



## Perspective

## When energy resources, transit routes, critical minerals and the interests of great powers meet in the Western Balkans: do citizens have a voice?

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## ABSTRACT

This paper aims to point out the major problems faced by the citizens of the Western Balkans when it comes to future energy policy. The anticipated decarbonization of Europe by 2050 will significantly influence the region that embraces the green agenda. The regions clean transition is hindered by outdated energy infrastructure, a high share of coal in energy consumption, energy-intensive industries, elevated pollution levels, influence from global powers, and tensions both among the countries of the region and within the region itself. Moreover, the post-2022 energy landscape has grown increasingly complex, necessitating adjustments in energy policy for the Western Balkan countries that have yet to be clearly specified under complex conditions. Namely, the European Union is interested in exploitation of natural resources and transit routes, which is happening at the same time as the influence and interests of the great powers are growing in the region – often contradictory. In such a situation, citizens are denied the opportunity to participate in decision-making and become only observers of the events. The study provides an analysis of the energy sectors status in six Western Balkan economies, serving as a foundation for the development of future energy policy while highlighting the specificities of the clean transition amid intricate geopolitical upheavals that significantly impact the region. After analyzing the geopolitical, infrastructural, socio-economic, and resource inputs (including critical raw materials and rare earth elements), it is evident that a just transition and the involvement of citizens in formulating the energy policy of their own countries is almost impossible. Recommendations have been provided in this regard.

## 1. Introduction

The transition to the concept of sustainable energy development is highly intricate and necessitates the execution of a multitude of activities, including the adoption of a new legislative and institutional framework, consistent implementation, the assessment of the effectiveness of public policy and legislation, the provision of a financial framework that facilitates implementation, and so forth; these activities must be embraced by the community [1]. Following the establishment of the sustainable development concept, it became evident that substantial issues may emerge from an incomplete understanding of poverty and environmental pollution, alongside the implications of economic growth and the roles of various stakeholders [2], whereby recent studies also indicate an alternative perspective on environmental, social, and economic sustainability [3]. The aforementioned persists today, with social acceptance issues notably evident in the transition to clean energy

technologies [4]. The clean transition entails significant economic changes that affect every individual; however, despite the profound societal implications of the clean transition, research indicates that citizens, even in the most economically advanced countries, lack comprehension of their role in the process [5]. Moreover, despite years of perseverance and substantial expenditures in the clean transition process, energy poverty persists throughout the European Union (EU) [6]. Job losses and wage reductions, particularly among lower-skilled workers in the energy-intensive sector [7], exacerbate uncertainty and distrust in decision-makers, highlighting the necessity to define energy poverty as a priority of energy policy, as it undeniably constitutes a significant social issue.

Clean technologies and products necessitate the extraction of rare earth elements, leading to environmental contamination, diminishing the quality of life in local communities [8], and exacerbating injustice [9]. Consequently, the scarcity of rare earth elements and geopolitical

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tensions are anticipated to decelerate the clean transition [10] while exacerbating poverty, discrimination, and inequality [11]. A 2020 study [12] reveals that specific citizen groups (communities and states) will gain advantages from the clean transition, mainly through a healthier environment and job prospects in innovative companies, whereas other citizens (communities and states) may not experience benefits from the green transition and could even endure its burdens. This approach engenders discontent and a perception of inequality, which significantly strains international relations and is a trend likely to intensify. In countries at a lower level of development, clean transition benefits cannot be deemed equitably distributed, as they are anticipated to accrue only to a limited number of affluent households with access to government subsidies, thereby exacerbating inequality [13].

Public awareness of the significance of a clean transition is evident, along with public support, yet several implementation challenges have emerged over time. The EU's commitment to decarbonization, along with the corresponding obligation for member states, as outlined in Directive 2024/1760, which provides for the cessation of collaboration with countries exporting energy to the EU (should they fail to adhere to specific regulations concerning climate action and labor rights) [14], may exacerbate tensions in EU governance and result in divergent perspectives among member states on energy supply and energy management.

Upon defining the Green Deal in 2019 [15] as an umbrella document intended to be aligned with previously established global sustainable development goals, various issues became apparent regarding the above [16]. The aforementioned document established the strategic objective of decarbonizing Europe by 2050, aiming to foster a more favorable future for all European citizens, generate new employment opportunities, and diminish inequalities. However, post-COVID-19 studies on public perception indicate notable shifts and the necessity to reassess specific plans [17]. Specifically, at the time of adopting the Green Deal as a binding document, the EU was already confronting several challenges, notably: high dependence on energy imports, elevated carbon dioxide emissions (particularly in countries of Southeast and Eastern Europe) [18], inadequate pace and impact of the transition to renewable energy sources, illegal migration, and energy poverty. The COVID-19 pandemic has introduced new challenges and strained the budgets of European nations; however, the EU has consistently pursued its decarbonization objectives, with a projected budget of €2.018 trillion, the largest in the history of the EU since its inception [19].

Shortly after the end of the pandemic, the onset of conflict in Ukraine transpired, resulting in significant ramifications for the European economy, accompanied by a multitude of analyses and forecasts released in the year the conflict began. According to a 2022 study, the EU's position and internal cohesion were exacerbated by the diverse responses [20] to these two crises in the short term. A challenging position is particularly evident in member states that have been importing natural gas from the Russian Federation for decades and whose economies are substantially dependent on the aforementioned [21].

Research from 2022 [22] identified specific phenomena that the war crisis in Ukraine could precipitate, most of which subsequently materialized: the phasing out of fossil fuels is decelerating, resulting in evident adverse effects on the clean energy transition in developing countries; the resurgence of the state as the predominant entity in the energy sector is markedly evident, while other objectives, including the clean energy transition, are losing traction and are not prioritized in governmental agendas or public perception. In the same year, research was published indicating that heightened involvement from governments, rather than commercial organizations, is anticipated, and that the primary dangers to the EU's climate objectives are inaction and a lack of coordination [23], which has mostly proven to be accurate.

In the context of heightened instability, uncertainty, and volatility post-2022, the EU occupies a distinct position. Most European countries remain significantly reliant on energy imports, with a particular issue being the disruption of natural gas imports from the Russian Federation

due to sanctions imposed by the EU [24,25]. Natural gas is an energy source that has facilitated the consistent operation of a portion of the European industry for decades and has provided energy for the heating of the population at an affordable price [26]. Moreover, natural gas is an environmentally favorable energy source, offering an almost optimal solution for a clean transition while maintaining the competitiveness of the European economy [27]. The imposition of sanctions on natural gas imports from the Russian Federation compels the EU to seek alternative solutions, primarily through intensive electrification, which may occur directly or indirectly (utilizing intermediary fuel such as hydrogen). This necessitates the construction of new infrastructure and results in elevated costs [28]. Although a certain amount of electricity can be generated from both existing and new renewable sources, it is insufficient to meet the demand. Furthermore, the aforementioned inevitably results in an increase in the price of the end product (or service) [29]. The import of energy from other, often remote places at elevated prices exacerbates the strain on the European economy, particularly on countries that consume substantial energy quantities. In certain instances, the infrastructure is insufficient to facilitate the supply of the required quantities of natural gas from specific countries. The damage to Nord Stream II has resulted in significant issues for the German economy [30] and generated political and social conflicts. Energy supply has become politicized, with the governing structures exerting a significant influence. This has resulted in an environment in which citizens have little to no influence, and their interests can be easily disregarded [31].

The EU's decision to decrease its reliance on the import of critical raw materials (primarily sourced from the People's Republic of China), which are essential for the green transition, has resulted in an even greater burden in terms of the identification of new supply chains and financing activities that will facilitate the continued supply of critical raw materials [32]. The evaluation of materials essential to industrial production has been ongoing since 2011, when 14 critical raw materials were first identified. The most recent assessment—the fifth in the series—was conducted in 2023 and expanded the list to 34 critical raw materials [33]. This decision will undoubtedly have a significant impact on the competitiveness of European economies and, as a result, on citizens' quality of life.

Under these conditions, it is anticipated that the member states of the EU will endeavor to safeguard their economic interests, thereby adversely affecting the cohesive energy and foreign policy of the EU and hindering the transition to clean energy [34]. The aforementioned factors have resulted in heightened insecurity among citizens, changes in attitudes, and shifts in priorities. Under the new circumstances, energy and climate policy must undergo modifications [35].

Besides the EU, the countries of the Western Balkans region, which opted for membership in the EU, encountered a challenge when they began to implement activities to align their policies with the EU's requirements [36,37]. The countries in this region are encircled by EU member states, thereby necessitating collaboration, particularly regarding cross-border pollution and the existing and new transit corridors for the transportation of energy products not sourced from the Russian Federation [38]. Conversely, during the formulation of the energy policy, countries in the region encountered a scenario wherein the EU's enlargement policy is being scrutinized, largely due to social factors [39]. This situation exacerbates Eurocepticism within the region, thereby adversely impacting the decarbonization of the European continent, of which the Western Balkans is an integral part [40]. Moreover, the effective execution of clean transition initiatives may be obstructed by the populace's unfamiliarity with the forthcoming changes in the economic sector.

## 2. Methodology

This paper aims to examine the principal challenges faced by the citizens of the Western Balkans in the process of achieving a just energy transition. The research focuses on three core factors that the authors

consider crucial for the successful implementation of a just energy transition in the region: a) the development of a comprehensive regulatory and institutional framework offering support mechanisms for regions directly impacted by decarbonization policies; b) consideration of the structural characteristics of the energy sector in Western Balkan economies; and c) identification of the key geopolitical challenges relevant to the region. The Western Balkan countries, as candidates for EU membership, have committed to harmonizing their national policies with the EU *acquis communautaire*. Nonetheless, they do not have access to the support mechanisms provided by the EU for its member states that are directly impacted by the decarbonization process, nor are they capable of independently financing a just energy transition process. On the other hand, the European Commission has declared a just transition as a fundamental prerequisite for achieving climate neutrality and has allocated a budget of €55 billion for the period from 2021 to 2027, aiming to assist regions facing challenges in reaching specific objectives by 2030. The Just Transition Mechanism provides support, particularly for the establishment of new employment opportunities in emerging sectors, the enhancement of energy efficiency in housing, combating energy poverty, and facilitating improved access to clean energy at affordable prices [41].

Just transition should establish the groundwork and guide socioeconomic transformation toward a low-carbon economy [42], grounded in solidarity and safeguarding the social status of citizens who will face various repercussions from the decarbonization of the European continent, which must be considered from the perspective of complementarity. It is important to consider the compatibility of just transition with climate goals, mainly due to the current financial trajectories [43].

Research indicates that the fundamental challenges associated with the implementation of the Just Transition Mechanism can be encapsulated in three primary issues, each of which may have significant social ramifications. The first issue pertains to national allocation, specifically related to the Just Transition Fund, the first pillar of the Just Transition Mechanism. This fund allocates €30–50 billion from the EU's cohesion funds (which includes the European Social Fund and the European Regional Development Fund), with co-financing from each member state. However, this is not always approved by the governments of individual countries [44]. This phase involves reallocating funds from one region to another, primarily for fossil fuel-dependent countries. Any withdrawal of funds from one region and allocation to another causes social dissatisfaction. Secondly, changes are required across all sectors, although this process is predominantly linked to the energy sector and industry. It is also imperative to consider the sectors that will have a significant impact on citizens, particularly in terms of employment availability [45]. Thirdly, it is imperative to prioritize social inclusiveness, which refers to the inclusion of citizens who are the bearers of the clean transition and will directly experience its repercussions. However, there are currently no clear measures that will facilitate the inclusion of society (citizens and their representatives) at the local, national, and sub-national levels [46]. The examination of the existing financing methods employed by the Just Transition Fund has revealed that the predominant issues are procedural, that the allocated funds are frequently inadequate, and that not all stakeholders, particularly citizens, have been consulted [47].

Therefore, it is essential to reassess the matter of societal acceptance regarding the transition to clean energy in all aspects. The term “social acceptance” was initially introduced in 1984, yet it garnered significant scholarly attention [48] only in the 21st century, predominantly concerning renewable energy sources [49]. It is important to note that there is a scarcity of studies addressing how citizens form opinions regarding specific changes [50]. Furthermore, citizens must possess the right to comprehensive information, and their perspectives should be acknowledged by policymakers, as citizens are the ones who execute energy policy measures and endure the resultant positive and negative impacts of specific decisions. The transition to clean energy is a strategic decision with significant ramifications and numerous misunderstandings

concerning the distinctly defined structure of the implementation procedure [51]. The absence of non-governmental involvement is one of the significant factors contributing to the failure of even highly developed countries, such as Norway, to meet their objectives related to pollution reduction and energy efficiency enhancement in building construction [52]. Other studies [53] highlight the inadequate engagement of citizens and employees from the relevant sectors in decision-making processes, suggest that this practice may result in instability, hence jeopardizing the achievement of the clean transition [54].

Several factors of a just transition must be contemplated moving forward, as the conflict in Ukraine has underscored the fragility of supply chains and influences various issues, spanning from local to global concerns (including climate change and the provision of synthetic fertilizers). All these factors have repercussions for society, individual quality of life, and the quality of life of future generations. Interdisciplinarity, objectivity, and cooperation are essential for restoring stability across all domains [55].

The formulation of just energy policies for the Western Balkans region, which must prioritize social responsibility, is further complicated by external pressures on the countries of the region to align their foreign policies with that of the EU, alongside the persistent presence of energy companies from the Russian Federation [56] and the increasing influence of the People's Republic of China [57,58]. The People's Republic of China places significant emphasis on foreign policy and investments in the Western Balkans region, especially in the energy sector and areas that require a transition to cleaner energy sources [59]. This focus is especially evident in coal exploitation, cement production, and steel production [60].

Energy imports from the Russian Federation are the primary source of energy for all countries in the region, characterized by extensive coal exploitation and environmental pollution [61], a low level of investment in renewable energy sources, and outdated technology in the energy sector [62]. Nonetheless, there is a concerted effort to uphold the social status of the population, particularly through the implementation of energy price regulation, with a specific focus on electricity, which is perceived as a social category [63].

Research on the public perception of the clean transition among the populace in the Western Balkans does not exist. Rare research indicates a lack of awareness regarding the green transition among companies and individuals [64], as well as the necessity for further research of this nature in the future [65]. Where such research does exist, it tends to reflect the views of a narrow segment of the population, primarily focused on interest in household-level renewable energy production [66]. However, there is a lack of scientifically grounded studies addressing broader public perceptions across multiple dimensions of the clean transition—insights that could have a more profound and lasting impact on the social standing of citizens.

Within unstable geopolitical contexts, the small economies of the Western Balkans are under great pressure to ensure a stable supply of energy products, to advance on the path to membership in the EU (with all the obligations that it entails), to provide sources of financing for clean transition projects, and to create an energy policy that will be socially acceptable and enable stable and sustainable economic development, safety, and social security of citizens [67].

### 3. Main features of the energy sector of the Western Balkan economies

#### 3.1. Main clean transition indicators

The Western Balkans region—comprising six economies (Albania,

Bosnia and Herzegovina, Kosovo<sup>1\*</sup>, Montenegro, North Macedonia, and the Republic of Serbia)—constitutes a distinct geographical entity with a population of approximately 17 million [68]. Indicators of direct significance were chosen for the study to define a plan for socially responsible and just energy policies. Considering the historical heritage, accessible resources, and infrastructure, as well as the study's objective, data are supplied for each of the six economies individually; nonetheless, it is recommended that the region be regarded in its entirety.

The region generates the majority of its electricity from coal-fired thermal power plants (63 %), followed by hydropower plants at 34 %, with renewables contributing to a mere 3.5 %. With the exception of Albania, which generates nearly all its electricity from hydropower, coal predominates in Kosovo\* (95 %), followed by Serbia (67 %), Bosnia and Herzegovina (65 %), North Macedonia (51 %), and Montenegro (41 %). The complete electric power infrastructure (Fig. 1), encompassing production capacity as well as the transmission and distribution network, is obsolete, necessitating investments for the restoration of existing facilities and the building of new capacities. In addition, the poorly maintained and outdated energy infrastructure is characterized by a lower level of productivity, i.e., a higher level of energy and carbon intensity.

In all Western Balkan economies (with the exception of Montenegro), electricity consumption has increased, and it is not possible to satisfy this demand through domestic production. All countries (with the exception of Albania) utilize coal, specifically lignite, which is of inferior quality and is imported as the primary energy source for electricity generation. Since 2000, CO<sub>2</sub> emissions have exhibited an upward trajectory across all countries (with the exception of North Macedonia). The primary sources of pollution include coal combustion in thermal stations, fossil fuel combustion in transportation, the utilization of residential chimneys, and the absence of sufficient technical measures for the purification of harmful gases [71]. It is crucial to highlight that pollution levels in the region frequently reach hazardous thresholds; the monitoring system lacks transparency, yet citizens are growing progressively cognizant of the issue [72,73].

Electricity prices in the Western Balkans region are significantly lower than the EU average—8.14 euro cents compared to 21.5 euro cents per kWh for household consumers and 10.64 compared to 15.97 euro cents per kWh for non-household consumers [74]. One reason for this disparity is that electricity prices in the Western Balkans do not include carbon emission costs. Although electricity prices in the region are regulated, they have increased over the past decade. However, this increase has been lower than in the EU. Specifically, average household electricity prices in the Western Balkans have risen by 22 %, while in the EU-27 they have increased by 63 %. An even greater disparity is observed in electricity prices for non-household consumers: in the Western Balkans, prices rose by 54 % on average, compared to a 94 % increase in the EU-27.

The energy intensity of the economy declines in all countries post-2000, but the importation of energy products during the same timeframe exhibits an upward tendency. All countries are significantly reliant on oil and natural gas imports, predominantly from the Russian Federation, despite efforts to augment their local gas output, which remains relatively limited. The energy infrastructure is many decades outdated, prone to outages, and highly susceptible to natural and technological disasters [75].

The generation of energy from renewable sources is a multifaceted economic, energy, and social concern. All economies in the Western Balkans have resolved to augment the proportion of renewable energy in total production; however, this endeavor faces significant challenges despite governmental incentives, with numerous and substantial protests of citizens arguing that the proposed solutions and sites

(particularly concerning small hydropower plants) adversely impact the viability of their communities [76], compounded by a lack of transparency and corruption in the process [77]. Research indicates that the greatest potential lies in biomass and geothermal energy generation, while the lowest potential is associated with wind energy, primarily due to high costs [78]. Considering the social status and economic capacity of households in the region, it is impractical to anticipate substantial improvements in this domain without considerable incentives.

The last data point presented in Table 1 pertains to energy poverty, and the results are alarming, as the number of households unable to adequately heat their living environments persists in its upward trajectory. According to 2021 data, energy poverty was most pronounced in North Macedonia (data for Kosovo\* and Bosnia and Herzegovina are not available). During the energy crisis, the issue became even more acute, prompting all countries in the region to simultaneously introduce subsidies for citizens in order to mitigate the immediate socio-economic impact of the energy crisis [79]. Nevertheless, as it is estimated that in 2023, up to 40 % of the population in the region was unable to secure the socially and materially necessary level of energy services in the home, compared to 10.6 % in the EU [80], it is imperative to identify more effective measures that can be incorporated into the new concept of socially responsible energy policy [81].

### 3.2. Energy and climate targets for the Western Balkans

Aiming to become a part of the unified European energy market, the Western Balkan countries signed the Energy Community Treaty (2005), by which they committed to transposing the EU energy and climate *acquis communautaire* into national legislation. In the last two decades since the ratification of the Energy Community Treaty, the Western Balkans region has made some progress [82]. However, the Treaty is set to expire in 2026, and the European Commission has not reported to the European Parliament on the implementation of the Energy Community Treaty since 2011.

The region has largely implemented EU legislation concerning energy market liberalization, including mandating that vertically integrated national electricity and gas companies be divided into separate entities responsible for production and distribution/supply [83]. Liberalization of the energy market entails the establishment of independent regulators and energy exchanges (which would contribute to attracting foreign direct investment (FDI) into the energy sector), strengthening competition between traders, enabling businesses and households to choose between different providers, and—over time—bringing down prices.

Furthermore, the EU regulation encompasses an extensive array of legislation pertinent to the decarbonization process, resulting in the Western Balkan energy sector undergoing a twofold transition: from state-controlled energy systems to competitive energy markets and toward decarbonization. Decarbonizing the region is particularly challenging for the following reasons: 1) a high share of coal in electricity generation, which adversely affects clean transition indicators (e.g., high energy and carbon intensity, low share of renewables); 2) insufficient and outdated energy infrastructure; 3) inadequate consideration of the socio-economic dimensions of the energy transition; 4) high levels of direct subsidies for electricity generation from coal/lignite; 5) lack of financial resources.

In 2022, the Energy Community adopted the 2030 energy and climate targets for Contracting Parties, aligning with the EU decarbonization targets for the period 2021–2030 [84], to support their path toward climate neutrality by 2050 and reduce dependence on fossil fuels (Table 2). Aiming to achieve the defined targets, the Western Balkan economies adopted long-term climate change strategies and nationally determined contribution plans.

The Western Balkans region has potential for energy generation from renewable sources, but it is not being utilized to its fullest extent [86]. The production of bioenergy from agricultural and forest biomass [87] is

<sup>1</sup> This designation is without prejudice to positions on status and is in line with UNSC 1244 and the ICJ Opinion on the Kosovo declaration of independence.”





**Fig. 1.** Electric power infrastructure of the Western Balkans.  
(Source: Authors.)

a significant potential that is presently underutilized. The production of energy from waste is a reality; however, the quantities of energy that are generated are typically modest [88]. Rare research indicates that the clean transition of this region will be significantly influenced by the modernization of the electric power sector and the increase in electricity generation from renewable sources in the future, because these measures have the potential to reduce the exploitation of coal and the resulting pollution [89]. The countries of the region are unable to independently undertake substantial investments in the power sector due to a lack of funding. Consequently, they rely extensively on foreign financial assistance. According to the available data, the efficiency of the use of foreign financial assistance to decarbonize the energy sector was 0.15 to 0.62 % of the GDP of the countries in the region. However, one-third of the funds were allocated to projects in the non-renewable sector [90].

The decarbonization process entails, among other measures, the implementation of the Large Combustion Plant Directive [91], specifically the gradual closure of fossil fuel-based thermal power plants. The energy infrastructure in the regional countries was predominantly inherited from the Yugoslav era, as all countries (except Albania) were constituents of the Socialist Federal Republic of Yugoslavia until 1991. The oldest thermal power plants are significant polluters; therefore, in compliance with the Large Combustion Directive under the Energy Community Treaty (passed on 31 December 2017), their phased closure is anticipated. Nevertheless, seven years after the deadline for the implementation of the Large Combustion Directive, sulfur dioxide emissions from coal plants included in the national emission reduction plans of Bosnia and Herzegovina, Kosovo\*, North Macedonia, and Serbia were still collectively 5.7 times higher than allowed [92]. Conversely,

the region implements substantial direct subsidies for electricity generation from coal/lignite [93]. In 2021–2022, these subsidies exceeded EUR 180 million, with the most substantial subsidies allocated to Serbia (EUR 98.67 million) and Bosnia and Herzegovina (EUR 70.14 million).

The shutdown of thermal power plants would lead to substantial job losses for numerous workers employed in thermal power plants, coal mines, and other affiliated industries. Research from 2021 [94] indicates that these two sectors employ around 41,510 individuals, while the estimated employment in related sectors (indirect jobs) is 60,914. Employees in energy-intensive industries (such as steel and iron production, the chemical industry, pulp, etc.) face potential job losses, with an estimated total of 1970 positions in danger. Unlike the EU, which has developed support mechanisms for its member states, Western Balkan economies are unable to rely on such support and, therefore, have higher unemployment rates and lower living standards. No study of the socio-economic ramifications of the decarbonization process in the Western Balkans has been conducted, nor are there studies or clearly defined strategies at the regional or national levels. The matter of just transition in the WB6 region is predominantly addressed by international organizations (such as the European Bank for Reconstruction and Development and the World Bank), primarily providing commercial loans. Unlike the EU, which established a specific Just Transition mechanism and Just Transition Fund to grant financial assistance to member states adversely affected by the socio-economic repercussions of decarbonization, the countries in the region lack access to the Just Transition Fund and have no funds of their own.

The economies of the Western Balkans region are further encumbered by an additional carbon tax under the Carbon Border Adjustment Mechanism (CBAM), which the EU started to apply in October 2023 for

**Table 1**

Fundamental indicators of significance for the formulation of socially responsible energy policy in the Western Balkans region.

Indicator / Economy	Albania	Bosna & Herzegovina	Kosovo*	Montenegro	North Macedonia	Republic of Serbia	Europe
Electricity consumption per capita (change 2000–22)	73% ↑	105 % ↑	143% ↑	30 % ↓	6% ↑	37% ↑	3% ↑
Energy intensity of the economy (change 2000–22)	49% ↓	15 % ↓	24% ↓	35 % ↓	41% ↓	42 % ↓	40 % ↓
Renewables (share of power generation, 2022)	100 %	30.9 %	8.7 %	53.3 %	23.5 %	22.8 %	38.2 %
Coal (of total energy supply, 2022)	6.9 %	51.4 %	58.6 %	33.8 %	32.2 %	42 %	14 %
Oil (of total energy supply, 2022)	47 %	22.0 %	29.2 %	37.5 %	44.6 %	26 %	32 %
Natural gas (of total energy supply, 2022)	1.3 %	3.2 %	0 %	0 %	9.3 %	14 %	25 %
Hydro energy (of total energy supply, 2022)	28.2 %	5.4 %	2.1 %	11.8 %	4.2 %	5 %	42 %
Biofuels and waste (of total energy supply, 2022)	13.3 %	18.0 %	10.1 %	14.2 %	8.6 %	10.6 %	10.7 %
Natural gas production (change 2000–22)	323% ↑	0 %	0 %	0 %	343% ↑	51% ↑	20.3 % ↑
Coal production (change 2000–22)	1995 % ↑	57% ↑	66% ↑	45 % ↑	38 %	28% ↓	13.3 % ↑
Share of coal (of total electricity generation, 2022)	0 %	67.4 %	90.7 %	36.7 %	46.7 %	66.3 %	17% ↑
CO <sub>2</sub> emission (change 2000–22)	17% ↑	50 % ↑	66% ↑	0 %	10 % ↓	5 % ↑	21% ↑
Net energy imports (of 2022 total energy supply)*	32.3 %	26.4 %	32.4 %	29.6 %	63.7 %	45.3 %	62.5 % ↑
Trend in energy imports (change 2000–22)*	79% ↑	99% ↑	170 % ↑	90 % ↑	79% ↑	308% ↑	4.5 % ↓
Energy poverty (share of households unable to adequately heat their homes in 2021)*	35.8 ↑	N/A	N/A	13.2 ↑	41.1 ↑	9.5 ↑	6.9 % ↑

Note:

\* Data for European Union. Source: [69,70].

**Table 2**

2030 energy and climate targets for the Western Balkans.

	Share of energy from renewable sources, %	Decrease of GHG compared to 1990 levels, %	Final energy consumption, Mtoe
Albania	52 %	+53,2	2,40
Bosnia and Herzegovina	43.6 %	−41,2	4,34
Kosovo*	32 %	−16,3 %	1,80
Montenegro	50 %	−55,0 %	0,73
North Macedonia	38 %	−82,0 %	2,00
Republic of Serbia	40.7 %	−40,3 %	9,54

Note:

\* The target for Kosovo is compared to 2016 levels. Source: [85].

imports from six sectors (aluminum, cement, iron, steel, fertilizers, electricity, and hydrogen) originating from non-EU countries [95]. The export of products from the aforementioned sectors in the Western Balkans constitutes around 13 % of the region's total exports. Bosnia and Herzegovina and Serbia, significant exporters of power, aluminum, and iron and steel to the EU, will face the most substantial adverse effects. To mitigate the costs associated with CBAM, the EU suggests implementing carbon pricing based on the EU Emission Trading System (ETS) market framework or allowing individual countries to introduce carbon taxes independently. Nonetheless, significant constraints exist regarding the

establishment of a market analogous to the EU ETS (specifically, it is imperative to guarantee a sufficient number of enterprises engaged in the trading of emission permits to ensure market liquidity, given that the EU ETS encompasses over 11,000 companies and was initiated in 2005). Furthermore, Montenegro's attempt to implement carbon taxes (as the only country to take this initiative) revealed numerous limitations.

Given that the green transition is a complex process with far-reaching socio-economic implications, one would expect public opinion research to be available on the topic. However, no studies exist in the region that examine citizens' views on the green transition and the commitments undertaken by Western Balkan countries. Studies addressing the social aspects of the green transition point to instances of public protest during the construction of certain hydropower facilities [96]. In this context, some authors argue that the EU's demands to increase the share of renewable energy, combined with the governance systems in Western Balkan countries, may have contributed to the construction of hydropower plants within national park zones in the Republic of Serbia [97]. A 2025 study indicates that the development of hydropower capacities has resulted in detrimental environmental impacts on forested regions in Bosnia and Herzegovina [98], which appears to conflict with the interests of the local population, although their perspectives were not explicitly assessed in the study.

### 3.3. Availability of critical raw materials and rare earth elements

The EU faces specific challenges due to disruptions in geopolitical

relations and the effort to diminish reliance on critical raw materials imports from the People's Republic of China, which supplied approximately 95 % of global demand for rare earth elements essential for both the clean energy transition and the defense industry [99].

Studies on the availability of rare earth elements and critical raw materials indicate their importance in Eastern and Southeastern European countries (including the countries of the Western Balkans) [100]. Post-2022, the EU is intensifying its endeavors to procure rare earth elements from alternative sources, with the Western Balkans region being of notable importance due to its resource abundance and geographical proximity. Currently, there is a dearth of substantial scientific research (a time-consuming process) on this subject. Nevertheless, certain conclusions and social considerations can be derived from the available information provided by official sources from the European Commission and the governments of the Western Balkan countries, as well as based on social and environmental concerns inherent to the region.

The region is in a paradoxical situation in that, on the one hand, it can serve as a source of critical raw materials and rare earth elements essential for the EU's clean transition. However, the exploitation of these minerals has ecological repercussions that could be regarded as a significant impediment to the Western Balkan countries' membership in the EU [101]. The deposits of critical raw materials (mainly uranium, lithium, and boron) and rare earth elements (laterite and bauxite) in the Western Balkans have garnered the attention of both EU officials and corporations. Consequently, the reopening of previously closed mines is regarded as a highly advantageous alternative for the extraction of zinc, barite, gold, copper, lead, and silver [102].

The potential exploitation of lithium in the region presents a unique social and ecological challenge that must be considered from social, ecological, and political perspectives [103]. Despite the discovery of substantial lithium and boron reserves in the Republic of Serbia, preliminary studies have suggested that environmental harm has already occurred following the implementation of exploration activities [104]. On numerous occasions [105], the public has expressed strong opposition to the announcement of lithium exploitation (primarily due to social and environmental concerns). The academic community has also expressed caution [106]. According to research conducted in 2023, the local populace is fiercely opposed to the exploitation of lithium and places a higher value on fertile soil, biodiversity, and the preservation of cultural heritage than on potential economic benefits [107]. However, in July 2024, a memorandum of understanding on mineral raw materials was signed in Belgrade as part of the Summit on Critical Raw Materials [108]. This document serves as the foundation for a strategic partnership in the areas of raw materials, electric vehicles, and battery value chains for the purposes of the clean transition of the EU [109]. The issue of lithium exploitation in the Republic of Serbia is still being considered due to its significance in the clean transition of the EU. As a key supplier of lithium for electric car batteries, Republic of Serbia is strategically important to the EU. The future of lithium exploitation in the Republic of Serbia is currently uncertain, as it is influenced by social and environmental considerations, as well as the expressed resistance of citizens (particularly the local community).

Given the considerations indicating the potential benefits of nuclear energy on decarbonization [110], it is important to note that the Republic of Serbia has substantial uranium reserves, estimated at 11.1 million tons [111], utilized to operate nuclear power plants in certain EU countries. Additionally, the demand for electricity is steadily increasing, which suggests that there is a reasonable expectation that the demand for uranium will increase. Research on the impact of nuclear energy on decarbonization generally indicates that it can be advantageous (as it reduces the consumption of fossil fuels) [112]. However, citizens' opposition to nuclear energy is evident because of security concerns.

The competent ministry indicated that nuclear energy could be one of the possibilities for realizing the clean transition of the Republic of

Serbia, despite the fact that the moratorium on nuclear energy, which had been in force since 1989, was lifted in December 2024 [113]. It was unclear whether nuclear plants would be built in the country or if Serbian mined uranium would be used for the EU clean transition. There are no academic studies that indicate the public attitude toward the aforementioned possibility in the Western Balkan countries.

#### 4. The impact of geopolitical factors on the Western Balkan energy sector

The Western Balkan countries' energy sector was directly impacted by the energy crisis that ensued after the Ukraine crisis and the subsequent sanctions imposed by the EU on the Russian Federation. This was not only a direct negative impact on the security and stability of energy supply in the Western Balkans but also impeded the further process of energy transition.

##### 4.1. Energy dependency as an indicator of vulnerability of the Western Balkans region

The EU has encountered considerable challenges in the aftermath of the crisis in Ukraine that began in 2022, with the sanctions imposed on energy imports from the Russian Federation ranking as some of the most impactful. The geographic positioning, transit routes, and the EU's expectations for candidate countries to align with its foreign policy place the Western Balkan countries in a relatively disadvantaged situation. Although the countries of the region are less dependent on imports compared to the average of the EU (Table 3), primarily because they have a significant share of coal and hydropower in the energy mix, the region is almost entirely dependent on imports of oil and gas. The unavailability of oil and natural gas reserves, as well as the insufficient development of the energy infrastructure (for example, only three countries have access to the gas pipeline network), and the lower level of economic development in the Western Balkan countries have made this part of Europe highly vulnerable to the energy crisis. Moreover, given that the living standards in the region are much below the EU average, the socio-economic status of its residents is considerably more vulnerable to the adverse effects of rising and fluctuating energy prices, as well as the effects of energy transition.

Unlike the EU, where Russian gas constituted 22 % of total natural gas imports in 2022 [115], the Russian Federation is the sole supplier of natural gas in the Western Balkans region. The Republic of Serbia is the largest consumer of natural gas in the region (accounting for 80 % of total imports), attributable to its greatest population and the most extensive gas pipeline infrastructure. Approximately 12 % of the oil and oil derivatives imported to the region originate directly from the Russian Federation [116].

Although the region has historically relied on oil and gas resources from the Russian Federation, Russian companies like Gazprom and Lukoil operate inside the gas and oil industry of the Republic of Serbia, North Macedonia, and Bosnia and Herzegovina. The Russian Federation has a large footprint in the Balkan energy sector since Russian state-controlled companies own critical gas transit, gas storage infrastructure, and key oil assets, including refineries, oil storage, distribution, and retail networks.

The Republic of Serbia is experiencing the most severe repercussions of the crisis among all the countries in the region due to the fact that the energy and gas sector is primarily owned by state-owned Russian companies. In particular, the Russian company Gazprom has a majority ownership (51 %) in the section of the gas pipeline connecting the Republic of Serbia to TurkStream and a majority ownership in the only gas storage facility in the Republic of Serbia (Banatski Dvor). Additionally, Gazpromneft is the majority owner of the NIS Company, which is the sole producer of crude oil and natural gas, the sole oil refiner, and the owner of the largest network of gasoline retail outlets.



**Table 3**  
Energy dependency and living standard in the Western Balkans region and EU-27 in 2022.

	Energy import dependency	Oil and petroleum products import dependency (%)	Gas import dependency (%)	GDP per capita at market prices (EUR)	Population, (million)
Albania	31.4	46.0	0	6230	2793
Bosnia and Herzegovina	26.2	99.9	99.9	na	3464
Kosovo*	32.2	100.0	0	na	1773
Montenegro	29.0	97.6	0	9600	0,617
North Macedonia	63.0	102.0	100	7230	1837
Serbia	44.9	85.0	100	9530	6697
EU-27	62.5	97.5	97.5	35,980	445,837

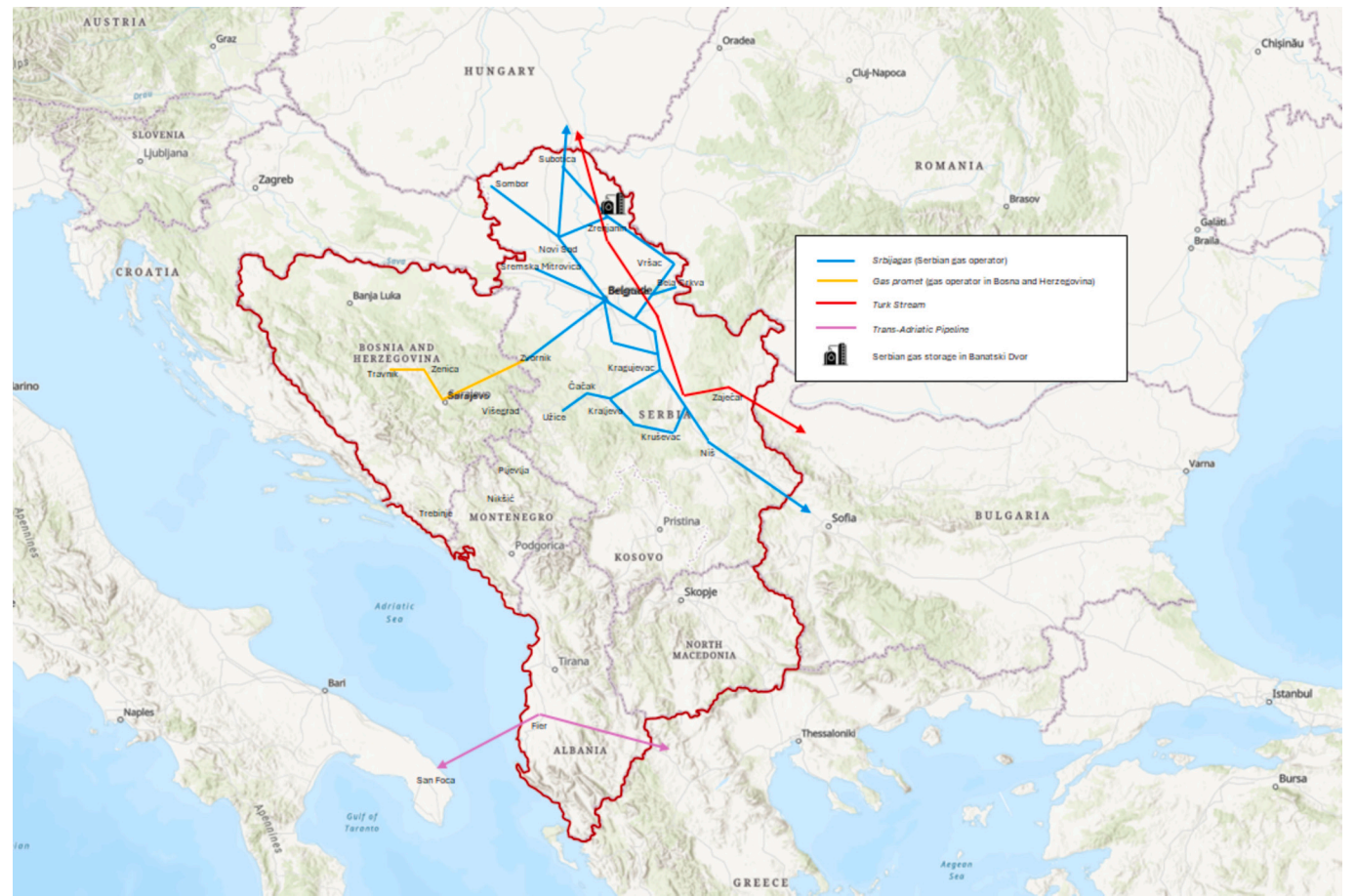
Source: [114].

4.2. Effects of geopolitical tensions on the gas sector

Gas consumption in the Western Balkans has not surpassed 4 billion cubic meters (with the Republic of Serbia consuming most of this amount), primarily for heating and combined heat and power (CHP) systems in major towns and a few industries in the Republic of Serbia, North Macedonia, and Bosnia and Herzegovina. The energy transition in the Western Balkans is “impossible” without an increase in gas consumption, according to representatives of the EU, who refer to gas as a “transition fuel”. Nevertheless, the region has historically relied on gas from the Russian Federation, which is, on the one hand, a legacy of the Yugoslav era and a consequence of the fact that relatively low gas consumption in the region did not entice gas suppliers from other countries to invest in the region's gas infrastructure.

The previous issues with supplying the region with Russian gas,

which were caused by transit problems in Ukraine, have been resolved with the construction of TurkStream, which was commissioned in 2021. However, the situation is further complicated by sanctions against Russian energy companies, which make the supply of Russian gas in the region uncertain. For the broader utilization of natural gas in the region, infrastructure development is imperative, as the gas network is most advanced in the Republic of Serbia, facilitating the supply to industrial consumers and approximately 340,000 households. In contrast, Bosnia and Herzegovina possesses merely a single branch of the gas pipeline, which serves only industrial consumers (Fig. 2). The gas pipeline in the Republic of Serbia that extends to TurkStream serves as an alternative to SouthStream, the construction of which was discontinued by the Russian Federation at the close of 2014 due to its failure to comply with EU regulations, which, among other stipulations, prohibit a single entity, in this instance the Russian Gazprom, from owning both the gas and the



**Fig. 2.** Natural gas infrastructure in the Western Balkans.  
(Source: Authors.)



pipeline. This gas pipeline is significant for the Republic of Serbia as it generates certain revenue, given that Serbia serves as a transit country for gas flowing through its territory to Hungary and other countries. (See Fig. 3.)

Alongside the TurkStream connection, a gas pipeline is being established in the region to connect Albania with the Adriatic Oil Pipeline running from Greece through Albania and the Adriatic Sea to Italy. It is the final section of the Southern Gas Corridor, originating in Azerbaijan. Albania, being solely a transit country without an operational gas network, utilizes all its consumption for extracting gas from the Adriatic Oil Pipeline to supply the compressor station near Fiera.

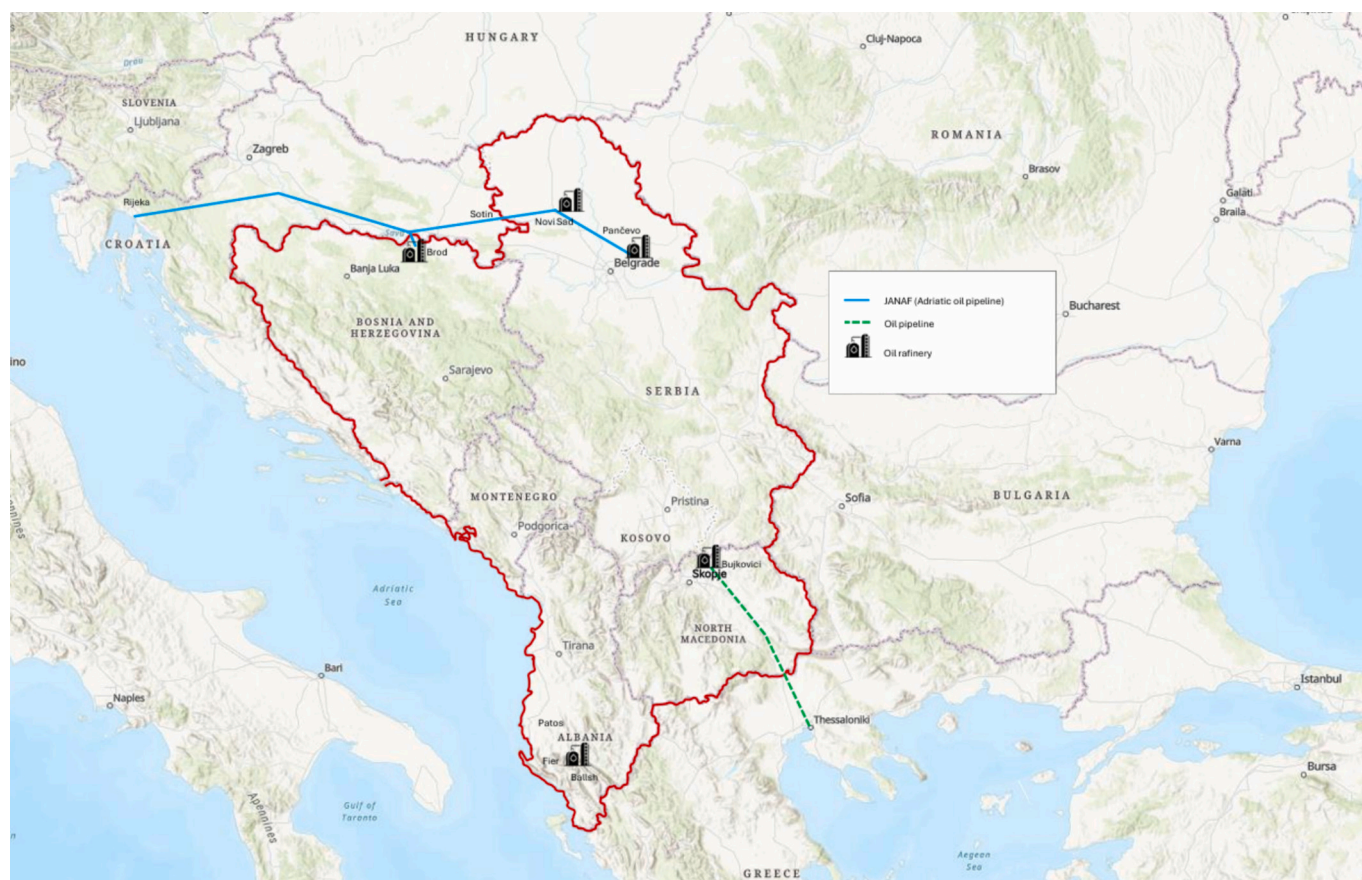
The Western Balkans region is not as dependent on natural gas for energy supply as the EU countries due to the insufficiently developed gas infrastructure. Prior to the onset of the conflict in Ukraine in 2022, the proportion of natural gas in the overall energy supply of the Western Balkans region was 8 %, whereas in the EU-27 it stood at 23.7 %. Eurostat data for 2022 [117] indicates that Serbia possesses the biggest proportion of gas in gross available energy at 14.1 %, followed by North Macedonia at 8.7 %, Bosnia and Herzegovina at 2.8 %, and Albania at 1.7 %, while the gas proportion is minimal in Montenegro and Kosovo\*.

Ukraine's recent resolution to halt the transit of Russian gas through its territory starting January 2025 will not have a direct impact on the Republic of Serbia and Bosnia and Herzegovina, as both countries commenced importing natural gas from the Russian Federation via TurkStream in 2021 (prior to this, the Republic of Serbia received gas from the Russian Federation through Ukraine and Hungary), while North Macedonia is supplied through Bulgarian and Serbian networks. TurkStream is designed to annually transport 31.5 billion cubic meters of gas from the Russian Federation, produced by the energy conglomerate Gazprom. Half of this amount (15.75 billion cubic meters) is

allocated for Turkey, while the remainder is designated for Bulgaria, the Republic of Serbia, and Hungary. Russian gas is delivered to the Republic of Serbia through the Balkan Stream, a segment of the joint Russian-Turkish TurkStream project, with the majority ownership of the gas pipeline section in the Republic of Serbia held by Russia's Gazprom.

The Republic of Serbia has been supplied with gas from the Russian Federation for decades, with approximately 92 % of the current supply originating from this country, while the remainder is obtained from other sources (Hungary, Switzerland, and Azerbaijan). Just prior to the onset of the Ukrainian conflict, the Republic of Serbia signed a three-year arrangement with the Russian Federation for the supply of 2.2 billion cubic meters of gas, at prices 100 % tied to oil prices (a mechanism designed to guarantee their relatively low level and stability in the face of uncertainty, dynamic change, and crisis). However, this arrangement is set to expire in March 2025 and a new one is expected to be signed soon, which should allow for larger quantities, given the growing demand for this energy source. To facilitate diversification in natural gas supply, the Republic of Serbia constructed a new gas interconnector from Bulgaria to the Republic of Serbia (with a total investment of 85.5 million euro, comprising a 49.6 million euro grant from the EU, a 25-million-euro loan from the European Investment Bank, and 10.9 million euro contributed by the Republic of Serbia). The interconnector commenced operations in December 2023. In the meantime, Serbia signed a natural gas supply contract with Azerbaijan, (400 million cubic meters of gas annually), which could meet just around 13 % of the Republic of Serbia's requirements. The newly established gas connection with Bulgaria enables the Republic of Serbia to obtain gas from countries not connected by existing pipelines, utilizing liquefied natural gas terminals in Greece and Turkey.

Conversely, North Macedonia is presently entirely reliant on the



**Fig. 3.** Oil infrastructure in the Western Balkans.  
(Source: Authors.)

import of natural gas from the Russian Federation. To diversify its gas supply, North Macedonia has signed an agreement with Bulgaria to enhance the technical capacity of the current gas pipeline, while the construction of the LNG terminal in Alexandroupolis, Greece, is expected to further support this initiative. Moreover, there are attempts to connect the gas network of Bosnia and Herzegovina with Croatia for delivery through LNG terminal on the island of Krk. This is in addition to the development of the Ionian-Adriatic gas pipeline (Albania, Montenegro, Croatia, and Bosnia and Herzegovina) connecting TAP to the port of Split (Croatia). Similarly, Turkey has harbored aspirations for decades to construct its own gas hub in Thrace (including five LNG terminals), which would facilitate the transportation of larger quantities of gas to Bulgaria (a contract between the two countries has already been signed) and to other countries in the region, as well as to Serbia and other South and East European countries [118].

Nevertheless, the region is required to make additional investments in the construction of new infrastructure to ensure the diversification of natural gas supply from other countries or the delivery of LNG (which is more expensive due to the liquefaction and regasification process). The question also arises regarding the cost-effectiveness of the approach to sustaining economic growth while reducing carbon emissions.

#### 4.3. Effects of geopolitical tensions on the oil sector of the Western Balkans

The Western Balkans region is almost entirely dependent on oil imports. Despite the presence of refineries in the region, their production capacities are restricted, resulting in the necessity of oil imports to satisfy the demand. At the same time, it is important to consider that the Republic of Serbia, Bosnia and Herzegovina, North Macedonia, and Kosovo\* are landlocked countries with poor inland waterways infrastructure. Consequently, imports are partially transported via the Adria Oil Pipeline (JANAF), a terminal in Albania (Porto Romano in Durrës and La Petrolifera Italo in Valona) and Montenegro (Bar), by road (wagons and tanks), and by river (the Danube river). The introduction of the sixth package of sanctions against the Russian Federation in May 2022, which includes a prohibition on the maritime transportation of Russian crude oil, has resulted in the substitution of Russian oil with alternative sources of supply. Moreover, there is a possibility for the direction of supply to be altered [119].

The Adria Oil Pipeline (JANAF), which is currently the sole operational oil pipeline in the region, is the region's primary source of oil supply. The Adria oil pipeline provides oil from Croatia (Omišalj Oil Terminal) and enables supply to Bosnia and Herzegovina (refinery in Bosanski Brod) and the Republic of Serbia (refineries in Novi Sad and Pančevo). The construction of the gas pipeline began in 1984, and the pipeline achieved full operational status by late 1989. However, due to wartime events in the former Yugoslavia, its functioning was suspended until 1995, when the northern branch became operational. The objective is to finalize the Thessaloniki-Skopje Crude Oil Pipeline (Fig. 2) by 2025, connecting the Hellenic Energy refineries in Thessaloniki with the OKTA refinery in Skopje, owned by Hellenic Energy. Due to the underdeveloped infrastructure, substantial volumes of oil derivatives are transported to the region by tankers, specifically road transport, and barges via the Danube.

Likewise, an agreement was reached between the Republic of Serbia (prior to the sanctions, the Republic of Serbia predominantly imported oil from Iraq 64 %, the Russian Federation 23 %, Kazakhstan 10 %, and Norway 3 %) and Hungary for the construction of a new 128 km oil pipeline, facilitating the Republic of Serbia's connection to the Druzhba oil pipeline and consequently the procurement of Russian oil. The Druzhba oil pipeline (owned by the Russian state company Transneft, which is subject to EU sanctions) is the longest (4000 km) and one of the largest oil pipelines globally, constructed by the Soviet Union in 1964. The pipeline originates in the Russian Federation and extends to Belarus, where it splits into two branches. One leg traverses Poland to Germany,

while the other leg conveys oil through Ukraine, with a portion reaching Slovakia and the Czech Republic and the remainder sent to Hungary and Croatia. Hungary, which imports 65 % of its oil reserves from the Russian Federation, is vehemently opposed to the sixth package of EU sanctions, including the prohibition on Russian oil imports. Other landlocked countries, like Slovakia and the Czech Republic, demanded an exemption as well. Based on the above, as part of the sanctions package implemented in May 2022, an agreement was reached to prohibit the import of Russian oil carried to the EU by sea, which constitutes two-thirds of overall imports from the Russian Federation. Hungary, Slovakia, and the Czech Republic continued to utilize the Druzhba pipeline, whilst Germany and Poland voluntarily ceased their purchases via the Druzhba pipeline, which resulted in a reduction of almost 90 % of Russia's oil supply to the EU.

The Republic of Serbia is exploring the possibility of constructing an additional oil pipeline traversing North Macedonia to Durrës, Albania. The pipeline route would extend from the refinery in Pančevo to Niš, subsequently reaching the hub in Skopje (North Macedonia), from where a link would be established to the port of Durrës in Albania. The section from Skopje to the Port of Durrës, approximately 300 km long, would incur a cost of 195 million euro, but the current section measuring 210 km may be utilized to access the port in Thessaloniki, Greece. In this way, the current oil pipeline from Durrës to Thessaloniki in Greece would be utilized. According to the statement from the competent Serbian ministry, the pipeline would span 400 km from Pančevo to Skopje, with an estimated cost of approximately 260 million euro. The construction of two oil pipelines, one to Hungary and the other to Albania, would establish the Republic of Serbia as a transit route for delivering crude oil to Central European countries.

The sanctions have the most significant impact on the Russian Federation in the oil sector of the Republic of Serbia. This effect is due to the fact that the Russian Federation is the majority owner of the oil industry in the Republic of Serbia. According to the 2007 energy agreement with the Russian Federation, the Republic of Serbia sold 50 % of the shares of the Oil Industry of Serbia (NIS) to the Russian Gazpromneft for EUR 450 million, while Gazprom received 6.15 % ownership. The controlling stake of 56.15 % of NIS shares is held by the Russian corporation Gazprom, with the state of Serbia owning 29.87 % and small shareholders holding the remaining shares. Serbia lost control over the management of NIS due to the privatization of the company, which is the sole producer of crude oil and natural gas, the sole oil refiner, and the owner of the largest network of gasoline retail outlets in the Republic of Serbia. Additionally, Serbia lost control over one of the largest budget providers, as the calculated liabilities based on taxes and other public revenues in 2023 amounted to approximately EUR 2 billion [120].

In addition to EU sanctions on oil deliveries, Russian-owned energy companies have also come under sanctions. As a result, on January 10, 2025, the United States announced comprehensive sanctions—joined by several European countries—against more than 400 companies that were owned or controlled by, or that acted or purported to act on behalf of, Gazprom Neft, either directly or indirectly [121]. NIS is also included in the list of companies that will be directly subject to sanctions. NIS is required to implement an ownership transformation by February 25, 2025, which will result in the complete removal of Russian ownership in the NIS company. Failure to do so will result in a complete blockade, which directly jeopardizes the Republic of Serbia's oil supply. In view of the importance of NIS to the Serbian economy and the energy supply to the population, the sanctions were postponed for a period of 60 days at the end of April 2025. In Republika Srpska (one of the entities in Bosnia and Herzegovina), two main oil refineries (Brod and Modriča) were sold in 2007 to the company NeftGazInkor, in which a part of the ownership is held by the Russian state company “Zarubnježneft”. Both refineries were directly affected by the sanctions, as they imported Russian crude oil almost exclusively before the sanctions were enforced.

## 5. Just transition of the Western Balkans region—recommendations

Considering the aforementioned critical issues, it is imperative to establish a novel concept of energy policy that will enable a just energy transition for the Western Balkans region, focusing on the regional level. This concept should examine and enhance the mechanisms of socio-economic support for the entire region, particularly for: 1) regions that will be directly affected by the rise in unemployment and decline in income resulting from the shutdown of coal mines, thermal power plants, and other associated industrial sectors affected by regulatory measures; and 2) regions that are directly affected by the repercussions of the energy crisis and geopolitical tensions, which have been accompanied by various measures—including sanctions, the blocking of companies with Russian ownership, the implementation of the Carbon Border Adjustment Mechanism (CBAM), and the latest protectionist policies. Taken together, these measures have a disproportionately large impact on the small, open economies of the Western Balkans, whose economic structures are characterized by a high share of energy-intensive industries and a lack of sufficient resources to develop mechanisms that would mitigate the effects of decarbonization. In this regard, it is suggested that the Western Balkans region be regarded as a regional energy market with distinct characteristics that constrain its capacity to fulfill previously assumed decarbonization obligations. However, further assistance is necessary to meet the supplementary requirements set by the EU, the energy crisis, and sanctions. In the same vein, the EU's experience in establishing the Just Transition Mechanism and Fund should be applied; however, it is important to recognize the distinct challenge of conveying the just transition to less developed countries in a manner that is pertinent to their circumstances [122,123].

It is evident that no single methodology exists for defining a just transition to decarbonization [124]; however, the literature presents various perspectives, including just transition as a governance strategy, a labor-oriented concept, an element of the conventional justice system, and a social and technological transition [125]. While some studies indicate that the application of Just Transition frameworks should consider the role of government, financial institutions, and civil society frameworks for Just Transition policies [126], other studies indicate that a just transition requires an integrated set of policies and effective management at multiple levels, proactive planning, and implementation of mechanisms that enable distributional, recognition, and procedural aspects of the concept of a just transition [127]. To provide the most effective “transitional assistance policies” and strategies, it is necessary to determine who is likely to be adversely affected by the low-carbon transition and in what ways [128].

This paper posits that the energy crisis that resulted from the conflict in Ukraine has had a profound impact on the Western Balkans region, further complicating the necessary decarbonization process. Moreover, the feasibility of planning and implementing the decarbonization process—still in its early stages—on the principles of equity and social acceptability is called into question, particularly with regard to ensuring citizen participation throughout the process. Consequently, the commitment of all countries in the region to European integration must also be taken into account. It is therefore imperative to evaluate all potential causes and support mechanisms in order to ensure that the transition of this region is equitable, rather than the collateral damage of the EU's extravagant objectives [129].

First and foremost, it is necessary to strengthen citizens' trust in authorities at all levels. While the majority of citizens acknowledge the importance of environmental protection, the methods by which related activities are implemented are often questionable and, in some cases, provoke strong public resistance. Therefore, it is essential to address the issue of a broader governance process, which lacks sufficient transparency and fails to ensure citizen participation in decision-making related to energy policy, changes in the energy sector, investment in renewable energy sources, and the exploitation of mineral resources. All

activities resulting from the above have a direct impact on the social position of citizens. Their responses, often expressed through protests, reflect public sentiment and contribute to political and social instability. This, in turn, places additional strain on the countries of the region, which are already burdened by a complex historical legacy. It is far more advisable for policymakers and decision-makers to implement mechanisms that ensure the timely and accurate dissemination of information to all citizens—particularly those who will be most affected by the anticipated changes, especially when these changes concern the protection of life essentials (clean water, air, and land) and the right to work.

The strategies employed by authorities to communicate and engage with citizens must be strengthened. The erosion of public confidence in media institutions, combined with limited access to credible information and the proliferation of misinformation from unverified sources, plays a critical role in shaping a socially detrimental environment marked by deepening polarization and escalating societal tensions. Such societal polarization is undoubtedly a highly detrimental phenomenon, as both governments and citizens should approach the decarbonization process as a shared pathway toward a common goal: a healthy living environment for current and future generations. Therefore, a new communication platform must be established—one grounded in a positive information culture, timeliness, accuracy, a culture of dialogue, and the citizens' right to ask questions and receive answers within the public media space.

Citizens, for their part, should act proactively and take advantage of all available avenues for participating in public life, from political engagement to education. Given the complexity of the transition the region must undergo, it is advisable to introduce education on both decarbonization and democratic decision-making from an early age. Only in this way can new generations grow up fully informed about these processes, enabling the planning and implementation of the clean transition to become institutionalized and transparent—thereby reducing the likelihood of violent reactions and decision-making under pressure.

In this context, certain regional specificities must be taken into account. First of all, a large portion of the territory consists of rural areas, which are often sparsely populated but rich in natural resources. These areas are frequently the sites—actual or planned—of mineral extraction activities essential for clean energy technologies. Despite unfavorable migratory trends, rural populations have maintained strong ties to their land for generations and should not be perceived as an obstacle but rather as key partners in the decarbonization process. Their rights must not be violated, and their voice must be heard and respected. Often, decarbonization activities have been politicized and carried out without meaningful cooperation with the local population, resulting in negative perceptions within local communities—attitudes that have subsequently influenced national discourse. It is therefore crucial that local populations are properly informed and that best-practice examples demonstrate how decarbonization efforts can serve as a driving force for the sustainable development of the communities in which they are implemented.

The unfavorable social status of a significant portion of the population, which is further exacerbated by high levels of migration, creates a special challenge in the context of planning and problem-solving. The combination of these factors has led to a demographic structure that is primarily populated by elderly individuals. This demographic is generally not actively engaged and, as a result, is unable to serve as a significant driver of the decarbonization process. However, it is particularly susceptible to its negative effects. At the same time, the majority of older citizens are members of households that are classified as vulnerable consumers, as well as socially disadvantaged families and individuals, people with disabilities, and the unemployed. The measures currently in place are insufficient to effectively address the issue of energy poverty. The aforementioned categories of citizens should be provided with grants to support the improvement of building insulation and



the installation of solar panels in their homes. At this point, it is important to emphasize that the energy efficiency of buildings and houses in the region remains low, resulting in high energy losses. However, many citizens are unable to afford the cost of insulation. Because such efforts are conducted inconsistently and without broad coverage, they have failed to produce meaningful results. A strong state-led initiative and the reallocation of budgetary resources in this area should not be viewed as an expense, but rather as a long-term investment in reducing energy consumption.

The future poses a distinct challenge, with two factors regarded as critical for the success of the decarbonization process: the high rate of youth migration and the persistent influence of major powers. Due to large-scale emigration, the region is rapidly losing its young and educated population, thereby placing itself at serious risk of becoming merely a source of low-value, minimally processed raw materials for the benefit of other economies. Secondly, the interests of great powers have historically converged in the Western Balkans, placing considerable pressure on the governments of its smaller economies—often resulting in public discontent over specific decisions. Anticipating that the interests of the major powers in the region will not be present is unrealistic. Therefore, the most feasible—if not the only—solution lies in enhancing regional cooperation and establishing a cohesive platform among Western Balkan countries, aimed at formulating a unified stance and coordinated strategy, particularly in areas where individual national efforts fail to produce meaningful results. This undoubtedly includes the decarbonization of the entire region, which shares a common geographical space, interconnected energy infrastructure, and abundant natural resources—while citizens across the region face similar challenges. The issue of exploiting critical raw materials and rare earth elements is particularly sensitive, having provoked strong public backlash from the outset. The EU's demands regarding resources mentioned are clear; however, the governments of the countries in the region must adopt a common position on this issue to establish a stronger negotiating stance—one that can lead to an outcome acceptable to all stakeholders.

## 6. Conclusion

A stable energy supply is one of the primary concerns the European continent must address, as the repercussions of post-2022 geopolitical events will be felt in all aspects of society and the economy. The Western Balkan countries, owing to their commitment to membership in the EU and based on the ratified Energy Community Treaty, are obligated to align their energy and climate policies and to harmonize national legislation with European directives, which will result in significant socio-economic ramifications. Moreover, the Western Balkans' level of economic convergence in terms of GDP per capita in purchasing power standards is between 30 % and 50 % of the EU average and is not progressing fast enough. In addition, the transition to a low-carbon economy is further complicated by the altered geopolitical conditions. Consequently, the region requires a new energy policy that will account for the new circumstances, and ensure a consistent supply of energy at reasonable prices while being grounded in the concept of equity.

The planning, financing, and execution of both of these requirements are intricate, but the repercussions of the related decisions will be felt for generations to come. The entangled interests of key powers make it difficult to address urgent issues currently. For decades, the region has been reliant on the cost-effective energy products from Russia, which has led to a Russian footprint. In contrast, the EU mandates strict decarbonization, while the United States seeks to completely eliminate Russian presence by enforcing sanctions. Furthermore, the People's Republic of China stands as the greatest individual investor in the region. The small economies of the Western Balkans face objective challenges in reconciling their current energy policy with the aforementioned facts. Consequently, the definition of a new and just energy policy must be customized to the unique specificities of the region.

The region is heavily dependent on coal due to the availability of domestic reserves, which has a detrimental impact on carbon and energy intensity indicators. Thermal power plants are the primary source of electricity generation, with renewable energy sources contributing insufficiently. Investments in the construction of new electric power capacities and the modernization of the existing electric power infrastructure are urgently required due to the fact that they are obsolete and fail to accommodate increasing consumption. Moreover, investment in the oil and gas sector is essential due to the underdeveloped infrastructure network, and the geopolitical context necessitates supply diversification, which is hindered by lacking infrastructure.

To ensure a feasible and equitable transition, it is imperative to examine all facets of the intricate interplay of geopolitical interests and adopt a targeted approach for countries and regions that, due to their specificities (such as lower economic development, high reliance on coal in their energy mix, and underdeveloped infrastructure), are more susceptible to the adverse impacts of decarbonization and concurrently highly vulnerable to energy crises.

The new energy policy of the regional countries must effectively address two key specificities that could be of interest to enhance economic momentum. Firstly, the countries of the region possess a geostrategic position that renders them an appropriate land route for providing the EU with energy products not sourced from the Russian Federation. The establishment of new infrastructure projects (oil pipelines, gas pipelines, and warehouses) across the territory of this region signifies a substantial growth possibility; nonetheless, it is undoubtedly affected by major powers with their own frequently conflicting objectives. Secondly, the region faces a paradox: it possesses reserves of rare minerals essential for decarbonization, yet the potential extraction of these minerals poses environmental risks that may significantly hinder the Western Balkan countries' accession to the EU.

## CRedit authorship contribution statement

**Mirjana Radovanović:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Formal analysis, Conceptualization. **Sanja Filipović:** Writing – review & editing, Writing – original draft, Supervision, Investigation, Formal analysis. **Goran Šimić:** Visualization, Supervision, Methodology.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Data availability

Data will be made available on request.

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