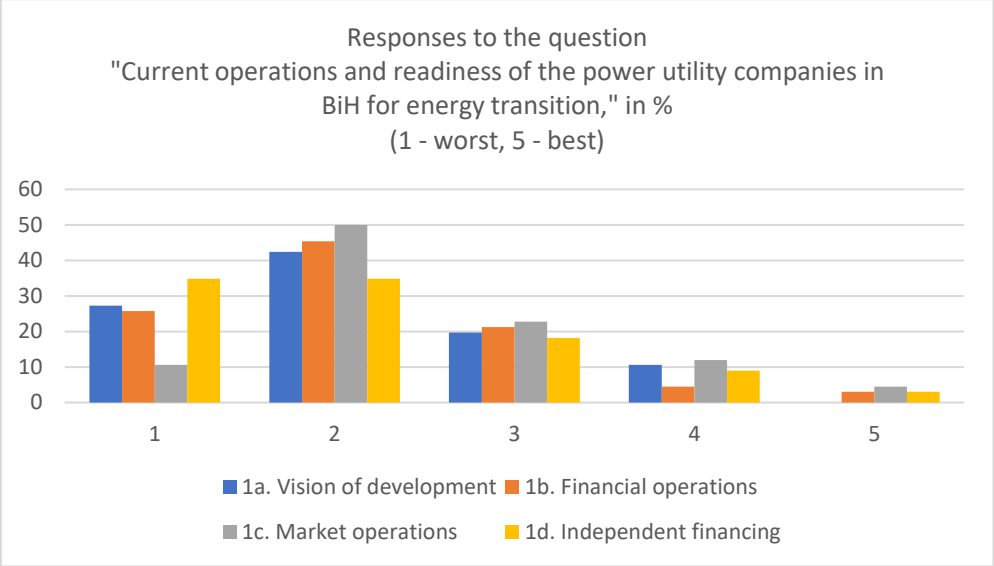
Responses to Sub-Question 3d – Transparency and citizens' and businesses' participation

Responses to this sub-question indicate a very low level of transparency in making decisions within state institutions when planning the energy transition (especially in BiH and Serbia). The level of public participation – of citizens and the business sector, is negligible. This makes it impossible to reach a broader social consensus, which is necessary for the successful implementation of the energy transition. If transparency is not improved during the preparation of the NECP, this document also will not provide a sound basis for management of the decarbonisation process.

What is the level of readiness of the public power utility companies for the energy transition?

Public power companies, which are majority state-owned, are currently the key economic actors in the electricity sector in the countries of the Region. Consequently, the activities of these companies will significantly determine the pace of the energy transition. Furthermore, when making strategic decisions in the preparation of the development plans, political actors pay considerable attention to the "interests" of the power utilities and the views of their experts. Since ministries and governments perform governance functions in public power utilities, political influence on the operations of these companies is strong and is often used to achieve political goals (e.g., the policy of keeping electricity prices unrealistically low to maintain „social peace“). This tendency led to the creation of a system of political and economic relations, a kind of symbiosis beween the public power utility companies and the governments, which makes it impossible for the electric power sector to operate on market principles and reveals the reasons for the sluggish implementation of the regulations of the first energy transition (liberalization of the sector and market opening). The problem with this "vicious politico-economic system" is that short-term political priorities often take precedence over long-term economic and social benefits. Until this domination of politics over the way public power utility companies do business is broken, the role of these companies in implementing decarbonization will be problematic. The analysis of the responses to questions 1a-1d in the Questionnaire sought to identify the participants' views about whether electric

power utility companies, with the existing governance structures and the operational practices, are ready to be the drivers of sustainable energy transition in a liberalized market. The diagrams of the distribution of responses to individual sub-questions of Question 1 for public power utility companies from individual countries of the Region are shown bellow, with responses graded from 1 (worst) to 5 (best).

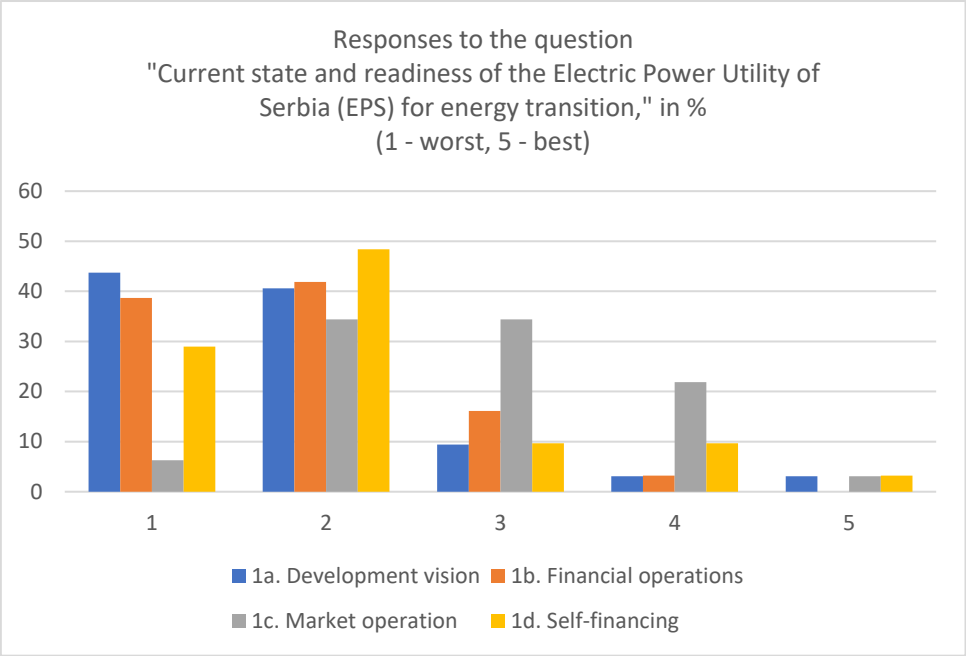


Answers to Question 1 in the Questionnaire for public power utility companies in Bosnia and Herzegovina

There are three active public power utility companies in BiH (Elektroprivreda BiH, Elektroprivreda HZHB, and Elektroprivreda RS). Although their size, production portfolio, and share of exports differs, a more detailed analysis of the responses indicates that the participants consider that business operations of all three power utility companies share the following common characteristics:

- they lack the long-term vision aligned with the principles of energy transition and the appropriate development plans,
- their current financial position is not satisfactory,
- they lack necessary skills to operate in electricity markets,
- they lack capacity to invest in new generation facilities without state aid.

Each public power utility company, as the dominant supplier in the region of BiH where it operates, supplies electricity to the public at regulated prices. In addition there is no competition between them for commercial buyers, which pay market prices. The only competition within BiH occurs in the supply of customers in the Brčko District of BiH, in the balancing market and in the tenders launched to cover transmission network losses. However, since BiH is a significant exporter of electricity (1/3 of total production or 1/2 of production from thermal power plants is exported), with the regional price increase in late 2021 the HUPX stock exchange is increasingly becoming a benchmark in setting prices for commercial customers. Price convergence with the regional market may trigger competition between power utility companies even within BiH.

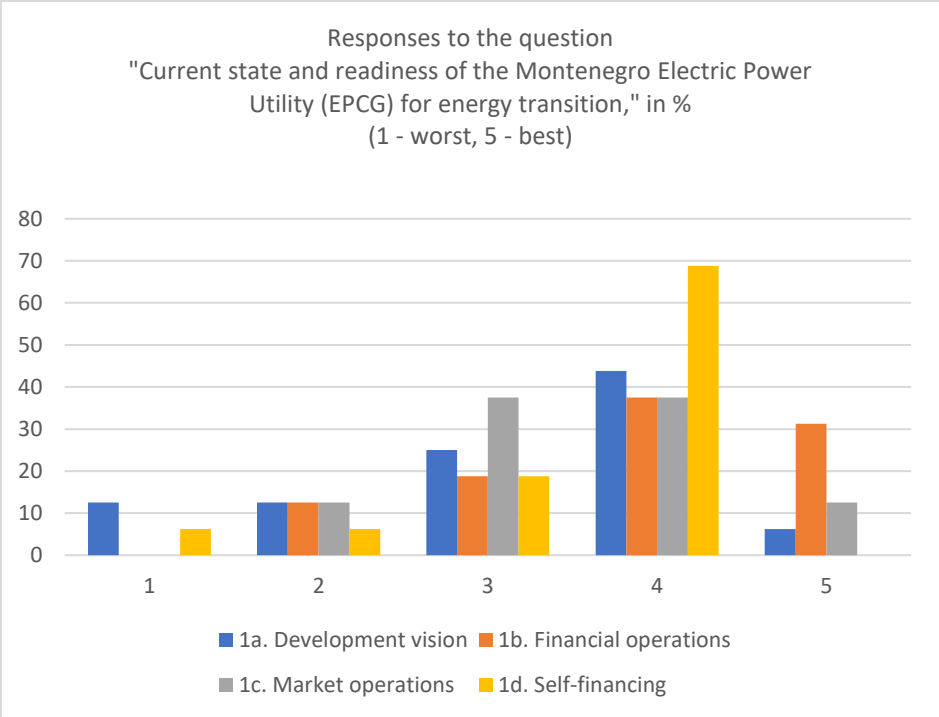


Answers to Question 1 in the Questionnaire for the Electric Power Utility of Serbia (EPS).

The Electric Power Utility of Serbia (Elektroprivreda Srbije - EPS), which is 100% state-owned, is the dominant actor in the power sector in Serbia. Study participants believe that the current operations of the EPS and its readiness for energy transition, just as is the case with the public power utility companies in BiH, are characterized by the:

- lack of the long-term vision aligned with the principles of energy transition, nor appropriate development plans,
- unsatisfactory state of the utility's financial operations,
- low capacity to invest in new generation facilities without state aid.

Unlike the power utility companies in BiH, study participants from Serbia believe that the capacity of the EPS to operate in the electricity markets is satisfactory. A possible explanation for this opinion may be found in the functioning of an electricity exchange in Serbia (SEEPEX), as well as in the EPS's strategy to use seasonal „sale-purchase“ market transactions to improve its financial position, although the utility does not generate significant net exports. Because of decades of inadequate maintenance in thermal power plants and mines in the EPS, the risks of major breakdowns caused by equipment deterioration are constantly increasing. In late 2021 and early 2022, major accidents in the Kolubara mining complex and the Nikola Tesla Thermal Power Plant indicate that this aspect of the EPS management poses a significant risk to the security of supply.



Answers to Question 1 in the Questionnaire for the Montenegro Electric Power Utility (EPCG).

Unlike in BiH and Serbia, participants in Montenegro believe that the EPCG has satisfactory operational results, a vision of decarbonisation, as well as the capacity to operate in the markets and independently finance new generation facilities. The only challenges for the EPCG in the process of decarbonization, is the operations of the Pljevlja TPP. The company has already initiated construction of new RES-based generation capacities (Komarnica hydroelectric power plant, Gvozd wind power plant, Briska Gora solar power plant as well as Solari 3000+ and Solari 500+ small solar power plant construction projects).

Governments and the majority of the public in the Region expect the public power utility companies to be the engines of the energy transition. Cheap and flexible electricity generation capacities of hydropower plants, as well as the role of public suppliers, allows public power utility companies to lead the decarbonization process. Some of the public power utilities (EPHZHB and EPBiH) have already built the first wind and solar power plant facilities. However, the way in which power utility companies are currently organized and managed in the Region prevents them from actively assuming the role of the drivers of transition. This is especially true for public power utility companies with large coal-fired power plants in their portfolio (EPS, EPBiH, EPRS). Decarbonisation of the production in these plants requires the states to have a clear vision of the energy transition and the public power utility companies to be assigned a clear role in the process. Those responsible for managing the electricity sector face a major task to define the future role of public power utility companies. It would be beneficial to base the appropriate strategic decisions about the organization of the sector on the concept of utilities of the future.[17]

[17] https://www.elsevier.com/books/future-of-utilities-utilities-of-the-future/sioshansi/978-0-12-804249-6

What is the level of readiness of private and non-governmental actors for the energy transition?

A sustainable energy transition involves participation of a wide range of non-governmental actors and a combination of a top-down and a bottom-up approach. This study (responses to Question 6e) shows that the participation of citizens and the business sector (local actors) is an important feature of the sustainability of transition. Question 4 in the Questionnaire explored the participants' attitudes about the ability of local actors to actively participate in the energy transition. The main conclusions of the study are presented below:

• Based on the responses to Question 4a, the majority of participants in BiH (53%) and Serbia (53%) responded that non-governmental organizations (NGOs) do not actively participate in the energy transition and do not contribute constructively to the management of this process. In Montenegro, the attitude of participants about the involvement of NGOs is more positive - about 70% of participants believe that the participation of NGOs is satisfactory. However, based on the answer to question 4e. the prevailing opinion in all countries is that NGOs lack the capacity necessary to actively participate with government institutions in planning and implementing the energy transition.

• Based on the responses to Question 4b, the majority view is that the academic and professional community are not actively involved in the energy transition. This view is particularly strong in BiH, and to a lesser extent in Montenegro and Serbia.

• Based on the responses to Question 4c, consensus was reached (over 2/3 of the participants) that the business sector, and especially small and medium enterprises, are not well informed about the energy transition and the impact its implementation will have on their operations.

• Participants are in nearly full agreement (over 90%) about a low level of awareness of citizens of the challenges and opportunities in the energy transition.

• In general, the participants are also largely concurrent (over 70% on average in the Region) in the view that there is no trust nor cooperation between government institutions and non-governmental actors, which prevents emergence of a social consensus on key energy transition issues.

The experts' assessment that non-governmental actors (small and medium enterprises, professional and academic communities, and NGOs) are inadequately prepared to participate in the energy transition may be considered in correlation with the responses to Question 8 on potential main drivers of the transition process, which indicate that the majority view is that the influence of all non-governmental actors in transition will be negligible.

Energy crisis that hit Europe in late 2021 caused dramatic increases in electricity prices for commercial/business sector customers in the Region. At the time of writing of this Report, the level of price increases of electricity supplied by individual power utility companies in the Region to the business sector in 2022 is still unclear, but it will certainly be in double digits. In BiH, the Parliament passed a decision to limit the price increase to 20%. Because of the government's decision to increase the coal purchase price by 20% from January 2022, the EPBiH forecast that, in the light of this (limited) increase in the price of electricity, its operational losses in 2022 will reach tens of millions of euros. The first, short-term, dramatic effect of the increase in prices on the regional stock exchange could be the closure of the electrolysis plant at the Podgorica Aluminum Group, currently operating at minimum capacity. After the announced electricity price increases, a more proactive attitude of the business sector towards the energy transition may be expected. A long-term consequence of the crisis may be the shift in development orientation towards thermal power plants burning natural gas, an imported energy source. The vast majority of participants believe that gas, as a transition fuel, is not a solution for the Region. The response to the crisis should be sought in stronger support for the development of renewable energy sources.

BARRIERS, OPPONENTS, AND MAIN DRIVERS OF THE ENERGY TRANSITION

Significant developments in the decarbonisation of the electricity sector in the Region will certainly unfold over the next 10 years. A recognized view of the study participants is that key institutional actors (including public power utility companies) are not ready to manage this process, which implies that the energy transition in the Region is likely to take place under the influence of markets and external factors, and primarily of the requirements for alignment with EU energy and climate policies.

Therefore, because of the unwillingness of domestic actors and the lack of consensus on the vision of development, the energy transition is approached passively, which significantly complicates the planning process - a key component of the transition's phase b. Consequently, there is a danger that the spontaneous implementation of the transition will result in a chaotic state of "perfect storm", when the transition processes will become unmanageable, with unforeseeable socio-economic consequences. It is also possible that, due to the passive role of state actors (e.g., through the postponent of the organization of auctions for renewable sources), market-based development of renewable sources will occur, but there will be no decarbonization of consumption, as the official policy is to continue using coal until 2050. In effect, due to the passivity of governments, private investors are increasingly focusing on market-oriented projects. In such a case, the best locations for renewable sources and transmission network capacities will be "occupied" by private, mostly foreign, investors who are likely to export "green" energy to the EU market driven by the profit imperative. However, green energy exports do not contribute to the national decarbonisation.

This chapter presents the results of the research into barriers, opponents, and possible main drivers of the energy transition. The aim is to distinguish the electricity sector phenomena that obstruct sustainable management of the transition and that can, if not adequately corrected, lead to a scenario of uncontrolled and chaotic decarbonization.

What are the most significant barriers and who are the current opponents to implementation of the energy transition?

In the responses to Question 7 in the Questionnaire, the participants expressed their views regarding the extent of impact of certain barriers on the implementation of the energy transition. The analysis of responses shows a strong correlation of attitudes between the countries in the study. It appears that the participants reached consensus (over 2/3 or 66.7% of participants think that the givern barrier has a major or significant impact) for some bariers, while for the others it was possible to detect the majority view (over 50% of participants who believe that a given barrier has a major or significant impact). Table 1 below presents these attitudes expressed in cumulative percentages of responses 5 - major impact and 4 - significant impact for individual barriers by country.

Table 1. Cumulative views on the major and significant impact of barriers, in%

Barrier	BiH	Serbia	Montenegro
7a. Policy of pricing electricity to maintain social peace	**68.7**	**87.5**	**73.3**
7b. Loss of jobs in the thermal power sector	50.7	**71.8**	**68.7**
7c. Need for economic restructuring of mining regions	**73.8**	**67.7**	**68.8**
7d. Insufficient professional and institutional capacities	**67.7**	**68.7**	46.7
7e. Inadequate education and research systems	58.6	**72.3**	62.5
7f. Inertia of public power utility companies to preserve the *status quo*.	**76.9**	**75.1**	**66.7**
7g. Resistance of the existing structures dependent on the coal/fossil fuel economy	**81.5**	**81.2**	**68.8**
7h. Insufficient and expensive sources of financing	57.8	51.6	**93.8**

The differences in attitudes about certain barriers between the countries of the Region are insignificant. The greatest barriers to the energy transition identified by their impact/importance are:

- Resistance of existing structures (regimes), which depend on fossil fuel policy and economy (the country average = 77.1%),
- Policy of maintaining low electricity prices for regulated customers to maintain social peace (the country average = 76.5%),
- Inertia of the public power utility companies which strive to preserve their existing monopoly position (the country average = 72.9%),
- The need to include programs for economic restructuring of mining regions as part of the energy transition (the country average = 70.1%).

When the responses to questions 7 and 3 are corelated, it becomes clear that participants consider that government institutions and inertia of public power utility companies, which are reliant on the fossil fuel economy and preservation of the *status quo* in the sector, are the greatest barriers to the energy transition. The participants' view that economic restructuring programs in mining regions must be an important component of a sustainable and equitable transition also emerges prominently. The prevailing view of the participants in BiH and Serbia is that the current professional and institutional capacities (of state bodies) required for management of sustainable transition process are insufficient. Only the participants from Montenegro believe that insufficient and expensive sources of financing are a major barrier.

Who will be the main drivers of the energy transition?

Taking into account the assessment of the readiness of key actors for the energy transition (questions 3 and 4) as well as the views about identified current opponents of the transition (question 7), question 8 assessed participants' views about the expected main drivers of the transition process. It was possible to choose 3 of the 7 response options offered:

a. Ministries and state institutions in the sector (policy makers),

b. Parliaments and governments (decision makers),

c. Public power companies (key economic actors),

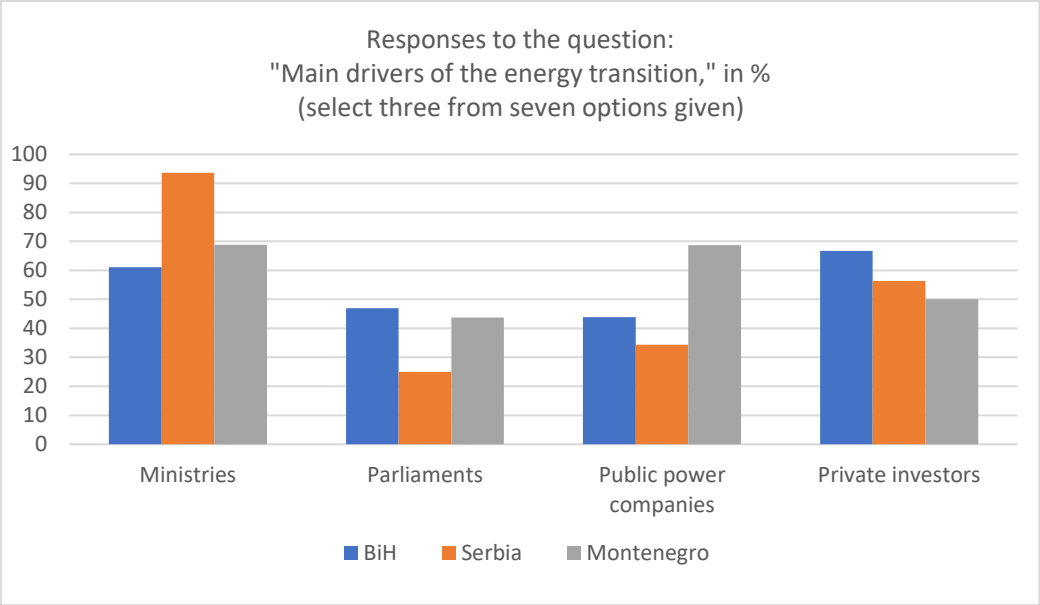
d. Private investors, including producers for own consumption (prosumers),

e. Professional and academic community, and think-tank organizations (as creators of public opinion),

f. Environmental NGOs (as the watchdogs of the policy implementation),

g. Media and the general public.

Participants do not expect that the professional and academic community (Serbia, 37.5%, BiH 27.3%, and Montenegro 25%), non-governmental organizations (BiH 19.7%, Montenegro 18.7%, and Serbia 9.4%) and the media and general public (Serbia 21.9%, BiH 18.18%, and Montenegro 6.3%) will have a significant impact and role in leading the transition process. That is why these social groups are not shown on the diagram below, which depicts the main social actors that the majority of the participants perceived as main driving forces in the process of the energy transition.



Answers to Question 8 - the main drivers of the transition

It is natural to expect that ministries and state institutions (policy makers) will initiate and direct the implementation of the energy transition as its major driving forces (regional average = 74.5%). This attitude is particularly widespread in Serbia (93.7%), which probably reflects the considerable efforts of the Ministry of Mining and Energy on adopting the legal framework for the energy transition in 2021. Parliaments and governments (regional average = 35.7%) and public power utility companies (regional average = 49%) are not expected to play a leading role. The exception is the view of the participants from Montenegro, who expect the EPCG to have a key role in the transition (68.7%), i.e., to be its major driving force. This attitude indicates that public power utility companies in Serbia and BiH are far behind in the energy transition process. Private investors, including producers for their own consumption, were identified as the most important economic actors - drivers of the energy transition (regional average = 57.7%). This opinion is particularly widespread in BiH and Serbia. This situation is confirmed by intensive activities of private (mostly foreign) developers of large wind and solar parks, as well as domestic companies that install distributed solar power plants for self consumption. A particular challenge for policy makers will be how to manage the decarbonisation process while achieving the goals of a sustainable energy transition when the key economic actors are private companies driven by the profit motive.

INCREASE IN USE OF RENEWABLE SOURCES AND THEIR INTEGRATION

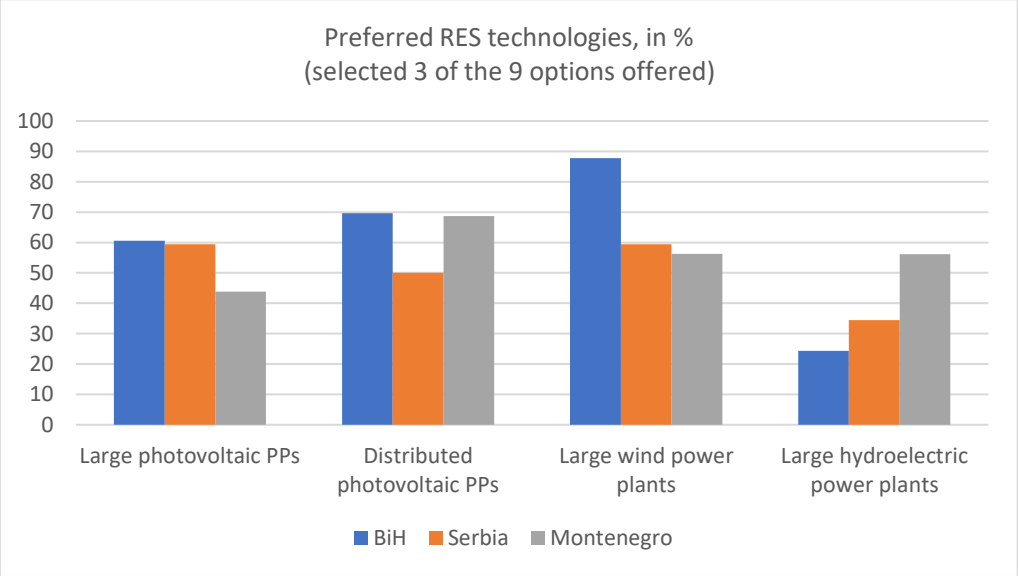
A sustainable energy transition is based on a controlled increase in the use of renewable energy sources (RES) and a reduction in electricity production from fossil fuels. RES technologies based on solar and wind energy are expected to be most widely used, but their energy output is variable, intermittent, and difficult to predict. Integration of wind power plants (WPPs) and photovoltaic power plants (PVPs) as variable renewable sources (vRES) into the electricity system requires increasing available flexible capacity to balance their difficult to predict production. This part of the Questionnaire examines the views of the experts about

the development of the RES and about the modalities of their efficient integration into the electricity system.

What concept and what technologies should be the basis for decarbonization of the electricity system in 2021-2030?

Experts in the Region are debating the optimal mix of decarbonisation technologies, and especially the RES portfolio, for different countries for the period until 2030. In addition to conventional renewable sources - hydroelectric power plants, it is particularly important to determine the total vRES capacity that should be installed in the system by 2030. Several development studies of the regional system[18,19] proposed different shares of WPPs and PVPs.

Question 17 in the Questionnaire required participants to express their preferences for the type of technologies to use in the decarbonization process. Participants could choose their 3 preferences from the 9 technologies offered as options. It emerged that construction of small hydropower plants is not supported in any of the countries. The diagram below shows the respective rates of support for the 4 most highly prefered technologies.



Answers to Question 18 - RES technology preferences

The diagram shows that participants prefer construction of wind farms (regional average = 67.8%), distributed photovoltaic power plants (regional average = 62.8%), large photovoltaic power plants (regional average = 54.6%) and to some extent large hydropower plants (regional average = 38.3%). A significant preference for wind farms is expressed in BiH (87.8%) and for large hydropower plants in Montenegro (56.2%). Significant support for construction of distributed solar photovoltaic power plants is important for decentralization and democratization of the sector. In sum, the prevailing attitude of the participants is that

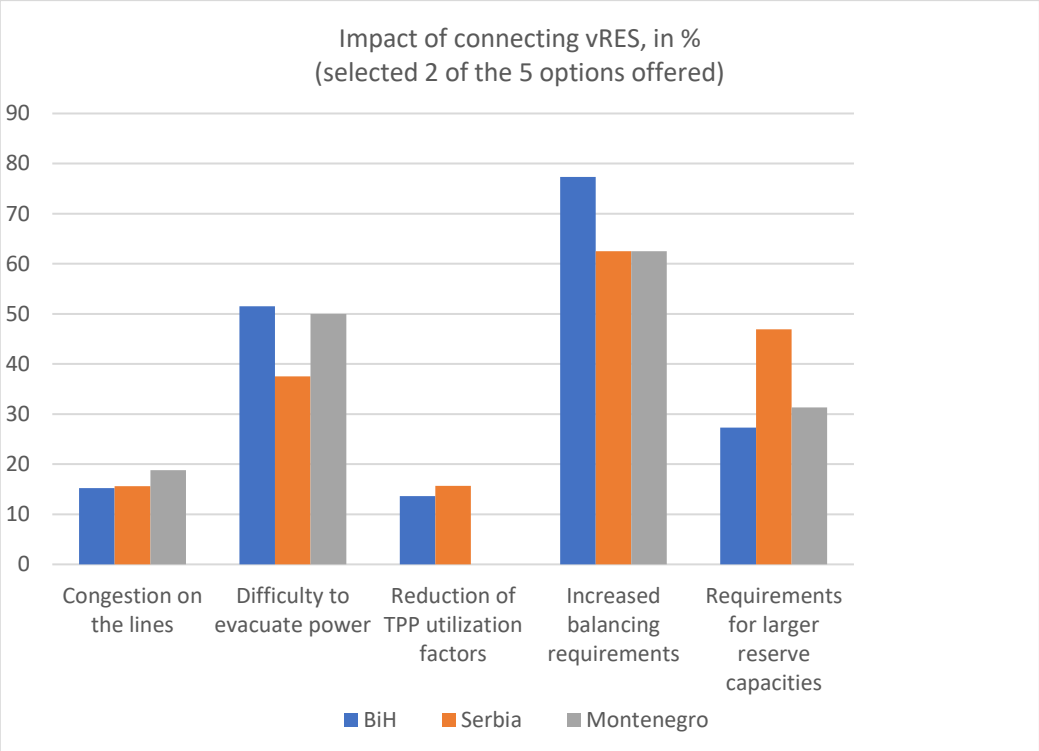
[18] https://www.irena.org/publications/2020/Oct/Renewable-Energy-Prospects-for-Central-and-South-Eastern-Europe-Energy-Connectivity-CESEC

[19] https://www.euneighbours.eu/en/east/stay-informed/publications/final-report-carbon-pricing-design-energy-community

development of renewable sources should be based on the concept of "Wind-Water-Solar" (WWS) technology mix. The review of the portfolio of RES projects currently being developed in the Region confirms the views expressed by the participants - most projects in development phase are WPPs and PVPs. It is also interesting that construction of gas-fired thermal power plants is supported in Serbia (37.5%) as a transitional solution. A probable rationale for this position is the conviction that the security of supply and balancing of variable production from WPPs and PVPs cannot be ensured without thermal power plants. Taking into account that gas-fired thermal power plants, because gas is a fossil fuel, are only a transitional solution, each of the potential projects of gas power plants should be analyzed bearing in mind the risk of „stranded" investments. This is especially true for countries without developed gas infrastructure (BiH and Montenegro).

What is the impact of connecting variable RES (WPPs and PVPs) to the electricity system?

Opponents of decarbonisation often point out that the variable and intermittent nature of WPP and PVP generation will significantly complicate the operation and management of the electricity system and will entail high balancing costs. This is why, in question 18, the participants were invited to determine the key aspects of the impact of vRES on functioning of the electricity system (they could select 2 of 5 options offered). The diagram below shows the distribution of responses.



Responses to Question 18 – Impact of connecting vRES to the electricity system

The diagram shows that participants believe that the greatest challenges in connecting vRES to the grid will be:

- Increase in balancing requirements due to (short-term) variability of WPP's and SPV's production (regional average = 67.4%),

- Inability to evacuate energy from areas with the best wind potentials and insolation, due to the limited capacity of the existing transmission network (regional average = 46.3%),
- Needs for reserve capacity in flexible generation sources (thermal power plants, storage and pump storage hydro power plants) to ensure security of supply (regional average = 35.2%). This concern is often expressed in the form of the question: What shall we do when the Sun is not shining and the wind is not blowing?.

The responses to complementary Question 20 in the Questionnaire indicate that the participants believe that the critical aspects of operating a power system with a large share of vRES will be: 20a. balancing short-term variability of vRES, 20b. monitoring rapid changes in "net load" as well as 20d. adequacy (security of supply) of system operations with several days of significantly reduced vRES production.

What measures should be taken to effectively integrate larger vRES capacities by 2030?

Based on the key challenges of vRES integration identified by analyzing responses to Questions 18 and 20 in the Questionnaire, participants were asked to comment on measures to be taken to achieve the integration of higher vRES capacities in the most cost-effective way possible. From 6 options, the participants were invited to choose 3 priority ones. Table 2 below shows the rates of support for each measure.

Table 2. Priority measures to be taken for economic integration of vRES, in%

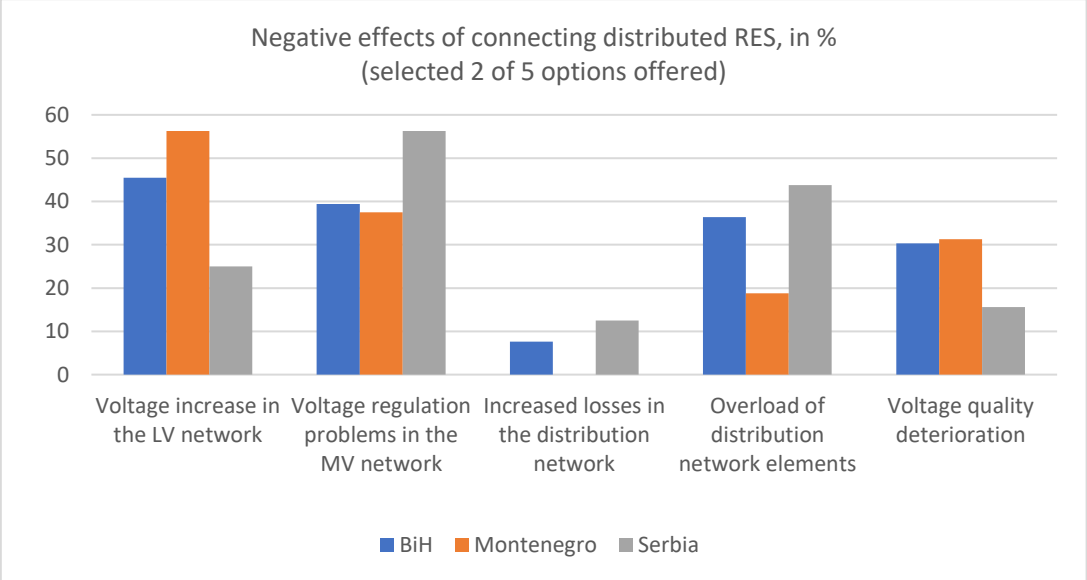
Measure	BiH	Montenegro	Serbia
21a. Reliable production forecast from vRES	**54.6**	**50.0**	28.1
21b. Transmission network investments	47.0	**68.8**	34.4
21c. Construction of interconnection lines	13.7	18.8	18.8
21d. Development and integration of electricity markets	**59.1**	37.5	46.9
21e. Regional coupling of balancing services	**60.6**	**56.3**	**65.6**
21f. Storage and Demad Side Management	36.4	31.3	43.8

The importance of a regional approach to the balancing service by linking secondary and tertiary frequency regulation is highlighted in all countries, (regional average = 60.9%). In BiH (54.6%) and Montenegro (50%) the importance of a reliable forecast of production from vRES is also noted. In addition, in Montenegro, the focus is also on the importance of investments in the transmission network (68.8%), and in BiH on the importance of developing and coupling the electricity markets (59.1%).

In responses to Question 17, participants supported the use of distributed (small) solar photovoltaic power plant technologies. Distribution system operators pointed out the negative effects that connecting such sources can have on low-voltage (LV) and medium-voltage (MV) distribution networks (DNs). With the increase in electricity prices, construction of distributed RES is expected to elicit considerable interest. This section of the Barometer presents the participants' views on the technical and economic effects of the integration of these types of sources.

What technical impact does connecting distributed generators have on the distribution network?

The diagram below shows the distribution of responses (in percentages) about the possible negative impact of connecting distributed generators to the distribution network. Participants could select their 2 preferences amongst 5 options offered. The diagram reveals that participants expect problems with increased voltage levels near the connected distributed generators, and the regulation of voltage on the connecting lines, as well as with possible overloads on certain elements of the distribution network. To some extent, problems are also expected with the reduction of the voltage quality because of the influence of the injection of higher harmonics and the occurrence of voltage flickers by the RES outputs. All these problems are well-known and in the countries where distributed generators make a large share of the generation capacities, solutions have already been developed to mitigate their impact on the distribution network. *Focusing on the problems indicates insufficient readiness of distribution network operators to accept generation from distributed generators.*



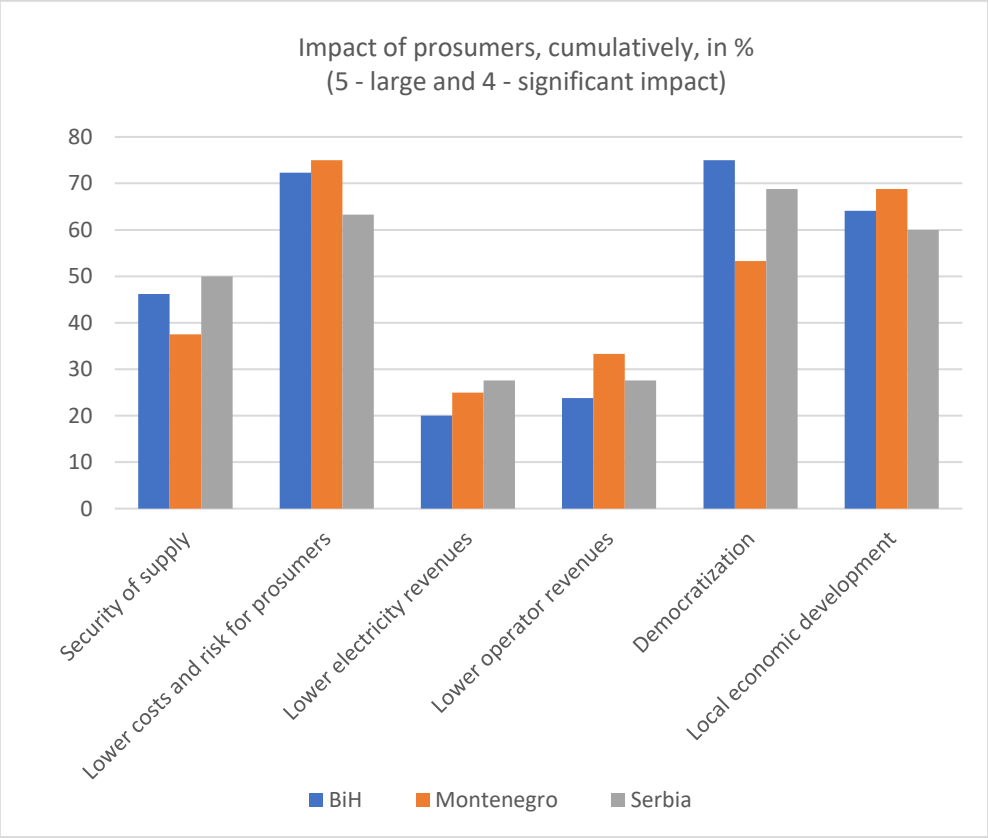
Responses to Question 19 - Negative effects of connecting distributed generators

What will be the techno-economic impact of distributed production from photovoltaic power plants?

Construction of distributed photovoltaic power plants (mainly production for self consumption - prosumers) is becoming a very attractive option in the Region, especially for

small and medium enterprises (SMEs). In addition to technical effects, connecting prosumers will have economic effects on companies, suppliers, and distribution system operators. To assess the techno-economic readiness of countries for development of distributed generation, participants gave their views about the importance of the effects of prosumers on the energy transition. The diagram below shows the participants' responses to Question 22 in the Questionnaire on the importance of technical and economic impact of prosumers.

The diagram below shows that the participants believe that prosumers will have positive effects mainly on reducing costs and mitigating the risk of price increases for SMEs, on decentralization and democratization processes, and on local economic development. Somewhat positive impact is also expected with regard to security of supply. Negative impact on the revenues of power suppliers and distribution system operators is not assessed as significant. Therefore, from the economic point of view, prosumers have a cumulatively positive effect on the country's economy. This should be a signal to state institutions to work on eliminating identified technical barriers to the development of prosumers. The activities already undertaken by the Government of Serbia and the Montenegrin Electric Power Utility Company (EPCG) in support of prosumers are showcasing the way how other institutional actors ought to support the participation of the business sector and citizens in the energy transition.



Responses to question 22 – Economic impact of prosumers

The SEERMAP[20] project used simulation software (EEMM and Green-X) on the model of EU countries' markets to analyze the implications of different decarbonisation scenarios for nine countries of Southeast Europe. A detailed analysis conducted in the SEERMAP project indicates that the decarbonisation of the electricity sector of the Western Balkans by 2050 would be *technically feasible, economically viable, and socially acceptable*. The simulations were based on the assumptions that the markets of all countries are functionally connected and that the available capacities of interconnection lines is the only constraint on trade. It is known from both theory and practice that the larger a geographical area where vRES are connected - the lower the costs of their integration. It is for this reason that, from the beginning of 2022, the markets (both day-ahead and balancing markets) in the EU are coupled into an integrated single EU market. This section of the Barometer discusses the economics of the energy transition, both in terms of market functions and competition, and from the standpoint of the allocation of the costs of energy transition.

Is there a functioning electricity market in your country?

As a competitive environment and functional electricity markets are preconditions for economically efficient implementation of the energy transition, Question 2 in the Questionnaire asked participants to assess the current state of market openness and of the competition in the sector in general. Although there is no important correlation in the responses to all sub-questions, it has been possible to draw the following conclusions that hold true for all countries:

- Electricity markets do not perform all the functions of competitive trading (e.g., they do not encourage competition, do not provide the necessary information for making investment decisions nor to design market-based incentives for renewables). This conclusion means that the "first energy transition" - the liberalization of the sector, had not been consistently implemented.
- In Serbia and Bosnia and Herzegovina, participants believe that the functioning of the markets is additionally impeded by cross-subsidization of prices for households, i.e., because the prices for regulated customers are kept unrealistically low (below the marginal costs of thermal power plants).
- In all countries, participants believe that the limits of available cross-border line capacity, which is set by transmission system operators to ensure stability, do not represent a significant barrier to trading in the regional market.
- Participants think that it is possible to create a competitive environment and an open electricity market despite the fact that the largest share of generation capacity is state-owned.

[20] SEERMAP – Southeast Europe Electricity Road Map, Regional Centre for Energy Policy Research (REKK) project, 2017. (https://rekk.hu/downloads/projects/SEERMAP_RR_SEE_A4_ONLINE.pdf)

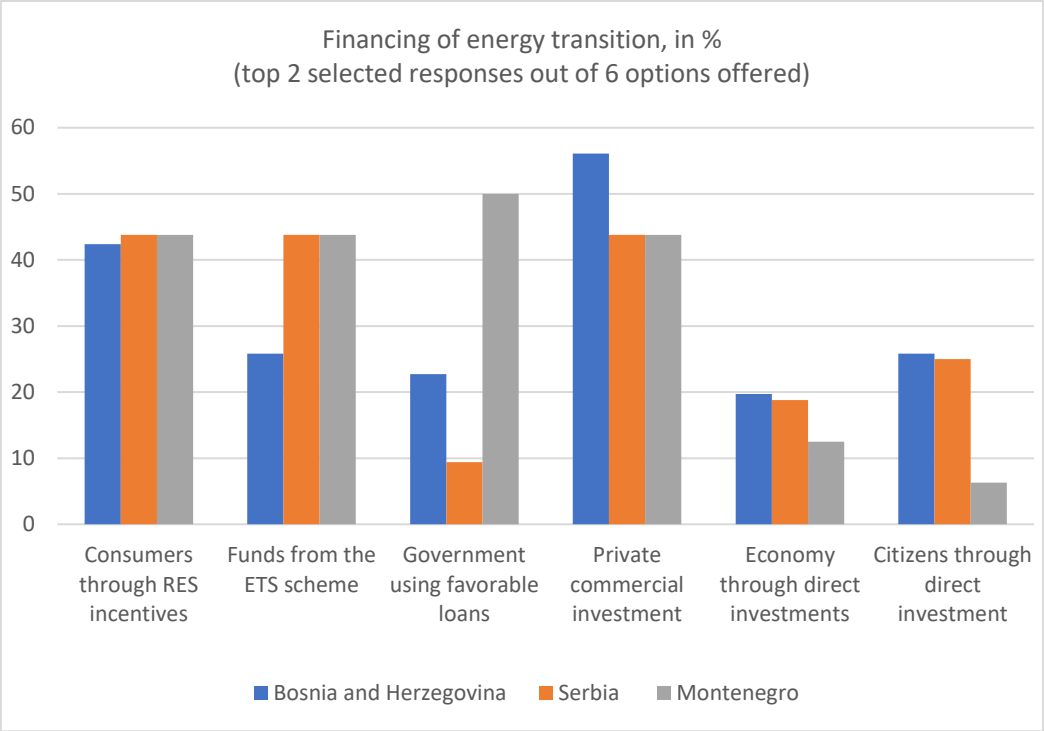
How important is regional cooperation?

Encouraging regional cooperation between the members of the Energy Community is one of the priorities of this organization. Cooperation refers not only to trade but also to coordination in planning, exchange of experiences in the implementation of reforms, defining common interests, especially with regard to the EU, etc. In Question 10 in the Questionnaire, participants were asked about priority projects that may improve regional cooperation. An analysis of the answers resulted in the following conclusions :

- There is a consensus (over 2/3 of participants consider this measure to be a high - 5 or significant - 4 priority) that creation of organized markets (power exchanges) and their coupling within the Region and especially with the EU market is a measure that will significantly improve regional cooperation.
- There is a consensus (over 2/3 of participants believe that this measure is a high - 5 or significant - 4 priority) that the introduction of the Emissions Trading System (ETS) in the Region will advance regional cooperation.
- Over 2/3 of participants strongly support a significant involvement of non-governmental actors (NGOs, academic and professional communities, professional associations, businesses, and citizens) in the implementation of the transition at the national and regional level.
- Over 50% of participants strongly support the concept that access to IPA III and other EU funds should be directly conditioned with the outcomes in the implementation of the energy transition. This means support for the approach that the countries which move faster in the implementation of reforms should receive more funds.
- Over 50% of participants strongly support the approach of coordinated development of NECP plans at the regional level.

Who will finance the energy transition?

Lastly, participants were asked to express their views on who would provide the largest share of financing for the energy transition and how would this financing be channelled. In the responses to Question 23, the participants were able to choose no more than 2 answers from 6 offered options. The diagram below shows participants' attitudes by country.



Responses to Question 23 – Sources of financing for energy transition

The views vary somewhat from one country to the next:

- In BiH, participants believe that the transition will be for the most part financed by private capital commercial projects (usually vRES) - 56.1%, and from investment incentives for production from RES - 42.4%.
- In Serbia, the transition is expected to be financed mainly from incentives for the RES production, from funds raised from the ETS scheme, and by private capital (43.8% of participants voted for each option).
- In Montenegro, participants expect that the transition will mainly be financed from soft loans (50%) taken by the state as well as from investment incentives for production from RES, through the ETS scheme, and from private investment (43.8% of participants selected each option).

CONCLUSIONS AND FUTURE RESEARCH

Implementation of the sustainable energy transition implies management of the energy sector decarbonization in a cost-effective way while respecting the requirements of security of supply and environmental acceptability as well as with active involvement of citizens and the business sector and with the lowest possible socio-economic disruptions. Without a broad social consensus on the vision and roadmap for decarbonisation and without the participation of all stakeholders in the society in undertaking this complex socio-economic transformation, there can be no sustainable and successful energy transition. If the transition is not managed in a sustainable way, it will occur spontaneously, under the influence of markets and external political pressures, which creates a risk of uncontrolled transformation

of the economy and society that could turn into a „perfect storm“ scenario. Depending on its initial state, energy potential and socio-economic priorities and interests, each state should develop its decarbonisation plans that will be adapted over time. The National Energy and Climate Plan is the starting point for preparation of these plans.

In order to manage the transition, it is necessary to know the key technical characteristics of the electricity system and the socio-economic characteristics of the energy sector. It is also important to understand the *soft* aspects of the transition management process, which essentially determine how policies and decisions are made. The objective of this research was to identify these aspects of transition and to assess the readiness of countries to manage a sustainable energy transition. The readiness of states implies existence of a clear vision, consistent action plans, institutional capacities, and mechanisms for coordination and synergistic action of key actors. The methodology developed in the 2021 Barometer project was applied in Bosnia and Herzegovina, Montenegro, and Serbia to assess the readiness of these countries for decarbonisation of the electricity sector, as the most challenging segment of the energy transition.

The general conclusion that emerged from this study, which was conducted with participation of more than 120 experts and actors from state institutions and the non-governmental sector, reveals that the countries covered in the study at this time are not ready to manage a sustainable energy transition.

All three countries are still at the beginning of the first phase of the transition process, which means *"accepting that the current situation is not sustainable and that it must be changed urgently."*[21] Although the study participants found that the operations of public power utility companies, as key actors in the electricity sector, are not satisfactory (the conclusion is that public power utilities lack both a long-term vision aligned with energy transition principles and appropriate development plans, their current financial position is not satisfactory, they lack the necessary skills to operate in the electricity markets and they do not have the capacity to invest in new generation facilities without state aid), there is still no sense of urgency that the situation must change. This is why the start of the energy transition is being delayed. Although the participants, in their responses to the Questionnaire, identified reasons that corroborate that the phase-down and ultimately abandonment of coal for electricity generation is justified for technical, environmental, economic, and political reasons, no decisions have been made on an exact date when this energy source will be phased-out and when the introduction of the system for trading of CO2 emission certificates (the ETS scheme) will commence.

Only after accepting the fact that the current situation is unsustainable (the first phase of the transition) it becomes possible to adopt a vision of the future and make and implement plans to achieve this vision (the second phase of the transition). At present, the vision of the future state of the electricity system has been formulated only within the project "Europe's First Climate-Neutral Continent Until 2050", which is promoted by the EU in the Region. Consequently, decarbonisation is generally perceived as an imposed obligation in the EU accession process, i.e., there is no local ownership of the transition process. Local actors are unaware that the energy transition constitutes a key component of the third industrial

[21] https://www.amazon.com/Managing-Transitions-Making-Most-Change/dp/0738213802

revolution and the post-pandemic green recovery, both of which are already in full swing in Europe in line with the EU Green Deal. As this industrial revolution will unfold very quickly, in the next decade, by hesitating in making the decision to join this process countries in the Region are running a major risk of inflicting on themselves an irremediable lag in overall development. With all this in mind, the Latin saying „*Periculum in mora*“ was adopted as the epigraph for this report.

In addition to structural problems that the energy transition begins without a clear vision and without the ownership over the decarbonisation process, the study also showed that the level of readiness of state institutions to manage the transition is completely unsatisfactory.

Participants agree:

- that the institutions lack a broader perception of the energy transition, as the key element of "green growth" concept and the third industrial revolution, and that they do not understand the urgency of starting this process;
- that the institutional capacity to manage complex, long-term transformation processes, such as the energy transition, is insufficient, which is considered the greatest weakness, because the lack of institutional readiness implies that decarbonisation could occur spontaneously (without process management), unfold chaotically (with major socio-economic consequences), and be economically inefficient and far more costly than necessary;
- that the decision-making within state institutions in planning the energy transition is non-transparent, which is why the involvement of the public - citizens and the business sector - is at a such low level. This way, it is impossible to reach a broader social consensus necessary for the successful implementation of the energy transition.

The study showed that the starting position of the countries in the Region for the implementation of the energy transition is very unfavorable. Hesitatance and a lack of determination to make crucial decisions as well as the prolongation of dependence on the existing electricity system structures, based on the obsolete infrastructure of coal-fired power plants, increase the risks to security of supply. On the other hand, development of renewable sources driven exclusively by market forces can certainly lead to problems with the integration of larger share of variable RES - wind and photovoltaic power plants. Ultimately, such RES development does not necessarily result in decarbonization of local consumption or increased security of supply.

A key recommendation for all countries is that a public debate on the energy transition process must begin as soon as possible, both in professional fora and in the general public. There are many doubts and ambiguities about the challenges inherent in such a radical transformation. But there are also many opportunities to base the development of the energy sector on the principles of sustainable development. At this time, tested solutions for launching the energy transition process, at least with "no regret" measures, are available. It will be most important to transform the challenges that the mining regions will face into developmental opportunities. The process of economic restructuring of mining regions and socio-economic support to employees in the declining industries - coal mines and thermal power plants -

should start without any delay. In this process, the EU and international financial institutions should provide not only technical, but also adequate financial support.[22].

During the preparation of the 2021 Barometer, extensive research was conducted into almost all aspects of the energy transition in three countries of the Western Balkans. The plan is to conduct research in all six Western Balkans members of the Energy Community from 2022. The plan is also to conduct focused studies on selected topics (e.g., security of supply, integration of renewable and distributed sources, just transition, modalities of financing the cost-optimal path of decarbonisation) to initiate a dialogue at the national and regional level in order to support policy makers in the development of national energy and climate plans as well as in designing the measures for the implementation of these plans.

[22] https://ec.europa.eu/jrc/en/news/recent-trends-coal-regions-western-balkans-and-ukraine