

Renewables  
Readiness  
Assessment

# BOSNIA AND HERZEGOVINA



SEPTEMBER 2023

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## About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity. [www.irena.org](http://www.irena.org)

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# ABBREVIATIONS

<b>AIB</b>	Association of Issuing Bodies	<b>kW</b>	kilowatt
<b>BAM</b>	convertible mark	<b>kWh</b>	kilowatt hour
<b>BiH</b>	Bosnia and Herzegovina	<b>kWh/m<sup>2</sup></b>	kilowatt hours per meter squared
<b>BLSE</b>	Banja Luka Stock Exchange	<b>LCOE</b>	levelised cost of electricity
<b>BMZ</b>	German Federal Ministry for Economic Cooperation and Development	<b>LEAP</b>	Low Emissions Analysis Platform
<b>CBA</b>	currency board arrangement	<b>m/s</b>	meters per second
<b>CBAM</b>	Carbon Border Adjustment Mechanism	<b>MFI</b>	microfinance institution
<b>CBBiH</b>	Central Bank of BiH	<b>MOFTER</b>	Ministry of Foreign Trade and Economic Relations of BiH
<b>CESEC</b>	Central and South Eastern Europe Energy Connectivity	<b>Mt</b>	million tonnes
<b>CIP</b>	Climate Investment Platform	<b>Mtoe</b>	million tonnes of oil equivalent
<b>CO<sub>2</sub></b>	carbon dioxide	<b>MW</b>	megawatt
<b>CO<sub>2</sub>-eq</b>	carbon dioxide equivalent	<b>MW<sub>e</sub></b>	megawatt electrical
<b>COVID</b>	coronavirus	<b>MW<sub>th</sub></b>	megawatt thermal
<b>DAC</b>	Development Assistance Committee	<b>NDC</b>	Nationally Determined Contribution
<b>DCA</b>	Development Credit Authority	<b>NECP</b>	National Energy and Climate Plan
<b>DFI</b>	development finance institution	<b>NOSBiH</b>	Independent System Operator in BiH
<b>DHC</b>	district heating and cooling	<b>NREAP</b>	National Renewable Energy Action Plan
<b>EBRD</b>	European Bank for Reconstruction and Development	<b>ODA</b>	official development assistance
<b>EIB</b>	European Investment Bank	<b>OIEiEK</b>	Operator for Renewable Energy Sources and Efficient Cogeneration in the Federation
<b>ENTSO-E</b>	European Network of Transmission System Operators for Electricity	<b>OSP MH EPS</b>	Operator of system for renewable energy sources and efficient co-generation in Republika Srpska
<b>EP BiH</b>	JP Elektroprivreda BiH d.d.	<b>OSS</b>	one-stop shop
<b>EP ERS</b>	Mješoviti Holding Elektroprivreda Republike Srpske a.d.	<b>PID</b>	project information document
<b>EP HZHB</b>	Elektroprivreda Hrvatske Zajednice Herceg Bosne d.d.	<b>PJ</b>	petajoules
<b>ESAP 2030+</b>	Environmental Strategy and Action Plan	<b>PPA</b>	power purchase agreement
<b>ESIA</b>	environmental and social impact assessment	<b>PPP</b>	public-private partnership
<b>EU</b>	European Union	<b>PV</b>	photovoltaic
<b>EU ETS</b>	European Union Emissions Trading System	<b>PVGIS</b>	Photovoltaic Geographical Information System
<b>EV</b>	electric vehicle	<b>RCC</b>	Regional Cooperation Council
<b>FBiH</b>	Federation of Bosnia and Herzegovina	<b>REEP</b>	Regional Energy Efficiency Programme
<b>FERK</b>	Regulatory Commission for Energy in the Federation of BiH	<b>RERS</b>	Regulatory Commission for Energy of Republika Srpska
<b>GCF</b>	Green Climate Fund	<b>RS</b>	Republika Srpska
<b>GDP</b>	gross domestic product	<b>S&amp;P</b>	Standard & Poor's
<b>GEFF</b>	Green Economy Financing Facility	<b>SASE</b>	Sarajevo Stock Exchange
<b>GGF</b>	Green for Growth Fund	<b>SEE</b>	Southeast Europe
<b>GHG</b>	greenhouse gas	<b>SERC</b>	State Electricity Regulatory Commission
<b>GO</b>	Guarantee of Origin	<b>SIDA</b>	Swedish International Development Cooperation Agency
<b>GW</b>	gigawatt	<b>SMEs</b>	small and medium-sized enterprises
<b>GWh</b>	gigawatt hour	<b>TFEC</b>	total final energy consumption
<b>HPP</b>	hydro power plant	<b>TPES</b>	total primary energy supply
<b>HUX</b>	Hungarian power exchange	<b>TPP</b>	thermal power plant
<b>HV</b>	high voltage	<b>TSO</b>	transmission system operator
<b>IFC</b>	International Finance Corporation	<b>TWh</b>	terawatt hours
<b>IFI</b>	international financial institution	<b>TYNDP</b>	Ten-Year Network Development Plan
<b>IMF</b>	International Monetary Fund	<b>UNDP</b>	United Nations Development Programme
<b>IPA</b>	Instrument for Pre-Accession Assistance	<b>UNFCCC</b>	United Framework Convention on Climate Change
<b>IPP</b>	independent power producer	<b>USAID</b>	United States Agency for International Development
<b>IRBRS</b>	Republika Srpska Investment-Development Bank	<b>VAT</b>	value-added tax
<b>IRENA</b>	International Renewable Energy Agency	<b>WBIF</b>	Western Balkans Investment Framework
<b>ISO</b>	independent system operator	<b>WeBSEFF</b>	Western Balkans Sustainable Energy Financing Facility
<b>ktoe</b>	kilotonne of oil equivalent	<b>WPP</b>	wind power plant
<b>kV</b>	kilovolt		

# EXECUTIVE SUMMARY



Bosnia and Herzegovina (BiH) is taking steps to improve the country's long-term resilience, to support its economic diversification and competitiveness, and to secure its energy supply and sovereignty by harvesting its natural renewable resources.

Despite being in a situation of security of supply and energy independence, and maintaining a net electricity exporter position, BiH bears the heavy cost of air pollution and health impacts due to the combustion of fossil fuels and wood. The residential sector largely relies on local wood biomass for heating. The coal sector employs thousands of workers and is a major economic activity in several regions.

Already, BiH has made international commitments to address climate and health impacts in the energy sector. Drivers to the energy transition have emerged with the progressive integration of the European Union *acquis communautaire*. The Sofia Declaration on the Green Agenda for the Western Balkans is a strong message for the region, as it reconfirmed the determination to pursue and accelerate the accession process and contribute to the carbon neutrality goal introduced by the European Green Deal.

Compliance with the European legislation will imply drastic changes, e.g. the removal of subsidies for the power sector,<sup>1</sup> the adoption of cost-reflective prices, the progressive adoption of carbon prices and the requirements to preserve the environment. If not managed ahead of time, with planning, the changes could turn into cost to the economy, through loss of purchasing power for households, reduced competitiveness for energy-intensive industries and a shift to a net importer position.

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<sup>1</sup> According to the Energy Community Secretariat, the country paid direct subsidies worth some EUR 22.7 million to support coal-fired power generation in 2019.





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The upcoming National Energy and Climate Plan (NECP) will set a clear path for the reduction of carbon emissions in the energy sector up to 2030. Through the adoption of the NECP, BiH should seek to improve the country's long-term resilience, to support its economic diversification and competitiveness, and to secure its energy supply and sovereignty by harvesting its natural renewable resources. Due to its ageing coal generation fleet, with large coal capacities scheduled to be decommissioned, the country requires significant investments in generation capacity. It should also be recognised that the economy is facing brain drain, and possibilities for growth and innovation are critical at this juncture.

The country has significant renewable energy potential, featuring high hydropower, biomass, wind and solar resources, as well as unconfirmed geothermal resources. Variable renewable energy resources (wind and solar) are currently underdeveloped but considering their consistently low costs – still decreasing despite rising material and equipment costs globally – these sources could provide a solid option for the delivery of stable power prices and a diversification away from unsustainable coal.

The transition to a decarbonised energy mix should also be accompanied by the transition of the coal mining sector. The sector employs thousands of miners and the economic impact of the current downsizing of the coal sector may impact entire communities.

Consistent with the Energy Community acquis, BiH has already started an in-depth review of its regulatory and policy frameworks. Developed by the International Renewable Energy Agency (IRENA) upon request and in close co-operation with the Ministry of Foreign Trade and Economic Relations (MoFTER) and through extensive consultation, this Renewable Readiness Assessment (RRA) complements the current activities and proposes a set of focused recommendations regarding the regulatory, policy and financial framework that can accelerate the ongoing energy transition in BiH.

### **Improving regulatory performance, learning from the past reform period**

Although the country has made significant efforts to adapt and implement the necessary regulatory and legislative changes committed through the Energy Community acquis, previous regulatory reforms have shown limited outcomes regarding the opening of the electricity market and the adoption of variable renewables. The variable regulatory performance is related to the complexity of the regulatory framework as well as the time and capacities needed by the market actors to absorb and implement new legislation.

The effective implementation of the NECP will depend on developing renewable energy projects without administrative delays. Legislative developments<sup>2</sup> should emphasise simplification of the laws with fewer, more targeted support measures for renewable energy.

Specific attention should be paid to streamlining the administrative procedures for obtaining the necessary authorisation to build, operate, produce and sell. There, the concept of a 'one-stop shop' for renewable energy projects might be explored as a long-term goal to streamline administrative burdens. In this regard, IRENA sees as added value the progress made by the Republic Srpska, where by adoption of new legislation the procedures have been significantly simplified and reduced in the previous period.

Monitoring of the regulatory performance should be enforced by the regulators, based on performance indicators, which should lead to recommendations for legal improvements. Co-ordination among entities to achieve a uniform application of the support schemes at entity level would also be recommended in order to ensure consistency between investments in each entity.

Given the complexity of the regulatory frameworks and policies, capacity reinforcement is needed at all levels of governance, in order to ensure that the laws are duly implemented, and that interpretations do not lead to market distortions.

### **Developing an integrated strategy for planning and investment in the energy sector**

The upcoming NECP is an opportunity to create a predictable pathway for the transition of the power sector towards its sustainability, through setting up targets, incentives and measures for the transformation. Its adoption is strongly recommended as early as 2023.

Setting up coherent plans and targets by 2030 which are in line with the Paris Agreement goals, and the country's Nationally Determined Contribution (NDC), and the long-term strategies by 2050 will bring investors certainty and predictability in their implementation. In this view, the long-term energy planning for renewable energy targets should adopt an integrated approach, which moves from long-term through short-term planning steps, and establishes clear, internally consistent feedback loops within techno-economic assessments.

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<sup>2</sup> During the final production phase of the present report a new package of legislation regulating renewable energies was adopted by both Republika Srpska and the Federation of Bosnia and Herzegovina. The new legislation benefitted from direct inputs provided via the workshops and related discussions conducted during the RRA process, including some of the recommendations contained herein.

The generation and transmission plans should be updated to reflect aspirations/targets approved in NECP. These will then help create the solid and bankable project pipeline for BiH, which will need to be deployed according to a phased plan. In order to stimulate the market, the capacities to be allocated under each support scheme, and implementation timelines, should be specified per technology, and transparently communicated through rolling plans, forming an overall NECP implementation plan.

The co-ordination framework organised to deliver the NECP has been a key co-ordination mechanism for the energy sector for the last couple of years. The current NECP co-ordination framework should be institutionalised in order to ensure robust co-ordination and monitoring mechanisms, for instance by setting up a permanent energy planning team/office that can also be responsible for co-ordinating with different entities and ministries, with its own capacity to develop and model medium- to long-term capacity expansion within BiH. This also allows the team to focus on regular updates and quality assurance for such activities, keeping up with market developments, technology and cost trends, and political changes, and ensuring the alignment with the international climate commitments.

### **Aligning climate ambitions in the NDC and draft NECP**

As BiH continues to develop its upcoming NECP, there's a unique opportunity to ensure alignment with the Paris Agreement, the European Union's climate objectives and the Sofia Declaration on the Green Agenda for the Western Balkans. This alignment is key to harmonising the country's climate strategies and targets, and positions BiH as a strong partner in global climate efforts. As a member of the Energy Community, BiH's NECP holds the potential to reflect the ambition of the European Union, which ambitiously targets climate neutrality by 2050. This high level of commitment can also be mirrored in all energy and climate plans at the national level, ensuring a consistent approach.

The IRENA comparative assessment of BiH's upcoming NECP and the latest NDC submission provides encouraging insights. While the NECP outlines a higher level of ambition, this can be seen as an opportunity rather than a challenge. With a greater share of renewable energy in terms of installed capacity and electricity generation, BiH is in a strong position to increase the ambition of renewable energy integration in the power sector for the subsequent NDC update, harmonising it with the more ambitious targets of the NECP currently under development.

The current NECP model and targets, therefore, provide an excellent blueprint for the upcoming NDC updates. Moreover, the creation of methodological documentation to accompany the NECP and the next NDC update can significantly enhance the model assessments and alignments, while simplifying future revisions to the respective plans. This valuable resource should outline the overall methodological approach, data sources and assumptions, and explain the process of target creation.

The establishment of an NECP co-ordination framework is a positive step that can be extended to the next update of the NDC. By doing so, it will ensure a smoother and more efficient approval process for the NDC, while aligning it with the NECP document. Furthermore, this creates the potential for synergies between the reporting documents for the Energy Community and United Nations Framework Convention on Climate Change (UNFCCC), further simplifying and enhancing the process. This commitment to consistent and comprehensive processes will ensure BiH's strong progress towards its ambitious energy and climate goals.

### Identifying project capacities and locations to support a solid pipeline of projects

With the upcoming NECP, the regulatory frameworks should evolve, with the opportunity to conduct auctions<sup>3</sup> for large renewable energy capacities and redefined rules for smaller capacities.

Auction systems are complex to operate, and responsibilities of the different stakeholders (e.g. auctioneer, offtaker, bidders, developers, institutions) should be set in detail. The capacities of the regulators and single-buyer entities should allow them to carry effective and transparent auction mechanisms, and additional resources might be required to design and conduct the new auction schemes.

An auction pipeline should be built and transparently announced ahead of time and supported by an alignment between the national and the entity level. The auction schemes should be accompanied by robust enabling regulatory framework and the mobilisation of adequate financing instruments and volumes. Good practice in this direction is what Republika Srpska did with adoption of new legislation. However, long-term certainty and predictability regarding the upcoming auctioned volumes need to be communicated to investors. Areas should be assigned for renewable energy projects and referenced in spatial plans. Also, considering the long lead times involved in infrastructure development, infrastructure investments should be urgently initiated to enable the delivery of renewable energy projects along the NECP. Qualification requirements could include socio-economic benefits, such as recourse to local manufacturing and workforce.

It is important to establish a winner selection process which outlines the procedures for bidding, minimum competition requirements, selection criteria, clearing mechanism, marginal bids and payment to the auction winner. Clear rules should be established for the seller's liabilities to ensure high implementation rates of the awarded projects and timely implementation. These rules should be transparent and easily understood by all participants in the process.

The auction implementation strategy would require a dedicated task force, which should look into critical elements for investors, such as the capacities of the organisation(s) which would be in charge to develop the auction demand and select the auction scheme, to define the qualification requirements, to establish the criteria and process for the winner selection process, and to set the seller's liabilities.

### Reforming the retail electricity market and empowering consumers

The operationalisation of the free choice of supplier should be carried out to allow the emergence of end customers and retailers willing to source power exclusively from renewable energy sources. The competitiveness of renewable energy should rely on the implementation of Guarantees of Origin and market-based retail pricing. The transition towards market-based retail pricing can create a level playing field for renewable energy, which is increasingly cost-competitive. At the same time, it is important that the price reform is accompanied by mitigation measures to protect vulnerable consumers and small and medium-sized enterprises.

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<sup>3</sup> All action-related recommendations were discussed throughout the RRA process and development of this report, which supported the latest legislative developments in Bosnia and Herzegovina. Most of them are already adopted as part of the renewable energy laws in Republika Srpska in FBiH, as well as in draft entity bylaws on auctions for electricity from renewable energy sources.

Building on current experiments on smart metering, active customers should, among other things, be entitled to self-generate electricity and to participate in energy efficiency schemes and flexibility schemes. Through defining renewable self-consumers, active customers should also be enabled to act individually or aggregated, as well as through renewable energy communities.

In parallel, the unbundling of distribution system operators should be enforced to allow for the efficient management, transparent and non-discriminatory access of the distribution networks. It is acknowledged that the operation of the distribution system operators would be impacted by the emergence of the prosumer market, evolving towards “smart grids”.

### **Operating a transnational wholesale power market that incentivises efficient investments**

BiH lacks an operating competitive market. The current regulatory framework lacks transparency regarding the costing methodologies on the generation side. A revisited regulatory context enabling a more effective integration of variable renewable energy sources would call for larger balancing areas, which would harvest the statistical complementarity between wind and solar and lower the “intermittency” of variable renewables. Potentially, some joint efforts could be made regarding the development of balancing capacities at national level, in order to seek for optimisation of storage at system level, rather than through individual balancing areas.

The emergence of a regional wholesale market, such as under the discussions initiated by the Western Balkan 6 initiative, should be pursued to increase competition on the power supply segment and increase generation efficiency. More specifically, to support the uptake of renewable energy and lowering greenhouse gas emissions, a transnational wholesale market could be established, which would be beneficial to the integration of large shares of renewable energy, particularly variable sources, *i.e.* as this would allow to aggregate complementary generation means, with demand patterns over larger areas.

### **Integrating the socio-economic aspects of the energy transition and renewables deployment**

An economic assessment considering the adoption of the carbon price impact, and how carbon price revenues can be reinvested in the energy transition, is fundamental to scaling the efforts in support of the energy transition. Special attention should be paid to the social implications on employment, energy prices, impact on industry, and energy poverty and vulnerability. The coal regions in transition should be an integral part of the discussion.

In the short term, the targeted skills, entrepreneurial capabilities and industrial capacities required to implement the NECP should be assessed, with the objective to leverage local competences and engage local industries to create renewable energy value chains. An industrial policy would need to be based on an assessment of which parts of the value chain can be localised. A green industrial strategy, and an education and skills development strategy, should support the NECP. It should elaborate strategies to transfer the current skills into other sectors, including renewable energy projects.

The development of renewable energy training and educational programmes and the integration of climate and energy issues in the educational curriculum should be considered, with the long-term view to move towards a green economy – low carbon, resource efficient, socially inclusive.

To gather support from citizens for the energy transition, the benefits of renewable energy and energy efficiency measures should be visible to them, examples including building renovation programmes and district heating improvements. Also, public awareness should be raised regarding the social benefits of the energy transition, environmental aspects and empowerment of consumers.

### **Promoting renewable energy in buildings**

There is a need to improve the sustainability governance on forestry management through dedicated regulations on the sustainability of biomass and forest, as well as promote voluntary certificates for sustainable forest management, to avoid negative impacts on environmental and social aspects.

By developing municipal policies and actions, the dependency on wood should be mitigated to modern, efficient heating technologies, such as waste- and residue-based bioenergy for residential heating, heat pumps, solar thermal systems, and district heating and cooling networks.

Energy efficiency measures can improve the cost-effectiveness of heating and cooling technologies, such as building envelopes. Building codes (at national or city level) should include higher efficiency requirements.

However, measures should be in place to address energy poverty of the economically weaker sections of the population when promoting renewable energy options and high-efficient appliances.

### **Developing renewable energy in transport**

Targets should be set on the renewable share in the transport sector and each subsector, including road transport and aviation, with the support of electric vehicles (EVs) and advanced biofuels. These targets may also include needed EV charging infrastructures and sustainability requirements on biofuel supply chains. The impact of EVs should be considered in electricity demand projections and grid planning.

EVs can be promoted through purchase subsidies, tax rebates or exemptions, fuel economy standards, and vehicle credit schemes. EV charging infrastructures can be supported by introducing mandatory EV charger installation to parking lots in new buildings and building refurbishment, and combining EV charging with solar photovoltaic would be encouraged through financial incentives and demonstration projects.

To minimise impact to the grid, adoption of peak-valley electricity tariffs would encourage EV charging at valley time period. New business models should be developed to utilise the potential of EVs as prosumers and improve the flexibility of the power system.

### **Developing a strong financial framework supporting renewable energy projects**

In general, renewable energy projects in BiH are financed either from developers' own funds or through loan financing provided by local banks or international financial institutions (IFIs). Local banks or IFIs provide financing to "risk-free" projects, while looking at two key elements, historical project performance and collateral.

Support measures need to be implemented to support the project preparation phase and reduce development risks. To lower project transaction costs, feasibility studies, environmental impact assessments, resource measurements, etc., should be supported and facilitated. In addition, a suite of standardised project agreement templates can provide certainty to investors about the project operation timeline and conditions. Standard contracts that have proven their bankability reduce the length of negotiations and the risk that banks will object to the wording.

BiH also needs to improve the financial framework for supporting renewable energy projects. An array of possibilities is described in this report, such as: creating fiscal charge exemptions; establishing a guarantee fund; creating dedicated credit lines for renewable energy projects; fundraising; subsidising locally manufactured equipment to enhance development of domestic production capacities; or encouraging blended finance structures.

There is a need in BiH to cut red tape and facilitate the obtaining of consents and permits for renewable energy projects. A guide on developing renewable energy projects should be updated continuously to provide all information about the project preparation process including required documentation and permissions.

Although a single-buyer system would be in place, supported by funds collected on consumer bills, risk mitigation instruments could enhance the creditworthiness of the offtaker in order to protect developers and investors and mitigate unforeseen risks – such as foreign exchange risk. If BiH could provide such cover, the risk perception would improve, and the risk premium would decrease significantly.

Once the renewable energy projects are operational, there may be discrepancies between the due dates for payment of loan instalments and the collection of receivables for the energy sold, creating a risk of insolvency. For these cases, dedicated credit lines for liquidity financing should be created and possibly implemented through entity development banks.

To support the deployment of such financial instruments, innovative financing mechanisms could be considered.

Carbon allowances under the European Union Emissions Trading System (EU ETS) and emissions reduction certificates that can be sold in a transparent way could generate additional revenue. Research by IRENA has shown that this can help to attract investments, provided that the income is assured over a long period.

Considering the successful introduction of bonds and other securities by BiH and the low interest rates that were achieved, BiH can consider issuing sovereign “green bonds” that are dedicated to renewable energy infrastructure and certified by international reviewers. Many asset managers are trying to improve their “green” portfolio. The advantage of such structure is that it can also attract domestic savings and reduce international indebtedness.

Different parties issue guarantees of origin for energy in BiH. A key recommendation is to ensure membership of entity renewable energy operators in international associations for guarantees of origin trade.

# 1 COUNTRY OVERVIEW

Bosnia and Herzegovina (BiH) is a country located on the Balkan Peninsula in southeastern Europe. It consists of two entities: the Federation of Bosnia and Herzegovina (FBiH) and Republika Srpska (RS), and Brčko District of Bosnia and Herzegovina as a separate administrative unit (Figure 1). The FBiH is further divided into ten cantons, each of which is divided into municipalities, resulting in a total of 79 municipalities in the FBiH. The RS has 63 municipalities.

The capital of BiH is Sarajevo, with a population of 696 000, followed by Banja Luka, the largest city of RS with a population of 221 000. Other major cities include Zenica, located in the Zenica-Doboj canton of the FBiH, with a population of 164 000; Tuzla, the administrative centre of the Tuzla canton of the FBiH with a population of 142 000; and Mostar, the administrative centre of the Herzegovina-Neretva canton of the FBiH with a population of 104 000.

In 2016, BiH began its European Union (EU) accession process and currently holds EU candidate status as of December 2022.

**Figure 1** Administrative map of BiH



**Source:** (ontheworldmap.com, 2021).

**Disclaimer:** This map is provided for illustration purposes only. Boundaries and names shown on this map do not imply the expression of any opinion on the part of IRENA concerning the status of any region, country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries.



## Population distribution, urban versus rural population/growth in urban population

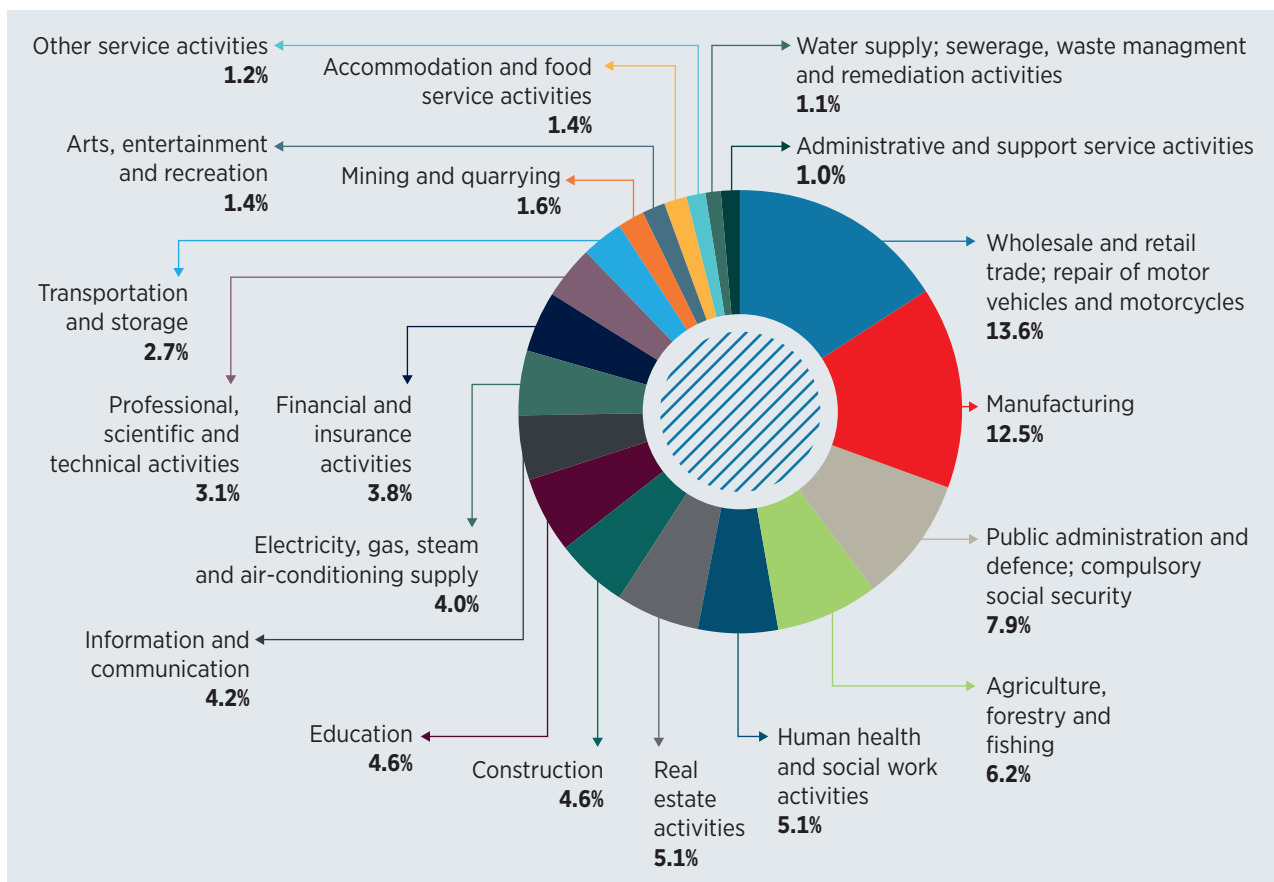
The total population has continuously decreased for the last 30 years, with a current total of 3.2 million inhabitants, down from 4.4 million in 1990. The country has been affected by a strong emigration of skilled workers for years, reflected in the high share of remittances in the gross domestic product (GDP) (9.6% of the GDP in 2020) (World Bank, 2022), with significant socio-economic implications.

The share of urban population has been increasing, from 47.2% in 2015 to 49% in 2020, but it remains well below the European Union average, where 75% of the population lives in urban areas.

## Economy

According to the International Monetary Fund (IMF) (2021), after a 2015-19 period of growth at an average of 3.2% per year, the GDP contracted by 5.5% in 2020 due to the COVID-19 pandemic, to reach USD 19.4 billion in 2020. The GDP per capita (GDP purchasing power parity [PPP] at constant price) was USD 5 912 in 2020. For 2020, the service sector represented 55.7% of the GDP, followed by industry (23.9%) and agriculture (6.2%). The economy is diversified, the main sectors contributing to the GDP for 2020 being wholesale and retail trade (13.6%), followed by manufacturing (12.5%), public administration (7.9%) and agriculture (6.22%) (Figure 2).

**Figure 2** Contribution to GDP by sector for 2020, at current prices



Source: (Statistics Agency of Bosnia and Herzegovina, 2021).

The country is structurally at deficit, with a current account balance negative at -2.1% of GDP in 2021 (Table 1), projected to reach -3.9% in 2023.<sup>4</sup> The current account imbalance is due to a structural dependency on imports of goods and services, despite the positive balance for travel, as part of the service sector, according to the Central Bank of Bosnia and Herzegovina (CBBiH, 2021b).

**Table 1** Current account balance - extract for period 2015-2021

	2015	2016	2017	2018	2019	2020	2021
Current account balance (USD million)	(827)	(805.2)	(876)	(660)	(563.7)	(749.1)	(484.8)
Current account balance as % of GDP	(5.1)	(4.8)	(4.8)	(3.3)	(2.8)	(3.8)	(2.1)
Trade balance (USD million)	(4 071.1)	(4 009.7)	(4 273.7)	(4 537.7)	(4 558.9)	(3 654.5)	(4 351)
Trade balance as % of GDP	(25.1)	(23.7)	(23.6)	(22.5)	(22.6)	(18.4)	(19.1)

Source: (Central Bank of BiH, 2021b)

The largest import partners are (by decreasing value, for 2019) Germany, Italy, Serbia, Croatia and the People's Republic of China (hereafter, "China"). The main export destinations are Germany, Croatia, Serbia, Italy, Austria and Slovenia.

For the goods sector, BiH in 2020 and 2021 imported primarily machinery and electrical equipment; base metals (iron and steel; aluminium); mineral products (e.g. cement); chemical products (primarily pharmaceutical products in the midst of the COVID pandemic); and vehicles. It exported primarily base metals (iron and aluminium mainly, which rely on energy-intensive industries as will be mentioned in the end-user sector section); machinery and electrical equipment; and furniture.

## Employment

The service sector represented 50.3% of the total employment in 2019, followed by industry (31.7%) and agriculture (18%). Those ratios have remained stable over the last decade, after a decrease in employment in the agricultural sector in the period 2000-10 (World Bank Data, 2022).

Unemployment significantly decreased between 2015 and 2020, from 27.7% of the labour force in 2015 to 15.9% in 2020. Unemployment strikes independently of the level of education (advanced 13.3%, intermediate 16.6%, basic 15%), and is slightly higher for female workers (18.8% in 2020), than for male (13.7% in 2020) (World Bank Data, 2022).

As a matter of comparison, unemployment (as % of the labour force) for 2020 in the European Union stood at 7.1%, and 7.8% for Europe and Central Asia (excluding high income) (World Bank Data, 2022). Bridging the gaps between these employment figures will require additional economic growth opportunities to be seized.

<sup>4</sup> World Economic Outlook database available at: [www.imf.org/en/Publications/WEO/weo-database/2021/April](http://www.imf.org/en/Publications/WEO/weo-database/2021/April).

### Human Development Index (HDI)

For 2020, BiH ranks 73 in the Human Development Index, and is in the category “High Human Development”. The life expectancy is 77.4 years. Expected duration of schooling is 13.8 years.

The notion of “human capital” is important in the context of the socio-economic aspects of the energy transition. Education and training will be vital for building the sizeable human resource capacity, required for achieving energy transition goals and for empowering future professionals and workers. The ability for the country to successfully transition would in part depend on the level of education of the workforce.



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## 2 ENERGY CONTEXT

### 2.1 REGIONAL ENERGY CONTEXT

Southeast Europe (SEE)<sup>5</sup> is a diverse and heterogeneous co-operation area, with significant differences particularly between European Union (EU) member states and the Energy Community's Contracting Parties.

The energy sector in SEE is predominantly fossil fuel-based. There are important differences between the countries, and electricity generation is provided mainly by lignite and hydropower in non-EU countries (IRENA, 2019b). In the region, the total primary energy supply (TPES) is mainly supplied by solid and liquid fossil fuels (28.3% solid and 27.3% liquid in 2017), followed by natural gas (19.7%). Bioenergy (wood) represents 10.5% of the TPES, due to the large forested area (IRENA, 2019b). Nuclear represents 8.5% of the TPES (IRENA, 2019b).

Electricity is primarily supplied by solid fossil fuels (coal) (43.3% of the total electricity production in 2017), followed by hydropower (22%), nuclear (15.6%) and natural gas (10.4%). Solar energy and wind energy are still marginal, at 1.7% (photovoltaic [PV]) and 4.9% (wind energy) of the power production. Some countries in the region are progressively integrating more variable renewables (solar PV, primarily in Bulgaria and Romania; onshore wind, primarily in Bulgaria, Romania and Croatia). Overall, the SEE region, with some variations among the countries, is facing a set of common challenges:

- **Unsustainable biomass use causing deforestation and indoor air pollution:** The largest share of energy consumptions is in the residential sector, with 32% of the total final energy consumption (TFEC). The main energy source in the residential sector is biomass, mostly using inefficient cooking and heating appliances. Many households still rely on traditional cooking solutions in the region, which is linked to deforestation when resources are harvested unsustainably, as well as indoor air pollution, with significant health risks.
- **Reliance on coal:** Electricity is primarily supplied by solid fossil fuels (coal) (43.3% of the total production in 2017). SEE has large reserves of lignite, estimated at 4.6% of the world's total reserves. The largest reserves are located in Serbia (7 112 million tonnes [Mt]), Bosnia and Herzegovina (BiH) (2 264 Mt), and Bulgaria (2 174 Mt). Consequently, the coal sector is a large contributor to the economy and the employment sector, with entire regions relying on coal activity for their subsistence. However, the combustion of coal is responsible for the majority of carbon dioxide (CO<sub>2</sub>) emissions in the region, and a significant source of local air pollution. The progressive phase-out of coal, an inevitable process based on climate, environmental and economic considerations, creates a complex set of challenges impacting a variety of stakeholders in the region.

<sup>5</sup> This section builds on IRENA (2019b). It is focused on southeast Europe, covering EU SEE – Bulgaria, Croatia, Romania and Slovenia and Contracting Parties of the Energy Community: non-EU SEE – Albania, Bosnia and Herzegovina, Kosovo\*, Montenegro, North Macedonia, the Republic of Moldova, and Serbia.

\* Throughout this publication, this designation is without prejudice to positions on status and in line with the United Nations Security Council Resolution 1244 (1999).

- **A need to invest in the short term and replace the ageing fossil generation fleet:** Most of the largest power plants in the region are ageing. An estimated 12% of the generation capacity (7.7 gigawatts [GW]) is older than 50 years. The average coal- and oil-fired plants were 41 years old in 2018 (IRENA, 2019b). Investments should therefore be engaged to replace the ageing generation fleet, and current investment decisions will strongly influence the energy mix for the next four to five decades.
- **Potential impact of subsidy removal and emerging carbon market on consumer prices and industrial competitiveness:** In the region, electricity prices for households and industrial consumers are lower than the European average (IRENA, 2019b), in particular due to the recourse to regulated prices combined with direct and indirect subsidies. Should the subsidies be removed, the electricity prices for households would increase by 18% to 36% depending on each country's situation (Miljević, Mumović and Kopač, 2019). This can also have a significant impact on the competitiveness of energy-intensive industries such as steel and cement.

In addition to the removal of subsidies, the implementation of the Carbon Border Adjustment Mechanism (CBAM) by the European Union might have a direct impact on the competitiveness of the fossil-based generation facilities, as well as carbon-intensive industries in non-EU SEE. This perspective should be considered in planning for future investments in generation capacity.

In an earlier publication for the SEE region, and before the current energy crisis emerged, the International Renewable Energy Agency (IRENA) indicated onshore wind could undercut the levelised cost of electricity (LCOE) of fossil fuels by 2025, and solar PV and hydropower can already be generated at competitive levels in SEE (IRENA, 2019b).

The removal of subsidies and the internalisation of the carbon prices, could contribute to creating a level playing field with renewable energy sources, which might eventually be brought to grid parity due to drastically reduced costs over the last decade.

## 2.2 THE ENERGY COMMUNITY

As a Contracting Party of the Energy Community,<sup>5</sup> BiH has committed to implementing EU energy legislation, also known as the *acquis communautaire*, which covers a wide range of areas including electricity, gas, oil, infrastructure, renewable energy, energy efficiency, competition and state aid, environment, statistics, climate, and cybersecurity. The Energy Community *acquis* is constantly updated to align with EU law, and Contracting Parties regularly report on progress in harmonising their legislation with EU directives and regulations, as well as on joint projects (IRENA, 2019b).

<sup>5</sup> The Energy Community was founded by a treaty signed in Athens in October 2005 and has been in force since July 2006. Albania, BiH, Georgia, Kosovo\*, Montenegro, North Macedonia, the Republic of Moldova, Serbia and Ukraine are Contracting Parties of the EnC. The Energy Community extends the EU internal energy market to its neighbouring countries. The principal objectives of the Energy Community are to create a regulatory and market framework which is capable of attracting investments for a stable and continuous energy supply (Energy Community, 2020a).

\* Throughout this publication, this designation is without prejudice to positions on status and in line with the United Nations Security Council Resolution 1244 (1999).

This implies that the Contracting Parties should conduct the necessary regulatory reforms to comply with current reforms ongoing within the European Union. At the moment, while some of the Contracting Parties are undergoing adoption of the Third Energy Package, the adapted Clean Energy Package is being progressively incorporated into the Energy Community acquis.

In the short term, concerning renewable energy deployment, additional significant reforms will be carried out, with the ongoing implementation of the Clean Energy Package,<sup>7</sup> part of the Energy Community acquis, to be transposed in local legislation by 2022 and 2023, and reach full implementation by 2024. Of particular relevance to the country's renewable energy readiness are:

- transposition of the Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action (hereafter referred as “the Governance Regulation”), with a transposition by 31 December 2022.
- transposition of the Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources (hereafter referred as “the Renewable Energy Directive”), with a transposition by 31 December 2022.
- transposition of the Directive (EU) 2019/944 on common rules for the internal market for electricity (hereafter referred as “the Electricity Directive”), with transposition by 31 December 2023.

The National Energy and Climate Plan (NECP) for BiH, which is currently in development, will be the backbone of the country's climate and energy strategy for the years to come, setting out the greenhouse gas (GHG) reduction and targets in different energy union dimensions. According to Article 9 of the Governance Regulation, the first draft NECP should be submitted to Energy Community Secretariat at the latest by June 2023<sup>8</sup> and a final draft by June 2024.<sup>9</sup>

In December 2022, the Energy Community Ministerial Council, presided over by Ukraine, adopted ambitious 2030 targets to reduce primary and final energy consumption, increase the use of renewables, and achieve climate neutrality by 2050. Additionally, a new electricity package was adopted that will allow for the full integration of Energy Community Contracting Parties into the European market and support the integration of renewables while phasing out coal. The ministers also discussed measures to address the impacts of price surges and ensure energy supply security.

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<sup>7</sup> Adopted by the Energy Community Ministerial Council in November 2021.

<sup>8</sup> Governance Regulation Article 9. Bosnia and Herzegovina submitted its draft NECP to the Secretariat on 30<sup>th</sup> June 2023.

<sup>9</sup> Governance Regulation Article 9.

## 2.3 REGIONAL POWER MARKET

The European Network of Transmission System Operators for Electricity (ENTSO-E) released the 2021 version of the Regional Investment Plan (“the Plan” in this section) (ENTSO-E, 2021), which supports the Ten-Year Network Development Plan (TYNDP) (ENTSO-E, 2020).

ENTSO-E defines the Continental South East Region (“the region” in this section), which includes the transmission system operators (TSOs) of Albania (AL), BiH (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), Greece (GR), Hungary (HU), Italy (IT), North Macedonia (MK), Montenegro (ME), Romania (RO), Serbia (RS) and Slovenia (SI).

In this area, the grid interconnections and transfer capacities between countries is limited, which ENTSO-E identifies as a limiting factor for market integration in the region. The region is currently experiencing massive integration of renewable energy resources, and considerations to decommission conventional thermal generation would additionally create a need to commission new generation projects.

The Regional Plan also calls for stronger interconnections with the European Union and Turkey, while foreseen extensions to Cyprus, Israel, the Republic of Moldova and Ukraine might require reinforcing internal transmission corridors.

In any scenario addressed by ENTSO-E,<sup>10</sup> the decarbonisation of the electricity supply in the region should increase the recourse to non-hydropower renewable sources (29%-32% wind; 10%-12% solar; with wind reaching up to 45% in 2040) (Figure 3). Those sources have a higher level of variability and would require higher frequency balancing. At low penetration levels of these sources, as is currently the case, the balancing would be performed at national level. However, for more ambitious penetration levels of variable renewables, balancing would involve higher frequency regional trade (day-ahead, hourly) – which would build on solid infrastructures and efficient regulatory frameworks for power trading.

According to ENTSO-E, these trends can already be established (ENTSO-E, 2021). The plan notes that the share of thermal plants in the region’s power mix decreased by 13% over the 2010-18 period, which was compensated by renewable sources (non-hydro), the other sources (nuclear, hydro) remaining stable over the period. In parallel, the energy flows in the region are becoming increasingly variable. The plan foresees the increase in the share of variable renewables as a driving factor for variability, as countries would have to balance demand and supply on shorter time frames than currently, which requires a backbone infrastructure. For the time being, two major corridors can be distinguished – North-South<sup>11</sup> and East-West – the latter including BiH.<sup>12</sup>

<sup>10</sup> The “National Trends” scenario is based on current NECPs and EU climate targets and is compliant with the EU 2030 Climate and Energy Framework (32% renewables, 32.5% energy efficiency) and European Commission 2050 Long-Term Strategy – and 85% to 90% CO<sub>2</sub> reduction compared with 1990 levels. The “Global Ambition (GA)” scenario is in line with the 1.5°C target of the Paris Agreement and foresees a full decarbonisation of the power sector in 2040. The “Distributed Energy (DE)” scenario involves prosumers.

<sup>11</sup> Hungary, Serbia, Albania, North Macedonia and Greece.

<sup>12</sup> Romania, Bulgaria, Serbia, Croatia, BiH, Slovenia, Montenegro, Italy.

## RENEWABLES READINESS ASSESSMENT

Within the region, ENTSO-E notes that the power exchange trends did not change significantly between 2010 and 2018.<sup>13</sup> As illustrated in Figure 4, some countries are traditionally net exporters, *i.e.* BiH, Bulgaria and Romania being the largest, with links to larger demand centres. Large importers (Greece, Hungary and Italy) are supplied by regional power flows, *e.g.* in Figure 4, BiH to Croatia (BA-HR), Croatia to Slovenia (HR-SI), Slovenia to Italy (SI-IT).

In any circumstances, the diversification of the power supply mix and electricity trade are important drivers to account for in the design of renewable energy policies within the region.

**Figure 3** ENTSO-E scenarios underlying the Regional Investment Plan 2020 for the Continental Southeast Region



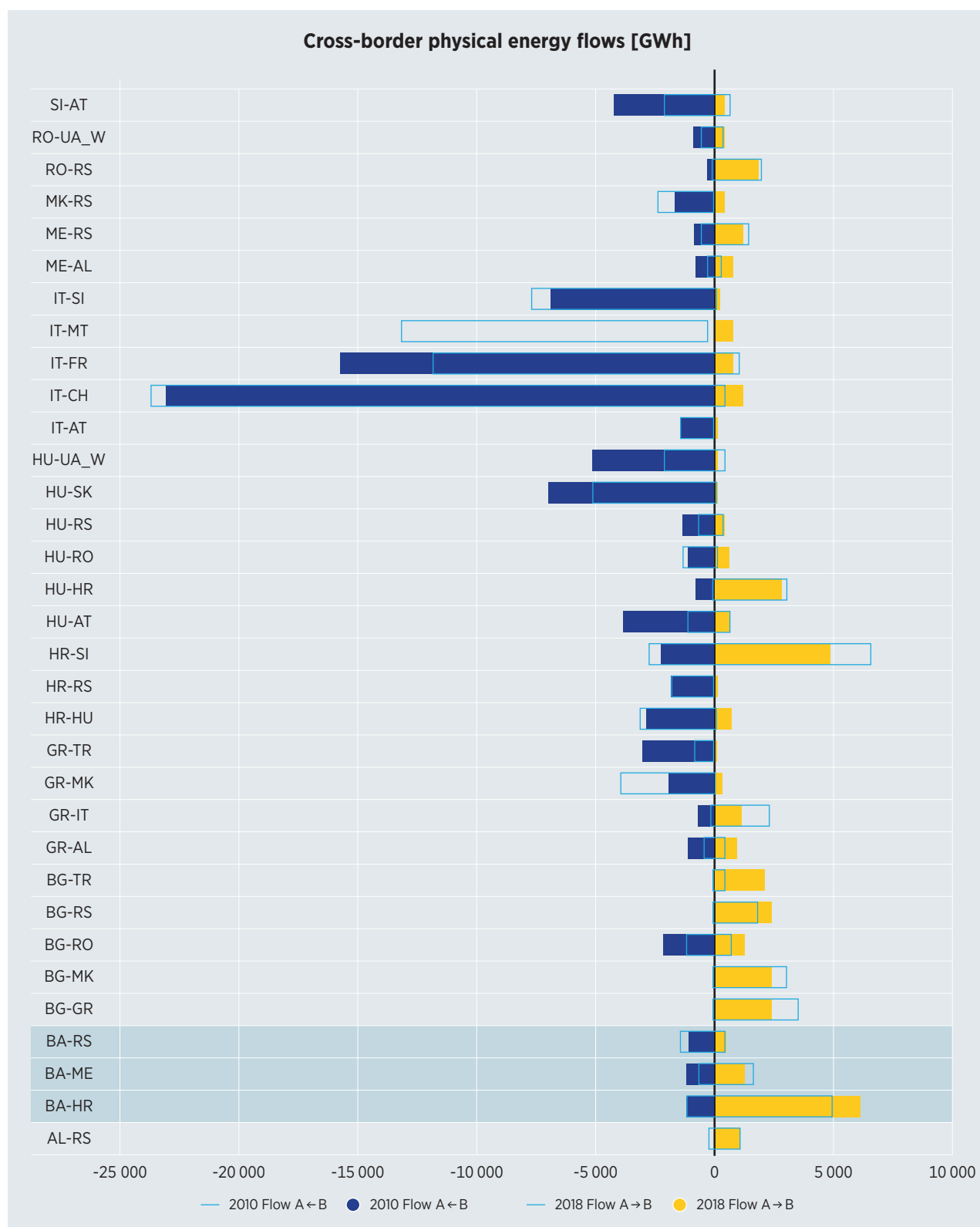
Source: (ENTSO-E, 2021).

Note: RES = renewable energy source; RES-E = renewable energy sources based-electricity.

<sup>13</sup> Except Croatia/Slovenia where the flows decreased.



**Figure 4** Cross-border energy flows (GWh) in the CSE Region in 2010 and 2018.



Source: (ENTSO-E, 2021).

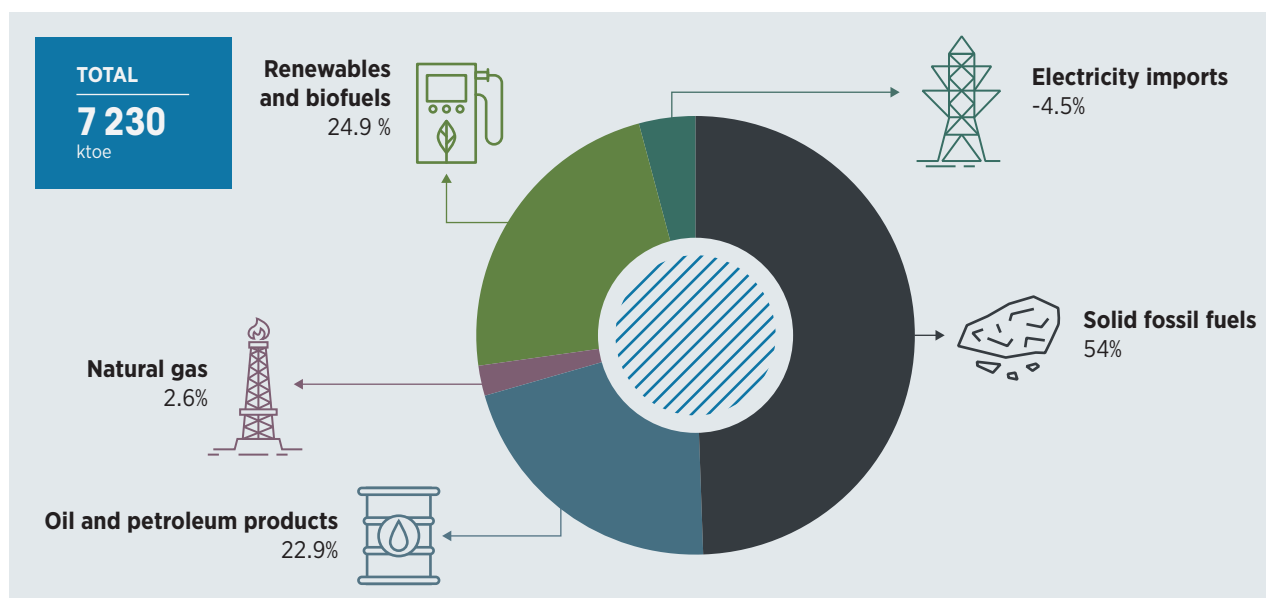
Notes: GWh = gigawatt hours. Country codes: Albania (AL), BiH (BA), Bulgaria (BG), Croatia (HR), Cyprus (CY), France (FR), Greece (GR), Hungary (HU), Italy (IT), North Macedonia (MK), Montenegro (ME), Romania (RO), Serbia (RS), Slovenia (SI), Switzerland (CH), Ukraine West (UA\_W).

## 2.4 ENERGY SUPPLY AND DEMAND IN BIH (ENERGY BALANCE)

The National Renewable Energy Action Plan (NREAP) (BiH, 2016) established a target share of energy from renewable resources in gross final energy consumption of 40% by 2020. For 2019, this share was estimated to be 37.58% (Eurostat, 2021a).

Looking in more detail into energy balances, Figure 5 presents the primary energy supply of BiH (7 230 kilotonnes of oil equivalent [ktoe] of gross available energy in 2019) (Eurostat, 2021b). The primary energy source is solid fossil fuels (locally extracted lignite primarily) (54%), followed by oil (22.9%) and renewables and biofuels (24.9%), distributed as 17.4% of primary solid biomass (wood essentially), 7.26% hydropower and minor contributions of wind, solar and biogas (0.3%, 0.04% and 0.02% respectively). The balance also features electricity export (-4.5%).

**Figure 5** Total primary energy supply of BiH



Source: (Eurostat, 2021b)

The TFEC amounts to 4 193 ktoe. The contribution of each subsector is presented Table 2. The largest consumer is the residential sector, with 40% of the TFEC, followed by the transport sector (31.5%), the industrial sector (20%), and commerce and public services (9.7%). Agriculture represents less than 1% of the TFEC. The end-use sectors are presented in more detail in the next section.

The TFEC (Table 3) is primarily supplied by imported oil products (35.5%), followed by renewables (wood biomass) (28.2%) and electricity (hydropower, coal) (22.5%). As mentioned earlier, electricity (3 752 ktoe) is primarily supplied from locally sourced lignite (82.5%) and hydropower (14%) (Eurostat, 2021b). The diversification of the electricity mix is limited: natural gas represents 1.2% of the production, followed by biofuels, and variable renewables represent only 0.4% of the production.

## Energy for the residential sector

The residential sector is the largest consumption sector, representing 40% of the TFEC (Table 2). This energy is primarily supplied from biofuels and waste (64%) (forest wood primarily for heating and cooking) and electricity (24.1%) (Table 3). Pfeiffer *et al.* (2019) notes the energy balances may largely underestimate the household biomass consumption, due to the use of unregistered biomass, and the fact that the consumption is self-declared. Pfeiffer *et al.* quantified the level of potential uncertainty, which could represent an additional 56% on top of the current estimates.<sup>14</sup>

Most of the biomass consumed by the household sector is used for heating and food preparation (53.5% of the households using biomass), heating only (24.9% of the households using biomass) and a combination of heating/hot water and food preparation (12.3% of the households using biomass) (Glavonjić *et al.*, 2017).

The heating sector is not highly diversified. According to Glavonjić *et al.* (2017) the majority of households (74% of the households) use solid fuels such as firewood (70.3% of the biomass use) and firewood/coal mix (23.2% of the biomass use). Other fuels include logging residues, residues from sawmills, wood briquettes, wood pellets, and combinations of solid and other fuels. Only 11% of the households were connected to the district heat system, 9% used electricity for heating, 5% used gas and 1% used heating oil in 2015.

## Energy for transport

Transport represents 31.55% of the TFEC,<sup>15</sup> and that is almost fully road transport (Table 2). Road transport is supplied from oil products (99.4% of the demand), and 0.2% is supplied from natural gas (Table 3). Rail transport is electrified and represents 0.11% of the demand for the transport sector.

The NREAP included a 10% renewable energy target for the transport sector by 2020. Currently, this share is estimated at 0.4% by the Energy Community Secretariat. Transport electrification has started appearing in the country, despite the absence of regulation for the sector. According to interviews, at the moment there are few charging stations for electric vehicles, which were implemented and are delivering power for free.

## Energy for industry

Industry represents 17.6% of the TFEC<sup>16</sup> (Table 2), of which the main contributor is the production of iron and steel (5%), followed by non-ferrous metals (4.1%), and the extraction of non-metallic minerals (1.8%). Electricity supplies 43% of the industry demand, followed by oil (35.7%), manufactured gases (16.5%), coal (12.3%) and natural gas (10.4%) (Table 3).

<sup>14</sup> Biomass types and use are described in the section "Biomass potential".

<sup>15</sup> For 2014, GHG emission's relative shares per sector amounted to 64% for energy generation, 12% for transport, 9% for industrial processes, 9% for agriculture, 4% for waste, and 2% for fugitive fuel emissions (NDC, 2021).

<sup>16</sup> For 2014, GHG emission's relative shares per sector amounted to 64% for energy generation, 12% for transport, 9% for industrial processes, 9% for agriculture, 4% for waste, and 2% for fugitive fuel emissions (NDC, 2021).

The industry sector represents nearly one-fifth of the TFEC. Its competitiveness, as quantified by exports (Chapter 1 of this report) relies mainly on low power prices achieved from subsidised coal and hydropower, and on imported oil, carrying unpredictable variability.

The removal of subsidies and the internalisation of the carbon prices to the power prices might increase the operation costs for the emissions-intensive industries. In addition, these industries would themselves incur additional fees on their own emissions, which might eventually create a level playing field with the EU countries where the goods are exported, thus would require investing in improving the efficiency of industrial processes.

### **Energy for the commerce and public services sector**

The commerce and public services sector represent 9.77% of the TFEC (Table 2). The energy is mainly supplied by electricity (51.9%), renewables (wood) (19.9%), and coal (10.3%) (Table 3).

The sector has large opportunities for increased efficiency in the buildings sector, including public and service sector buildings (UNDP, 2022). In this area, energy efficiency can help reduce energy intensity in the sector and save emissions from wood and coal combustion and the recourse to carbon-intensive electricity. Since 2013, the Green Economic Development project has been striving to implement energy management systems at all levels of development, improving energy efficiency in public buildings and public lightning. Recently, the European Bank for Reconstruction and Development (EBRD) and the European Union initiated a programme to improve energy efficiency in public buildings, financing efficiency measures in 20 public buildings in Republika Srpska, among them 16 schools and 3 hospitals (EBRD, 2022).

### **Energy for agriculture and forestry**

Agriculture represented 6.8% of the gross domestic product (GDP) in 2020. It represented less than 1% of the final energy consumed, which is supplied from oil products (87.3%) and electricity (12.7%).

Agriculture is a modest share of the economy. Electricity price changes may have a more limited impact on this sector than other sectors of the economy, from an energy standpoint this sector being more vulnerable to oscillations in oil prices.



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**Table 2** Total final energy consumption per source, per subsector

	Total	Solid fossil fuels	Manufactured gases	Oil and petroleum products	Natural gas	Renewables and biofuels	Heat	Electricity	Fossil energy	Bioenergy
<b>Final energy consumption</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
<b>Industry sector</b>	<b>17.6%</b>	<b>47.7%</b>	<b>100.0%</b>	<b>7.6%</b>	<b>54.6%</b>	<b>1.5%</b>	<b>0.5%</b>	<b>33.6%</b>	<b>22.8%</b>	<b>1.5%</b>
Iron & steel	5.1%	0.0%	100.0%	0.0%	14.1%	-	-	7.7%	7.1%	0.0%
Chemical & petrochemical	0.4%	0.0%	-	0.2%	1.2%	-	-	1.4%	0.5%	0.0%
Non-ferrous metals	4.1%	24.1%	-	0.3%	28.3%	-	-	8.9%	5.4%	0.0%
Non-metallic minerals	1.8%	19.7%	-	1.6%	1.1%	-	-	1.3%	2.7%	0.0%
Transport equipment	0.1%	0.1%	-	0.2%	0.0%	-	-	0.3%	0.2%	0.0%
Machinery	0.8%	0.3%	-	0.5%	0.1%	-	0.2%	2.6%	0.9%	0.0%
Mining & quarrying	0.7%	0.4%	-	1.2%	0.1%	-	0.1%	0.9%	0.9%	0.0%
Food, beverages & tobacco	1.4%	2.2%	-	1.2%	7.0%	-	0.0%	3.0%	1.9%	0.0%
Paper, pulp & printing	0.6%	0.0%	-	0.5%	0.2%	-	-	1.9%	0.7%	0.0%
Wood & wood products	0.5%	0.0%	-	0.1%	0.6%	-	0.1%	2.0%	0.6%	0.0%
Construction	0.6%	0.0%	-	0.1%	-	-	0.0%	0.7%	0.8%	0.0%
Textile & leather	0.5%	0.6%	-	0.4%	1.7%	-	0.0%	1.2%	0.6%	0.0%
Not elsewhere specified (industry)	0.8%	0.1%	-	0.1%	0.1%	1.5%	-	1.7%	0.5%	1.4%
<b>Transport sector</b>	<b>31.5%</b>	<b>-</b>	<b>-</b>	<b>87.7%</b>	<b>1.6%</b>	<b>-</b>	<b>-</b>	<b>0.5%</b>	<b>50.0%</b>	<b>0.0%</b>
Rail	0.1%	-	-	-	-	-	-	0.5%	0.1%	0.0%
Road	31.4%	-	-	87.7%	1.6%	-	-	-	49.9%	-
<b>Other sectors</b>	<b>50.9%</b>	<b>52.3%</b>	<b>-</b>	<b>4.6%</b>	<b>43.8%</b>	<b>98.5%</b>	<b>99.5%</b>	<b>65.9%</b>	<b>27.2%</b>	<b>98.5%</b>
Commercial & public services	9.7%	22.0%	-	1.5%	16.1%	6.9%	23.4%	22.4%	9.2%	7.3%
Households	40.2%	30.2%	-	0.9%	27.7%	91.7%	76.1%	43.0%	16.6%	91.3%
Agriculture & forestry	0.9%	0.1%	-	2.3%	-	-	-	0.5%	1.4%	0.0%

Source: (Eurostat, 2021b)

## RENEWABLES READINESS ASSESSMENT

**Table 3** Total final energy consumption per subsector, per share of supply source

	Total	Solid fossil fuels	Manufactured gases	Oil and petroleum products	Natural gas	Renewables and biofuels	Heat	Electricity	Fossil energy	Bioenergy
<b>Final energy consumption</b>	<b>100%</b>	<b>4.5%</b>	<b>2.9%</b>	<b>35.7%</b>	<b>3.3%</b>	<b>28.0%</b>	<b>2.9%</b>	<b>22.5%</b>	<b>63.0%</b>	<b>28.7%</b>
<b>Industry sector</b>	<b>100.0%</b>	<b>12.3%</b>	<b>16.5%</b>	<b>15.5%</b>	<b>10.4%</b>	<b>2.3%</b>	<b>0.1%</b>	<b>43.0%</b>	<b>81.8%</b>	<b>2.4%</b>
Iron & steel	100.0%	0.0%	56.6%	0.3%	9.2%	-	-	33.9%	87.5%	0.0%
Chemical & petrochemical	100.0%	0.3%	-	19.7%	9.4%	-	-	70.6%	73.9%	0.0%
Non-ferrous metals	100.0%	26.4%	-	2.5%	22.9%	-	-	48.3%	82.2%	0.0%
Non-metallic minerals	100.0%	49.0%	-	32.4%	2.0%	-	-	16.7%	93.8%	0.0%
Transport equipment	100.0%	1.8%	-	43.9%	1.1%	-	-	53.3%	80.3%	0.0%
Machinery	100.0%	2.0%	-	23.3%	0.4%	-	0.6%	73.8%	72.6%	0.2%
Mining & quarrying	100.0%	2.8%	-	65.2%	0.5%	-	0.6%	31.0%	88.4%	0.1%
Food, beverages & tobacco	100.0%	7.0%	-	30.2%	16.3%	-	0.1%	46.5%	82.8%	0.0%
Paper, pulp & printing	100.0%	0.1%	-	27.6%	1.3%	-	-	71.1%	73.7%	0.0%
Wood & wood products	100.0%	0.3%	-	9.9%	3.7%	-	0.4%	85.6%	68.3%	0.1%
Construction	100.0%	0.2%	-	72.6%	-	-	0.2%	27.0%	90.0%	0.1%
Textile & leather	100.0%	5.7%	-	28.2%	11.3%	-	0.2%	54.5%	79.8%	0.1%
Not elsewhere specified (industry)	100.0%	0.6%	-	5.3%	0.3%	48.7%	-	45.0%	34.6%	48.8%
<b>Transport sector</b>	<b>100.0%</b>	<b>-</b>	<b>-</b>	<b>99.4%</b>	<b>0.2%</b>	<b>-</b>	<b>-</b>	<b>0.4%</b>	<b>99.9%</b>	<b>0.0%</b>
Rail	100.0%	-	-	-	-	-	-	100.0%	63.0%	0.0%
Road	100.0%	-	-	99.8%	0.2%	-	-	-	100.0%	-
<b>Other sectors</b>	<b>100.0%</b>	<b>4.7%</b>	<b>-</b>	<b>3.3%</b>	<b>2.9%</b>	<b>54.3%</b>	<b>5.7%</b>	<b>29.2%</b>	<b>33.6%</b>	<b>55.6%</b>
Commercial & public services	100.0%	10.3%	-	5.3%	5.5%	19.9%	7.1%	51.9%	59.4%	21.5%
Households	100.0%	3.4%	-	0.8%	2.3%	63.9%	5.5%	24.1%	26.0%	65.1%
Agriculture & forestry	100.0%	0.5%	-	86.6%	-	-	-	13.0%	95.2%	0.0%

Source: (Eurostat, 2021b)

## 2.5 POWER SECTOR IN BiH

### Regulatory framework

Two decades ago, BiH embarked on the liberalisation of its electricity market<sup>17</sup> with continuous efforts made to date. The country has made significant efforts to adapt and implement the necessary regulatory and legislative changes committed through the Energy Community acquis<sup>18</sup> to its own constitutional structure, with decentralised legislative responsibilities, distributed between the national level and the entities. The regulatory framework and entities are presented in Table 4, and the relevant laws are listed in Annex 1:

- The independent system operator (ISO) in BiH (NOSBiH) manages the entire BiH transmission network above 110 kilovolts (kV), manages the balancing energy market in BiH, and is responsible for designing an Indicative Generation Development Plan and revising the Long-Term Transmission System Development Plan. NOSBiH formulates recommendations regarding the integration of renewable energy sources to the transmission level.
- The TSO (Elektroprenos BiH) connects power plants to power distribution areas or large industrial customers and connects the power system to neighbouring countries to enable power trade. It operates four operational zones (Banja Luka, Mostar, Sarajevo and Tuzla). It is in charge of developing the Long-Term Transmission System Development Plan.
- The state-level regulator (DERK) looks after transmission system operation, international trade and the power sector in the Brčko District (generation, distribution and retail).
- At entity level, the electricity market is regulated by the Regulatory Commission for Energy in the Federation of BiH (FERK) and the Regulatory Commission for Energy of Republika Srpska (RERS).
- The electricity sector in BiH is dominated by three vertically integrated power utilities, active in the generation, distribution and retail sectors. The transmission level is operated independently. The utility companies are JP Elektroprivreda BiH d.d. (EP BiH), Mješoviti Holding Elektroprivreda Republike Srpske a.d. (EP ERS) and Elektroprivreda Hrvatske Zajednice Herceg Bosne d.d. (EP HZHB). In 2021, their respective market shares of electricity production were 40% (EP BiH), 34% (EP ERS), 14% (EP HZHB).

In addition to the generation capacity owned by the integrated utilities, electricity is produced by independent power producers, essentially operating under the renewable energy feed-in tariff. The production is purchased by the single buyer (the renewable energy operator) in each entity. In 2023, 233 production units were registered in the Republic of Srpska, with an installed capacity of about 126 MW, owned by 122 companies. However, the increased prices on the market caused by the energy crisis influenced the fact that a significant number of producers abandoned the incentive system, *i.e.* the guaranteed purchase, and decided to sell electricity on the market, especially small hydropower plants.

<sup>17</sup> Indicated by Decision 48/06 (2006) on Scope, Conditions and Time Schedule of Electricity Market Opening in BiH.

<sup>18</sup> [www.energy-community.org/legal/acquis.html](http://www.energy-community.org/legal/acquis.html).

Twenty small hydropower plants owned by 12 companies left the incentive system (out of 100.29 MW in hydropower plants, 28.16 MW remained in the incentive system). In the incentive system, there are mostly hydropower plants with an installed power of less than 1 MW or small solar power plants with an installed power of up to 250 kW.

The concessions zones of the private distribution companies are highlighted in Figure 6, where EP BiH and EP HZHB operate in the Federation of BiH; EP ERS operates in Republika Srpska; and Komunalno Brčko operates in the Brčko District of BiH. The map also indicates the locations of the wind, thermal and hydropower plants within the different concession zones.

**Figure 6** Map of the electric power system of BiH with operational areas of the transmission level (Elektroprenos BiH) and distribution areas of the public electric utilities, 31 December 2020, and power plants



Source: (SERC, 2021).

Disclaimer: This map is provided for illustration purposes only. Boundaries and names shown on this map do not imply the expression of any opinion on the part of IRENA concerning the status of any region, country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries.



As Figure 6 shows, the country is interconnected with Croatia, Montenegro and Serbia. The four operation areas operated by the TSO Elektroprijenos BiH are indicated: Operational Area Banja Luka; Operational Area Mostar; Operational Area Sarajevo; Operational Area Tuzla.

**Table 4** Summary of the institutional regulatory framework for the entities

Category	Federation BiH	Republika Srpska
<b>Regulator</b>	Regulatory Commission for Energy in the Federation of BiH (FERK)	Regulatory Commission for Energy of Republika Srpska (RERS)
<b>Utility</b>	EP Elektroprivreda BiH d.d. (EP BiH) and Elektroprivreda Hrvatske Zajednice Hercegovine d.d. (EP HZHB)	Mješoviti Holding Elektroprivreda Republike Srpske a.d. (EP ERS)
<b>Renewable energy offtaker</b>	Single buyer: Operator for renewable energy sources	System operator, in the interim period to its adoption, this role is performed by Mixed Holding Power Utility of the Republic of Srpska
<b>Generation assets</b>	<i>see section on power generation</i>	
<b>Distribution</b>	Five distribution networks (Sarajevo, Tuzla, Zenica, Bihać, Mostar)	Five distribution networks (Elektro-Hercegovina, Elektrodistribucija Pale, Elektro Bijeljina, Elektro Doboje and Elektrokrajina)

Source: (Distribution of Republika Srpska, 2021)

## Unbundling status

Since 2015, the electricity retail segment has been liberalised, and customers can freely choose their supplier, however with limited impact (Energy Community, 2020a). In the Federation of BiH, 17 companies hold retail and trade licences, issued between 2015 and 2018,<sup>19</sup> and 4 for Republic Srpska.<sup>20</sup>

In the federation, the utilities are bundled. The separation of accounts for generation, distribution and retail has been postponed to the 2023-25 time horizon, by which time the distribution assets should be fully unbundled. In Republika Srpska, the utility was unbundled for distribution, while the utility owns a bundled generation and retail licence.

According to the interviews conducted as part of the Renewables Readiness Assessment process, the RERS was able to implement a revenue requirement methodology for the distribution companies, which led to triggering investments and improving performance of some of the incumbents. The new methodology was adopted,<sup>21</sup> which should enable the regulator to push the regulatory performance of the distribution sector to meet international standards.

<sup>19</sup> [www.ferk.ba/\\_en/index.php/licenses/registar-of-licenses/electricity-registar/18185-power-supply-second-tier-licences](http://www.ferk.ba/_en/index.php/licenses/registar-of-licenses/electricity-registar/18185-power-supply-second-tier-licences).

<sup>20</sup> <https://reers.ba/en/register-of-licenses/electricity/>.

<sup>21</sup> The Regulatory Commission of Republic of Srpska adopted the Methodology for determining the fee for using the distribution network and calculating the price of using a closed distribution system (Official Gazette of the Republic of Srpska, number 11/22). The act is published and publicly available on the website of the Regulatory Commission.

In the federation, the utility EP HZHB also claims to have made improvements. The company is essentially preparing for future unbundling.<sup>22</sup>

**The retail segment** has been open to competition since 2015, and in principle customers can switch operators. In practice, the competition on the retail segment remains limited. Regulated tariffs apply for a “universal service” customer category, at the low voltage level. This tariff is applicable to households, companies and commercial customers. This social tariff is subsidised and may not be cost-reflective.

The rest of the customers, including large consumers, are supplied through bilateral agreements. The prices are not regulated in this segment. On this unregulated segment, in 2016 a wave of switching of industrial customers to alternative providers was witnessed. However, the situation has reverted in the meantime as the incumbent utilities could reduce their prices. From the current state of review, there is no evidence on price transparency. As generation and retail are bundled, the proposed prices may not necessarily be cost-reflective.

**On the distribution segment**, due to the conjunction of regulated and unregulated retail markets, as well as bundled generation and retail licenses, BiH might be at risk of cross-subsidies between customer categories. A price table for the federation is presented in Table 5; there are strong variations between consumer segments which indicate that tariffs are not cost-reflective (subsidised).

**On the generation segment**, there is no evidence of an operating competitive market, as internal trading is limited due to the absence of an internal power market, and competition is limited. It is also understood that each utility balances its own generation as part of its own balancing groups, each utility operating its own dispatch centre with its own internal constraints. Complementary balancing is then operated at national level through a competitive balancing market organised by the ISO (see section on market design).

**Table 5** Example of tariffs for the users of the distribution system in the Federation of BiH

				Medium voltage		Households		Commercial			Public lighting
Tariff determinant	-	Season	Time of day	35 kV	10 kV	I	II	I	II	III	-
Capacity	USD/kW/month	Higher	-	4.6	5.2	4.0	4.0	6.7	6.7	6.7	7.8
		Lower	-	3.6	4.0	3.1	3.1	5.1	5.1	5.1	0.1
Active energy	US cts/kWh	Higher	High	1.2	1.5	4.6	5.7	4.8	6.8	5.4	0.8
			Low	0.6	0.7	0.0	2.8	2.4	3.4	0.0	6.4
		Lower	High	0.9	1.1	3.5	4.4	3.7	5.2	4.2	0.0
			Low	0.5	0.6	0.0	2.2	1.8	2.6	0.0	4.9
Over accepted reactive power	US cts/kWh	-	-	1.3	1.6	0.0	0.0	1.9	0.0	0.0	0.0

Source: (FERK, 2014)

Note: cts = cents; kW = kilowatt; kWh = kilowatt hour.

<sup>22</sup> The information is pending for EP BiH, as it was requested after the interview took place.

## Power generation

### ■ Installed capacities

In 2021, the total installed capacity of generation units in BiH amounted to approximately 4.5 GW, dominated by large hydropower (2105 megawatts [MW] in 2021 – of which 420 MW is pumped hydropower) and thermal power plants (1888 MW in 2021). Third in terms of installed capacity is small hydropower (172.19 MW in 2020), followed by wind energy (86.6 MW in 2020 and increased to 135 MW in 2021) and solar energy (34.89 MW in 2020). The capacity of biomass power plants and small wind power plants is negligible (2.11 MW biomass, 0.40 MW wind). There is a sizeable capacity of industrial power plants, amounting to 92.85 MW (SERC, 2020, 2022).

On the territory of the Federation of BiH:

- EP BiH owns two thermal power plants (Tuzla and Kakanj), three large hydropower plants (Jablanica, Grabovica, Salakovac), seven small hydropower plants, and one wind park, Podveležje.
- It also operates five distribution networks (Bihać, Mostar, Sarajevo, Travnik, Tuzla, Zenica).
- EP HZHB produces electricity from seven hydropower plants and operates distribution networks.
- EP BiH operates the wind park Podveležje (48 MW, supported by KfW, the German development bank). The wind farm is operating without subsidies.
- EP HZHB operates the wind power plant Mesihovina (50.6 MW, supported by KfW). The project took 13 years to complete. The wind power plant opted out of the feed-in tariff scheme. It operates without support and the power is balanced and traded as part of the portfolio for HP HZHB.
- As a non-utility project, located in the federation, the wind plant of 36 MW (VE Jelovača) is privately owned (F.L. wind) and operating under the feed-in tariff regime.

On the territory of Republika Srpska:

- EP ERS operates a capacity of 1300 MW and produces 6000 GWh of electricity annually. The holding company owns the Gacko mine and thermal power plant, the Ugljevik mine and thermal power plant, and the hydroelectric plants in Trebišnjica, Drina and Vrbas.

On its website, the company claims 44% of its production from hydropower and 56% from coal (accessed in 2022). It operates five distribution networks (Elektro-Hercegovina, Elektrodistribucija Pale, Elektro Bijeljina, Elektro Doboj and Elektrokrajina) (source: Distribution Republika Srpska, 2021).

In the Brčko District of BiH:

- JP Komunalno Brčko is responsible for distribution. Apart from distribution, JP Komunalno Brčko holds the licence for trade and supply of electrical energy on the territory of BiH (SERC, 2021).

## ■ Power supply

Total electricity consumption in BiH, after a 7.3% decrease in 2019, continued to decline in 2020. The electricity demand recovered in 2021 with a 6% increase, and amounted to 19 615 GWh (SERC, 2022a).

The variations are for a great part related to variations in the consumption at transmission level. In 2020, consumption by customers connected to the transmission network (high voltage [HV] customers) decreased by 49.8% amounting to 890 GWh, due to the closure of an aluminium factory, and reduced demand due to the COVID pandemic. In 2021, the consumption of customers connected to the transmission network (HV customers) increased back by 31.4% amounting to 1170 GWh.

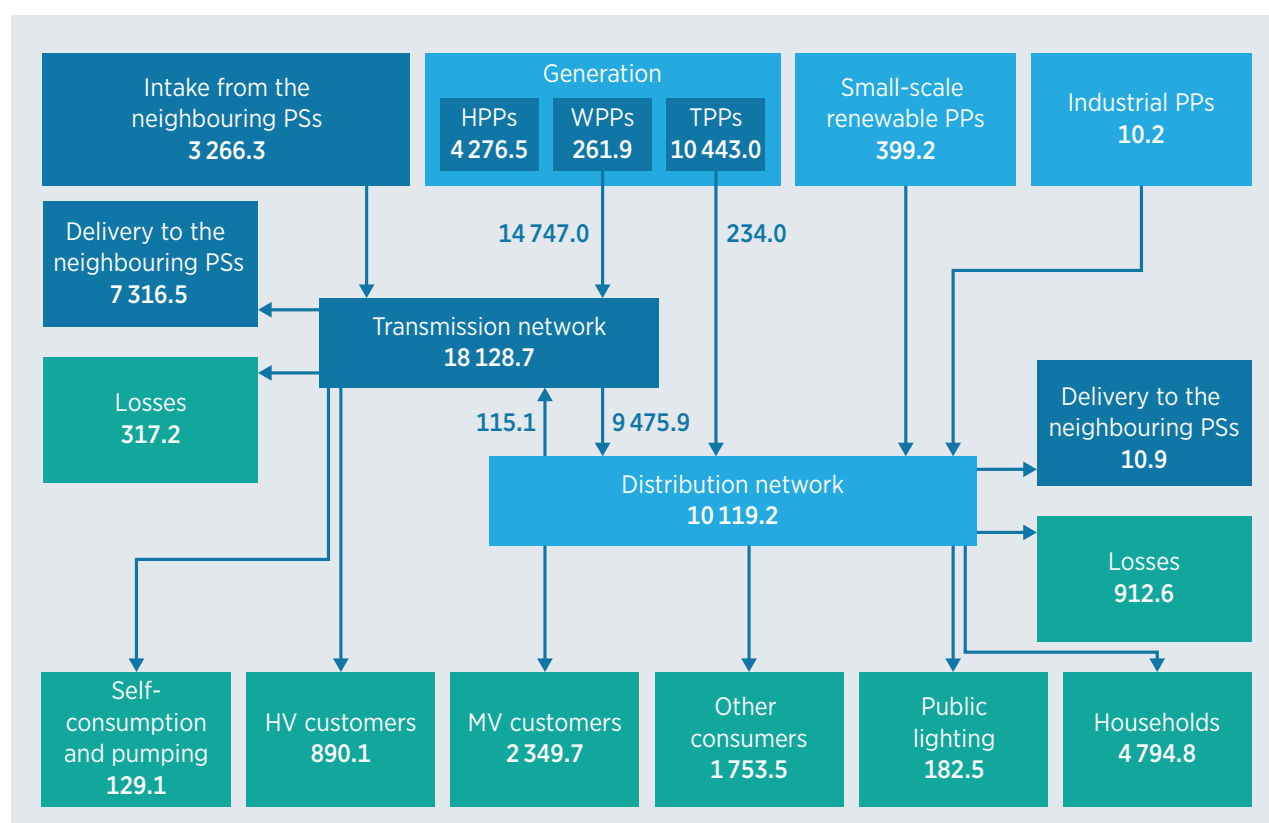
Of the total 19 615 GWh in 2021, 16 158 GWh was delivered to the transmission network, 199 GWh was injected into the transmission network from the distribution network and 3 259 GWh of electricity was received from neighbouring systems. BiH is a net power exporter: in 2021, it imported 5 032 GWh and exported 9 814 GWh, an 18% increase over 2020. The balance for 2020 is presented in Table 6.

Out of a total of 16 158 GWh of electricity delivered to the transmission network in 2021, 6 051 GWh (38%) of electricity was produced in hydroelectric power plants, while 9 724 GWh (60%) was produced in thermal power plants (SERC, 2022a). Wind power plants accounted for 383 GWh, or 2% of electricity. The characteristics of the electricity supply for 2020 involved (SERC, 2021):

- At transmission level, the generation of the two wind power plants (WPPs in Figure 7) located in the southwest of BiH (Figure 6), Mesihovina and Jelovača, amounted to 262 GWh in 2020 (+3.9% over previous year), demonstrating a robust 34% capacity factor that year. In January 2021 the Podveležje wind power plant entered into operation. As a result, the wind production increased by 46% in 2021, at 383 GWh (SERC, 2022a).
- Due to variations in precipitations, hydropower production decreased by 24.3% in 2020 (SERC, 2021), and – despite the overall lower demand – the generation from thermal power plants (TPPs in Figure 7) increased by 8.6% in comparison with 2019 amounting to 10 443 GWh. The situation reverted in 2021, with hydropower production higher by 43.8%. The electricity produced in thermal power plants reduced by 6.2% in 2021 compared with 2020 (SERC, 2022a).
- In 2020, small-scale renewable generation<sup>23</sup> decreased by 25.6% in 2020 (SERC, 2021) compared with 2019. This is related to the poor hydrological conditions, which reduced the production of small hydro power by 31%. The limited increase in capacity of the other renewable sources could not compensate for this loss, despite an increase in generation for small solar power plants (+50%), biomass and biogas power plants (+42%) and a minor share of small wind turbines.
- In this small-scale generation segment overall, independent producers delivered most of the generated capacity (76.4%),<sup>24</sup> while the remaining share (23.6%) was produced by power plants owned by the public utilities.

<sup>23</sup> Connected at distribution level and regulated at entity level.

<sup>24</sup> And purchased by the single buyer of each entity under the feed-in tariff schemes.

**Figure 7** Balance volumes realised in 2020 (GWh)

Source: (SERC, 2020).

Note: PSs = power supply, HPPs = hydro power plants, WPPs = wind power plants, TPPs = thermal power plants, PPs = power plants, MV = medium voltage; HV = high voltage.

**Table 6** Electric power indicators of Bosnia and Herzegovina

		2018	2019	2020	2021	2022
Electricity generation	(GWh)	17 872.99	16 074.02	15 390.67	17 055.44	15 035.96
Net imports	(GWh)	3 118.73	2 824.96	3 266.28	3 312.00	3 875.64
Net exports	(GWh)	7 697.77	6 568.84	7 327.44	8 197.66	6 853.90
Total electricity supplied	(GWh)	13 293.95	12 330.13	11 329.50	12 169.78	12 057.64
Gross electricity consumption	(GWh)	13 293.95	12 330.13	11 329.50	12 169.78	12 057.64
Transmission losses	(GWh)	398.77	323.95	317.16	369.20	333.03
	(%)	1.96%	1.77%	1.75%	1.87%	1.82%
Distribution losses	(GWh)	950.0	933.29	912.62	965.04	931.12
	(%)	9.37%	9.20%	9.13%	9.22%	8.83%
PPs self-consumption and pumping	(GWh)	152.69	113.05	129.08	162.98	54.50

Source: (SERC, 2022b)

Note: PPs = power plants

## Market design

### ■ Balancing

The ISO is in charge of maintaining the overall balancing of the system. A balancing market has been operational since 2016; it involves balancing groups (the bundled utilities) and some minor contributors.

The internal balancing, combined with bundled supply and retail licences, lacks transparency regarding the costing methodologies on the generation side (see Merit order effect). It is also noticeable that the power system in BiH is performing local dispatch of the generation assets, while the principle of capacity credits for renewable energy would call for larger balancing areas. In Chapter 3 of this report (potentials) the complementarity between wind and solar was mentioned (see also spatial planning section 7.2 for more on related challenges).

In this respect, it is noted that the balancing groups tend to create a need for each of the utilities to consider increasing the hydropower capacity for storage.<sup>25</sup> Potentially, joint efforts could be made regarding the development of balancing capacities at national level, in order to seek to optimise storage at system level, rather than through individual balancing areas.<sup>26</sup>

### ■ Merit order effect

From a price standpoint, renewable energy in liberalised markets is expected to create a merit order effect, whereby the technology with the lowest operating costs (usually renewables) is dispatched in priority, while technologies bearing higher balancing costs would reduce operations. The merit order effect generally has the effect of lowering power prices and reducing the recourse to fossil-based assets.

With the practice of balancing groups, the actual benefit of renewable energy plants in a portfolio would essentially rely on the dispatch strategy of the utility. For assets not owned by the utilities (independent power producers [IPPs]), the merit order effect of renewable energy projects is however implemented by the obligation to purchase and dispatch the electricity purchased by the single buyer (the operators for renewable energy sources in each entity).

Yet within the current scheme, there might be situations where a cost-reflective price is not guaranteed, nor is the financial viability of each asset in the portfolio guaranteed. Eventually, some assets within the generation fleet might be subsidising worse-performing investments.<sup>27</sup>

<sup>25</sup> Interviewees did not consider battery storage at large scale as economical.

<sup>26</sup> In this regard, Republika Srpska is carrying out activities on the construction of large accumulation hydropower plants (HE Dabar, HE Buk Bijela, HE Ulog, etc.). The construction of HE Dabar with the installed capacity of 160 MW started in June 2023 (Balkan Green Energy News, 2023a), while for HE Buk Bjela planned installed capacity is 93 MW (Balkan Green Energy News, 2022).

<sup>27</sup> Stakeholders mentioned the risk of hydropower to coal subsidy, in the absence of guarantees of origin.

## ■ Trade

The country is well connected to the bordering countries with interconnection capacities (Figure 8). Price gaps between countries offer opportunities for trading licences to generate profit from cross-border exchanges, and currently a large part of the generation in BiH is indeed traded.

The power system demonstrates vulnerabilities, with total electricity losses amounting to 10.88% in 2020, of which 9.13% are distribution losses (Table 6 in previous section). The annual report of the regulator also points to voltage levels in the system above the prescribed limits, and disruptions in the service. Despite these weaknesses, the power system is used for trading large volumes with neighbouring countries, as the interconnection of the system with Montenegro, Serbia and Croatia allows large power exchanges. A total of 16 producers exported power in 2020. The largest electricity exporters are Rudnik i Termoelektrana Stanari, EP Republike Srpske, GEN-I, Axpo BH and EP BiH.

SERC noted a significant increase of electricity transits through the national transmission system, by 28.3% in 2020 and another 17% in 2021 (Table 7), and an increase in revenue from cross-border trade. As it can be seen from Table 7, the main power export destinations in 2020 and 2021 were Croatia, Serbia and Montenegro.

**Table 7** Cross-border trade, including registered transits for 2020 and 2021 (GWh)

Country	Exports (GWh)	Imports (GWh)
Croatia	2 794/4 413	2 964/1 781
Serbia	3 546/814	1 325/879
Montenegro	2 728/2 787	731/599
<b>Total (rounded) (2020/2021)</b>	<b>9 068/8 014</b>	<b>5 021/3 259</b>
<b>Net balance (exports-imports) (2020/2021) (GWh)</b>	<b>4 047/4 755</b>	<b>-</b>

Sources: (SERC, 2021 and 2022)

Taking a simplistic perspective, power exports represented some 40% of the coal-fired generation in 2020 and 48% in 2021. From a CO<sub>2</sub> emissions standpoint, the review of the trade mechanisms may offer opportunities to reduce emissions.

Regarding trade, the Energy Community (2021) references trade on the Slovenia-Croatia and BiH control block, as well as bilateral exchanges for balancing with Serbia and Montenegro. It is also noticeable that several companies in BiH own a retail and trade power licence and are listed on the Hungarian power exchange (HUX) (Table 8). Due to the price gap between the two power systems, these operators might be exporting – or willing to export – to HUX.

For the bundled generation and supply licence owners, the supply of national consumers is secured due to the obligation of the retail suppliers to supply their clients in priority. However, a part of the capacity can be mobilised for cross-border trade.

Trade adds an additional level of complexity. At this juncture, the picture is not entirely clear if the traded electricity is free from cross-subsidies within unregulated retail segments and if this affects merit order dispatch of the generation assets.

Currently, there is no carbon price in BiH.<sup>28</sup> Also, there are uncertainties remaining regarding the impact of the levy raised on consumers for the renewable feed-in tariffs, as there is no traceability of the low-carbon generation in the absence of guarantees of origin.

In the future, the removal of subsidies, improved market transparency and the application of carbon prices would impact the competitiveness of coal-fired power plants. As a level playing field would emerge with other power sources, and the competitiveness of coal-fired power would reduce, the exported electricity volumes could decrease in the future and the country may not be able to remain a net exporter of electricity (SERC, 2022a). If subsidies were lifted, the impact on consumer prices could also be significant. To avoid a situation threatening energy independence and increased prices, the regulatory commission recommends increasing investment in renewable energy sources (SERC, 2022a).

With intense wind and solar resources, the LCOE for those large PV and wind farms is expected to be extremely low, which could benefit the price to end consumers in a situation where subsidies to fossil fuelled generation would be removed. Yet, due to the promising opportunities offered by trade, and the complexity to comply with the quota system, some renewable energy developers foresee developing large-scale PV and wind capacities outside the feed-in or guaranteed price regime, to export to neighbouring countries.<sup>29</sup> Unfortunately, if large renewable energy projects would export most of their production, this might be a missed opportunity for BiH to benefit from low power prices, and to lower its emissions in the power sector. This situation might be addressed in the near future with the adoption of the NECP (draft as of 2023) and the revised legislation towards better planning, and transparent auctions for large projects (see regulatory section).

**Table 8** List of retail and trade power licence owners in the entities registered on the Hungarian power exchange

Member of the HUX	Retail and trade power license in BiH	
	FERK	RERS
Axpo Solutions AG	x	-
Danske Commodities A/S	x	-
Energy Financing Team (Switzerland) AG, organisational unit, Praha, Czech Republic	-	x
Ezpada AG – organizacna zlozka zahranicnej osoby	x	-
GEN-I, d.o.o.	x	-
HEP d.d.	x	-
Interenergo d.o.o.	x	-
Vitol Gas & Power B.V.	x	-

<sup>28</sup> As of 2021, JP Elektroprivreda BiH applies internal carbon pricing within the company.

<sup>29</sup> There the long-term project bankability is not entirely clarified at this stage of the analysis.



Figure 8 Transmission network interconnections with bordering countries of BiH



Source: (ENTSO-E, 2023).

Disclaimer: This map is provided for illustration purposes only. Boundaries and names shown on this map do not imply the expression of any opinion on the part of IRENA concerning the status of any region, country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries.

## Current developments impacting renewable energy

BiH does not have a publicly available integrated resource plan, aligned with its national climate objectives.<sup>30</sup> An updated compilation of the current project pipelines is equally not available. The closest such guidance document is the Preliminary Long-Term Generation Investment Plan (2023-2032)<sup>31</sup> (SERC, 2022a), which is essentially based on a status quo regarding coal power, as presented below. The detailed tables are presented in Annex 2.

Current projections (Annex 2) indicate a growing production over the period 2023-2032, from 15 terawatt hours (TWh) to 17.8 TWh, with a share of thermal generation growing from 59% to 61.5% in 2023. Based on projects either already connected to the grid or having received concession agreements,<sup>32</sup> the share of renewables reduces over time; the share of hydropower decreases by 2% over the period and wind and solar increases moderately from 4.6% to 5.8% over the period.

Currently, BiH is self-sufficient and a net exporter of electricity. Its economy is stagnating and a growth in demand is not entirely foreseeable in the near term. The long-term investment plan (2023-32) foresees an annual increase in consumption of 0.4% to 1.8% up to 2032.

The long-term investment plan foresees the decommissioning of several existing blocks of thermal power production, which are partly compensated by increased production by the remaining blocks. An additional 2 736 GWh of coal are scheduled online by 2032 (TE Tuzla Block 7 and Toplana Zenica). Annex 2 presents the annual production per plant over period 2023-32.<sup>33</sup>

By 2032, new hydropower capacity is also foreseen, producing a total of 446 GWh, new wind power for 412 GWh, and new solar for 212 GWh. The share of renewable energy in the power production referenced at transmission level would amount to 38.5% in 2032, a decrease of 2.4% over the decade.

In the plan, the share of variable renewable connected to the transmission level remains limited, at 5.8% of the generation. Therefore, to reach the NREAP objectives, the plan implies connecting renewable energy at distribution level,<sup>34</sup> which is regulated at entity level. Under the current legislation, the renewable projects were in principle capped at 5 MW to 10 MW in scale, with potential exceptions for wind power (up to 30 MW). The revised legislation could include a revised ceiling of 50 MW for Republika Srpska and the Brčko District.

According to the long-term investment plan, the transmission lines are over-solicited. In order to limit the impact of variable renewable sources on the system operations, the ISO recommended capacity caps for variable renewables. Those caps were increased from 460 MW to 800 MW for wind and from 400 MW to 825 MW for solar PV, based on frequency control parameters.

<sup>30</sup> In the previous period, competent institutions prepared the first draft of the NECP. In June 2023 draft was submitted to the Energy Community Secretariat.

<sup>31</sup> It is the recommendation from the ISO (NOSBiH) to the regulatory commission, which adopted it in February 2017.

<sup>32</sup> Therefore not yet taking into account prospects which will be defined by the NECP.

<sup>33</sup> This long-term plan is currently being revised as part of the NECP, with revised (lower) projections for coal. It already includes a scenario that demonstrates that the demand can be served without Tuzla block 7.

<sup>34</sup> The NREAP (BiH, 2016), foresaw a 52.4% share of renewable for the electricity sector by 2030.

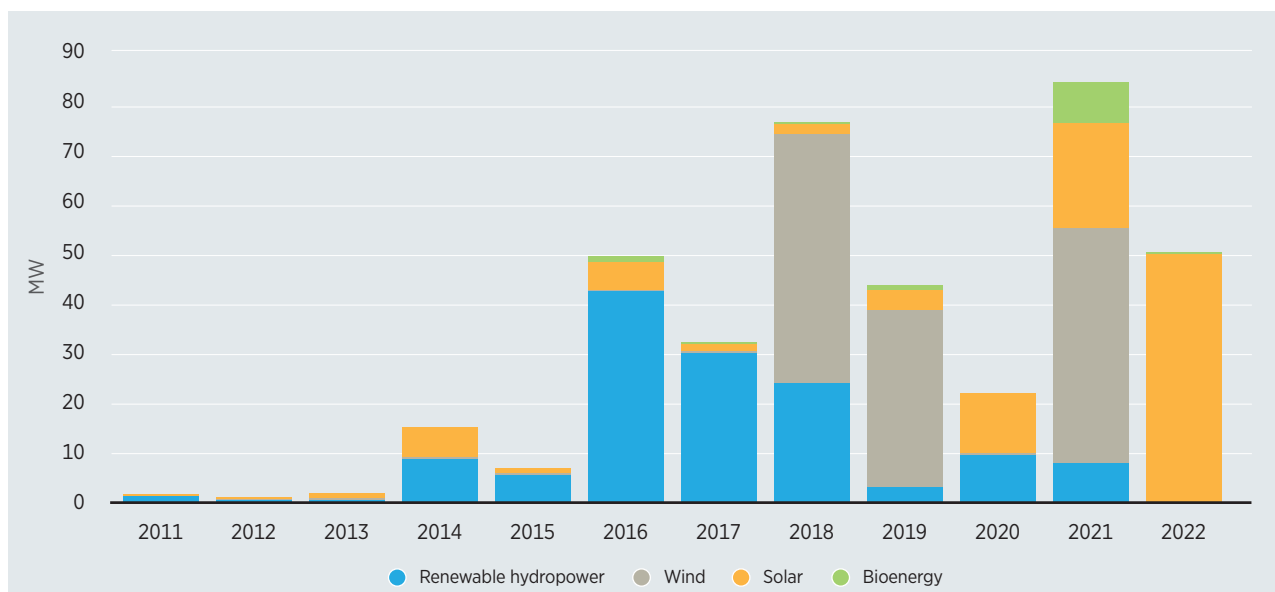
On this basis, SERC passed a Decision on Approval of Maximum Capacity for the Integration of Variable Energy Sources to 840 MW for wind power, and 825 MW for PV power plants, which – in principle – would limit variable renewables to 1.7 GW at transmission level. This limit is currently not a barrier to the development of renewables, but potentially a safeguard allowing for new coal assets.<sup>35</sup>

In practice, 1.7 GW of new renewable capacity would already mobilise sizeable investments to be made over the coming decade. To understand if this picture is realistic, one can refer to the long-term generation plan (SERC, 2022a) which lists potential renewable energy projects for a large pipeline of 2 133 MW of wind projects and 2 143 MW of solar projects. Yet the maturity and financial soundness of these projects has not been assessed, and interviewed stakeholders assessed it as being more of a “wish list” than a realistic investment plan.

Currently, the attractiveness of the large-scale renewable energy market is limited for foreign investors, as the large-scale investments in renewable energy assets are essentially performed by the public utilities (see Utilities in chapter 2). A 48 MW wind park is operated by EP BiH in Podveležje. The investment is worth EUR 83 million and expected to produce 130 GWh annually (EBRD, 2020). In Republika Srpska, the power utility has submitted to the government the Trebinje 1 solar project, for a value of EUR 50 million (73 MW, 101.5 GWh annually). The company is also developing a project for a 48 MW wind farm Hrgud in eastern Herzegovina.

Sizeable renewable energy projects came online from 2014 onward (Figure 9), initially with hydropower, and with solar and wind energy since 2018. In 2021, BiH installed 78.6 MW of renewable capacity, of which 48 MW was wind, 21.6 MW solar and 8.99 MW hydropower (IRENA, 2022a). Although encouraging, the market is not yet established, and Figure 9 demonstrates strong interannual variations.

**Figure 9** Renewable capacity additions by source, 2010-2022



Source: (IRENA, 2023b).

Note: While renewable energy consisted primarily of hydropower until 2010, solar PV started being installed at scale from 2014 onwards, and wind power from 2018 onwards.

<sup>35</sup> Mention of this decision also appears in SERC (2022) although stakeholders mentioned it might not be in force as of 2023.

The private equity-funded IPP projects are developed at entity level. Unfortunately, market information is not available, and the project pipeline is unclear. At the level of the entities, a consolidated list of projects is not publicly available either, despite the requirement by mandate to monitor such projects. Some partial information includes:

- In the Federation, large wind projects and few large solar projects (>60 MW) are under development by utilities and private investors. EP HZHB is developing the Poklečani wind farm (130 MW). According to stakeholders, EP HZHB is developing a solar power plant EP HZHB 1 (150 MW).
- EP BiH is considering a wind farm in Vlašić for a capacity of 50 MW. According to stakeholders, EP BiH is also developing a wind power plant Bitovnja with an installed capacity of 90 MW. There are also more than 10 solar PV projects in preparation phase amounting from 8 MW to 45 MW that could result in 300 MW of additional capacity.
- In Republika Srpska (EP RS), several solar and wind farms are under development and planned to be connected to the transmission network. After the analyses and activities carried out, Elektorprivreda RS received concessions for the construction of two solar power plants with a total installed capacity of 190 MW (SPP Trebinje 1 and SPP Trebinje 2), and further analyses are being made on the possibility of building a third solar power plant in Trebinje. One of the subsidiaries of the Elektorprivreda RS system, which has hydroelectric plants in Vrbas, received concessions for the construction of a solar power plant with an installed capacity of 9.26 MW. In the beginning of 2023, concessions were awarded to private investors in Nevesinje for the construction of seven solar power plants with a total installed capacity of 500 MW. In addition, the government granted concessions for the construction of two solar power plants with a total installed capacity of 60 MW, also in the area of the municipality of Nevesinje. In addition to the above, due to the extremely high interest of investors, a concession for the construction of the Planik solar power plant with an installed capacity of 80 MW and the Planik wind power plant with an installed capacity of 39.6 MW in the area of the municipality of Bileća was awarded to the private investor; as well, a concession for the construction of a 10 MW solar power plant in the same area was also granted to the private company. Finally, in co-operation with KFW Bank, the preparation of the necessary documents for increasing the installed power of the wind power plant Hrgud from 48 MW to 60 MW is under way. In the federation, the parliament called for a ban on the construction of new small hydropower plants on the territory of the Federation of BiH – closing a market segment for private investors, and potentially redirecting investors to solar PV<sup>36</sup> and biogas – currently on the rise.<sup>37</sup>
- In Republika Srpska, electricity from biomass represents 2 MW overall. Two biogas plants representing 1 036 megawatts electrical (MW<sub>e</sub>) are in operation on local farms and one (solid) biomass co-generation plant of 0.25 MW<sub>e</sub> is operating as the district heating plant of the city of Prijedor. Their electricity generation contributes less than 1 ktoe annually to the final energy consumption. There are several other co-generation biogas and biomass plants mentioned by Pfeiffer *et al.* (2019, 17), “within the husbandry sector, the meat and dairy industry and the wood processing industry”.

<sup>36</sup> Segment up to 10 kW to 23 kW in the Federation, where the tariff is the highest. Rooftop solar is not developed. See Chapter 3.

<sup>37</sup> Data on the Republika Srpska not collected at this stage.

# 3 RENEWABLE ENERGY POTENTIALS

## 3.1 BIOMASS

The biomass potential available for power generation is uncertain and varying within a large range (IRENA, 2017a) from 29 megawatts (MW) to 857 MW or 180 gigawatt hours (GWh) to 5 470 GWh per year (0.65 petajoules [PJ] to 19.7 PJ). A large part of the uncertainty is related to the solid biomass estimates, which can vary from zero to 813 MW, due to uncertainties on the current level of wood consumption and the availability of sustainable resources. For biogas, the cost-competitive potential estimate is narrower, between 29 MW and 44 MW or 180 GWh and 270 GWh per year (0.65 PJ to 0.972 PJ).<sup>38</sup>

Regarding heating, Pfeiffer *et al.* (2019) developed an analysis of the biomass potential for Bosnia and Herzegovina (BiH).<sup>39</sup> The report studied the biomass potential in BiH in 2015, based on 23 biomass sources, covering both forestry biomass and agricultural biomass.<sup>40</sup>

In BiH, 43% of the national territory is covered by private and public forest, of which 80% of the forests are publicly owned as “state forests”, managed at the level of entities.<sup>41</sup>

The energy potential is estimated, between 10.3 million tonnes (Mt) and 10.4 Mt of dry matter, which – according to the analysis – could supply 24% of the total primary energy supply of the country. The report indicates 2 Mt of residues is currently unused, which, as an order of magnitude, would correspond to “12% to 15% of the total primary energy supply” (Pfeiffer *et al.*, 2019, 13).

The report raises an important concern regarding the monitoring of wood consumption.<sup>42</sup> It estimates the non-registered wood consumption at an amount between 84 kilotonnes of oil equivalent (ktoe) and 627 ktoe, compared with a registered consumption of 620 ktoe to 700 ktoe annually. The report recommends updating the available data through household surveys in order to accurately estimate the consumption and update the energy balances.

In support of the Central and South Eastern Europe Energy Connectivity (CESEC) initiative (IRENA, 2020), the International Renewable Energy Agency (IRENA) has conducted a bottom-up analysis of the renewable energy prospects for the region, including bioenergy potential. The bioenergy potential is evaluated by three final bioenergy carriers: solid biomass, liquid biofuels and biogas.

<sup>38</sup> For reference, in 2021, electricity generation amounted to 19 615 GWh in BiH.

<sup>39</sup> Developed within the Ministry of Foreign Trade and Economic Relations, with support of GIZ, the German development agency, and UNDP, this report aims to improve the transparency of information regarding the availability of biomass in the country.

<sup>40</sup> Online atlas: <http://atlasbm.bhas.gov.ba/>

<sup>41</sup> The Brčko district’s public forest is managed by public forest administration.

<sup>42</sup> This is the core issue for wood biomass in BiH.

For BiH, the estimated sustainable bioenergy supply potential is estimated at:

- 20 PJ for liquid biofuels. As an order of magnitude, the final consumption for the transport sector in 2019 was 55 PJ (1 322.2 ktoe)
- 44 PJ for solid biomass and 12 PJ for biogas. As an order of magnitude, the final consumption for the heating and cooling sector in 2019 was 5 PJ (122.5 ktoe); and 39.6 PJ for electricity (945.2 ktoe).

### 3.2 GEOTHERMAL

Miošić (2010) indicates that a large diversity of geothermal applications is already in use across the country, which may offer further capabilities. Drillings for high-enthalpy applications have been tested and further drillings were planned. Fytikas and Arvanitis (2009) notes that limited exploration of the geothermal potential has been performed. It indicates geothermal potential for heating, based on existing wells, of 33 MW. In Sarajevo, a 1 megawatt electrical ( $MW_e$ ) geothermal power pilot plant was in planning before the civil war (at a temperature of 58°C and a flow rate of 240 litres per second), but was put on hold.

The literature (Fytikas and Arvanitis, 2009) mentions three potential geothermal sites or projects in BiH. The highest-temperature well is located in Bosanki Šamac with a temperature of 85°C. On average, the temperature of all sites is 65.6°C.

Sources in Bosanski Šamac, Kakanj and Sarajevo are of lower temperatures and usable for thermal exploitation. No sites have a temperature of 100°C or more and current activities are limited to thermal uses (Fytikas and Arvanitis, 2009).

Overall, (UNDP, 2019) estimates the geothermal potential at 1.18 PJ per year, of which 0.65 PJ is in the Federation of BiH and 0.54 PJ in Republika Srpska. IRENA (2017) estimates the cost-competitive potential to up to 7.1 MW or up to 50 GWh annually (0.18 PJ).

Srpska (2012) notes that a large part of Republic of Srpska is promising in terms of the presence of geothermal water. Areas of greatest potential are parts of Posavina, *i.e.* Semberija and Lijevča Polje. The energy potential is estimated at 1260 PJ (30 million tonnes of oil equivalent [Mtoe]). There are also geothermal resources in Republic of Srpska that are used for balneological purposes.

Exploring the potential for energy production would require additional research work in active boreholes. It is estimated that geothermal sources of heat power of 50 megawatts thermal ( $MW_{th}$ ) to 100  $MW_{th}$  can be formed in area of Semberija, Posavina, the Banja Luka valley and Lijevča Polje.

### 3.3 HYDROPOWER

- Due to the country's historic relationship with hydropower, most of the non-fossil fuel generation is still large hydro. This is not surprising given the country's availability of unrestricted free-flow hydro resources. As can be seen from the existing and planned project pipelines shown in this report, large hydropower is expected to continue to dominate the market. Further development of small hydro has been faced with difficulties due to the public pressure to cease new operations based on environmental concerns. The pressure had apparently not made a greater impact on the planning, even though there were attempts at making moratoriums and the country has been involved in several lawsuits (Bankwatch, 2021).
- The existing large hydropower plants in operation are generally quite old, on average 40-60 years of age, and would require some level of updates due to their growing inefficiencies. As for the small hydro, which comes third in the list of largest installed capacities, the public sentiment has been quite mixed. There have been objections to the new developments on the grounds of environmental and social concerns throughout the country (Radio Slobodna Evropa, 2021). There are currently over 100 small hydro plants and 400 more have been discussed (WWF, 2020). For that matter, given the plans to continue with hydropower expansion, it is vital to undertake in-depth project assessments in regard to their environmental impact, their legal framework compliance, and long-term growth of the renewable energy sector.

BiH FIPA (2015) and the International Hydropower Association (2016) indicate a hydropower potential of 6 000 MW. BiH FIPA (2015, 47) notes that "development programs identified fifteen potential new large and small hydropower projects, and four rehabilitation and expansion projects, with potential incremental electricity production capacity of approximately over 2 000 MW in total".

The hydropower plants of Nertva, Rama, Jajce and Čapljina were foreseen as rehabilitation and expansion projects. In addition, 400 potential micro locations were identified for construction of the mini hydropower plants in BiH, representing a potential capacity increase of some 1 000 MW. However, the actual sustainable potential for small hydropower could be lower.<sup>43</sup>

Srpska (2012) notes the total hydropower potential of 0.5 MW to 10 MW capacity is estimated to 1 500 GWh/year. The candidate small hydropower plants amount to some 212 MW, or about 650 GWh/year. For small hydropower plants below 0.5 MW (micro and mini hydropower plants), the potential has not been explored in Republic of Srpska.

<sup>43</sup> Small hydropower plants are part of the renewable energy laws for Republika Srpska and the Brčko district; however, a minimum distance is set between installations.



### 3.4 SOLAR

The solar atlas of BiH can be found through the IRENA Global Atlas (IRENA, 2021a) and presented in Figure 10. The solar resource is intense across the entire country, starting at 1 300 kilowatt hours per meter squared (kWh/m<sup>2</sup>) in the northern part of the country, to nearly 1 400 kWh/m<sup>2</sup> near the coast (Table 9). The actual technical and economic potential should be assessed in high resolution, in order to account for shading in hilly areas and valleys.

In a more detailed fashion, IRENA (2017) assessed the cost-competitive potential for renewable power generation across southeast Europe. For solar photovoltaic (PV), a geospatial analysis<sup>44</sup> was performed at high resolution (1 kilometer), based on the data of the IRENA Global Atlas. On this basis, the least-cost locations were identified, considering technology learning curves and for several simulations cost of capital. The cost-competitive potential by 2030 was estimated at 2 955 MW or 4 126 GWh per year.

**Table 9** Solar resource and technical potential for the largest cities in BiH

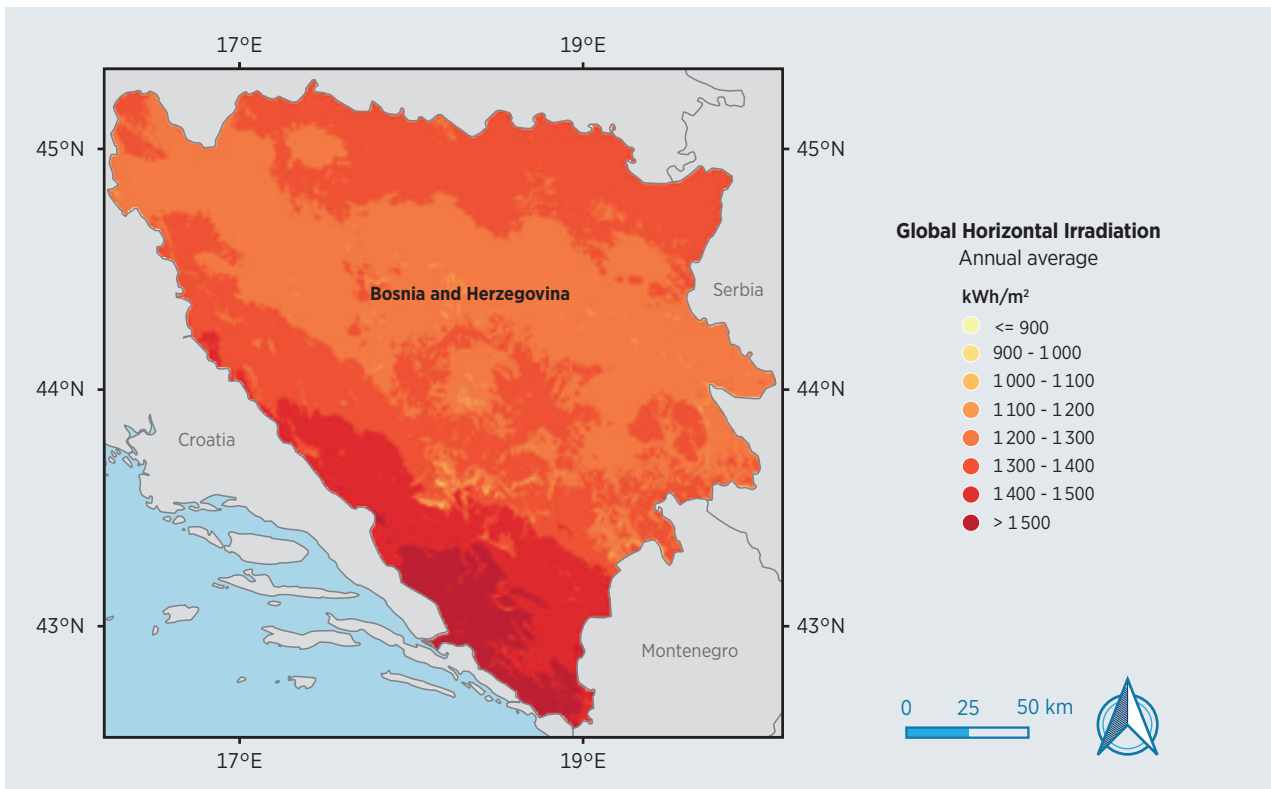
	Global horizontal irradiation (kWh/m <sup>2</sup> )	Technical potential (MWh/kWp/year)
<b>Sarajevo</b>	1 337	1 217
<b>Banja Luka</b>	1 248.6	1 199
<b>Zenica</b>	1 237	1 187
<b>Tuzla</b>	1 238	1 193
<b>Mostar</b>	1 412	1 363

**Source:** (ESMAP, Global Solar Atlas, 2021)

**Notes:** kWh/m<sup>2</sup> = kilowatt hour per metre square; kWp = kiloWatts peak; MWh = megawatt hour.

<sup>44</sup> The geospatial analysis identified the technical potential for solar PV, based on a multi criteria analysis, which considered the solar resource, the distance to the grid, topography, road access, population density, protected areas and land cover.



**Figure 10** Map of global horizontal irradiation for BiH

**Sources:** (Global Solar Atlas, ESMAP, 2019); United Nations administrative boundaries 2021).

**Disclaimer:** This map is provided for illustration purposes only. Boundaries and names shown on this map do not imply the expression of any opinion on the part of IRENA concerning the status of any region, country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries.

### High-level spatial planning for the integration of solar potential to the power system

An estimation of the solar potential was performed by the independent system operator (ISO). This assessment was used to provide recommendations to the State Electricity Regulatory Commission (SERC) regarding the capacity of wind and solar power which can be integrated to the network, considering balancing constraints, without specific adjustments to incorporate variable energy supply.

The analysis is based on a 2014 consultant report for the ISO (Parsons Brinckerhoff, 2014). The study used the Photovoltaic Geographical Information System (PVGIS) database and compared solar measurements performed on nine locations (Bihać, Goražde, Mostar, Sanski Most, Sarajevo, Tuzla, Budozelje, Medveđak, Rostovo). The deviation from the previously measured values for the largest number of locations is in the range from -7 to +14%. In two locations at high altitudes, it was found that the PVGIS annual value of irradiation is lower than the actual value by up to 25%, which shows the value of local ground measurements to validate estimates.

The power system analysis is then based on solar farms of 10 MW to 100 MW connected to the 110 kilovolt (kV) transmission network. The study established scenarios, by identifying favourable areas (flat terrains < 3% slope), for installed capacities of 3 060 MW and 4 010 MW, slightly more than IRENA's assessment (Annex 3).

Without specific investments for variable renewables in terms of transmission network capacities, the potential integration of solar power in 2020 was forecast to reach 565 MW in 2020, and 705 MW in 2025. Noticeably, the analysis includes 350 MW wind power. The study showed a complementarity between solar and wind power, which could limit the need for reserve.<sup>45</sup> The reserve capacities are further detailed in Parsons Brinckerhoff (2014).

### 3.5 WIND

The wind atlas of BiH (unvalidated) can be found through the IRENA Global Atlas (IRENA, 2021a) and is presented in Figure 11. The wind resource is intense in the several parts of the country, with wind speeds in excess of 9 meters per second (m/s) in many areas (Figure 11) and theoretical capacity factors above 50%.

IRENA (2017) assessed the cost-competitive potential for renewable power generation across southeast Europe. For wind energy, a geospatial analysis<sup>46</sup> was performed at high resolution (1 kilometer), based on the data of the IRENA Global Atlas. On this basis, the cost-competitive potential by 2030 is estimated between 10 618.8 MW and 12 809.6 MW or 22 892.7 GWh to 26 000 GWh.<sup>47</sup>

The actual technical and economic potential should be assessed in high resolution, in order to account for shading in hilly areas and valleys. Although the analysis carries large uncertainties, the resource is not a limitation, as it appears to be larger than the actual country needs.

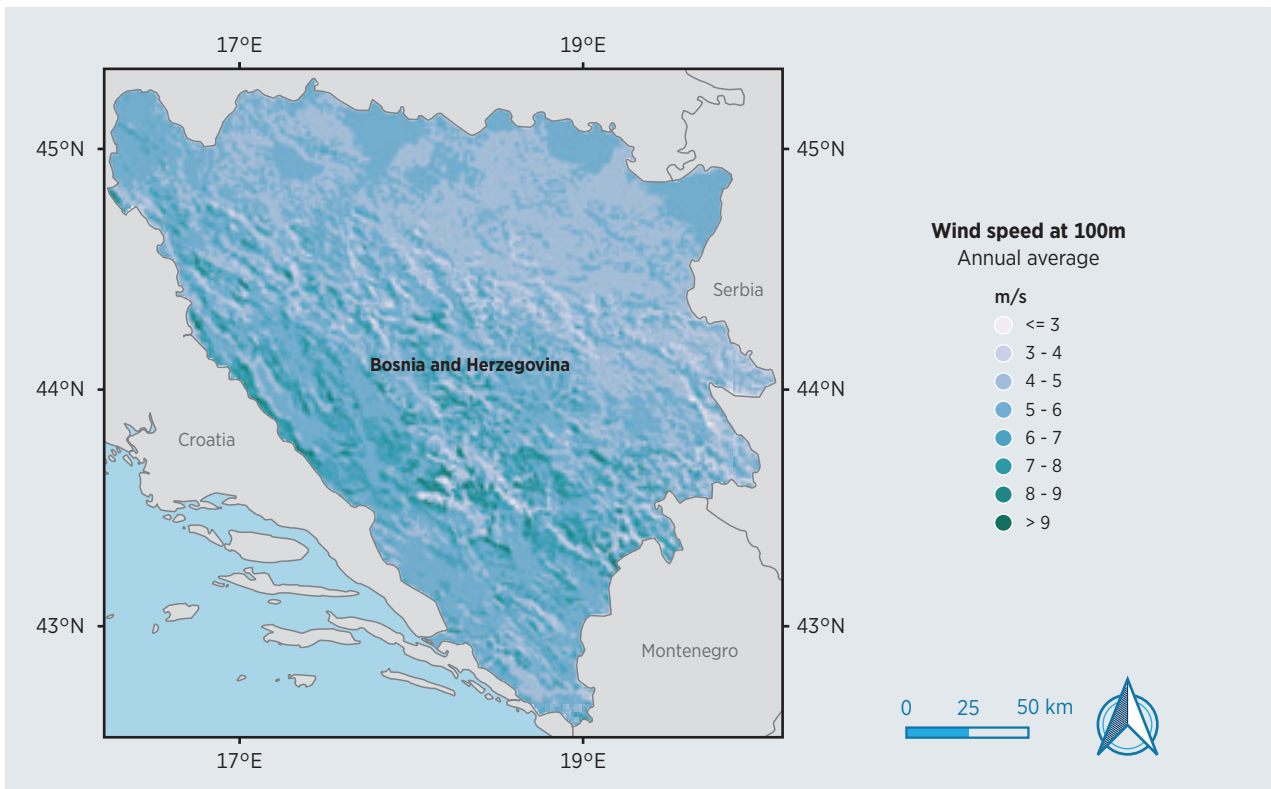


<sup>44</sup> This element is relevant, as this might open room for a national balancing more than a balancing by group as is currently performed (Chapter 2).

<sup>45</sup> The geospatial analysis identified the technical potential for wind energy, based on a multi criteria analysis, which considered the wind resource, the distance to the grid, topography, road access, population density, protected areas and land cover. On this basis, the least-cost locations were identified, considering technology learning curves and other financial assumptions.

<sup>46</sup> For reference, in 2021, electricity generation amounted to 19 615 GWh in BiH.

**Figure 11** Map of average wind speeds for BiH.



**Source:** (Global Wind Atlas (DTU, 2015); United Nations administrative boundaries 2021).

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### High-level spatial planning for the integration of wind potential to the power system

The latest available spatial plans appear to be outdated. An estimation of the wind potential was performed by the ISO. The analysis is based on ECA (2011). The study looks into the status of the transmission network as of 2011, performs a technical diagnosis, establishes scenarios for network reinforcement for 150 MW, 200 MW, 300 MW, 600 MW and 900 MW of wind power, and proposes market rules for dispatching new renewable energy generation.

In addition, Srpska (2012) notes a wind atlas was made for the area of Republic of Srpska that needs to be verified by wind measurements. The available wind potential in the area of the republic is significant. The most promising area for the construction of wind power plants is the southern part of the republic, in the area from Kalinovik to Trebinje. A theoretical potential of wind energy for electricity production is determined at 13 locations with the total power of 640 MW and the total expected production of 1200 GWh/year.

## 4 RATIONALE FOR RENEWABLE ENERGY DEVELOPMENT IN BIH

The process of integration into the European Union is changing the current paradigm in Bosnia and Herzegovina (BiH), as compliance with the European Union will imply drastic changes e.g. the removal of subsidies to the power sector,<sup>48</sup> the adoption of cost-reflective prices, the progressive adoption of carbon prices and the requirement to preserve the environment, among the community acquis.

Eventually, cost-reflective tariffs and carbon prices will apply to the power sector. If not managed ahead of time, positive environmental impacts can turn into cost to the economy, through loss of purchasing power for households, reduced competitiveness for energy-intensive industries and a jeopardised net exporter position.

Regulatory reforms will also impact engage consumers, who should become aware of the type of energy they consume, and be able to take decisions regarding their consumption levels and the sources of supply they choose to use for e.g. power, heating, mobility and industrial processes, which calls for the operationalisation of Guarantees of Origin.

Currently, the drivers are mostly perceived as external (e.g. the EU Green Deal and the 2050 long-term strategy for long-term carbon neutrality by 2050), and the consequences for the future are not entirely internalised. A strong internal drive and a sense of urgency to act would be required to successfully embark on the decarbonisation of the economy. The risk that the drivers for the transition may be perceived as external can hinder the adoption of the necessary reforms and create resistance to change. This can materialise into inconsistency of plans, lack of clear strategy, delays of adoption of laws, gaps in implementation and an overall limited performance of the regulatory framework.<sup>49</sup>

**Driver 1: BiH seeks to improve the country's long-term resilience, to support its economic diversification and competitiveness, and to secure its energy supply and sovereignty by harvesting its natural renewable resources**

Despite air pollution and health impacts due to the combustion of fossil fuels, the country is in a situation of security of supply and energy independence. It is a net power exporter and features low power prices (Figure 12 and Figure 13). The residential sector largely relies on local wood biomass for heating. The coal sector employs thousands of workers and maintains a standard of living in entire regions.

The coal generation fleet is ageing, with large coal capacities scheduled to be decommissioned, and the country would require significant investments in generation capacity. It should also be recognised that the economy is facing brain drain, and possibilities for growth and innovation seem critical at this juncture.

Renewable energy, coupled with increased market efficiency, transparency and flexibility, can supply locally sourced, reliable and cost-competitive energy to support economic growth moving forward.

<sup>48</sup> According to the Energy Community Secretariat (2020b) subsidies to coal-fired generation amounted to some EUR 22.7 million in 2019.

<sup>49</sup> This point is discussed in Chapter 2. Onboarding complex policies should be supported by onboarding human capacities and skills.

## **Driver 2: BiH has made international commitments to address climate and health impacts in the energy sector**

Drivers to the energy transition have emerged with the progressive integration of the European Union acquis. The Sofia Declaration on the Green Agenda for the Western Balkans is a strong message for the region, as it reconfirmed the determination to pursue and accelerate the accession process and contribute to the carbon neutrality goal introduced by the European Green Deal.

The upcoming National Energy and Climate Plan (NECP) should set a clear path for the reduction of carbon emissions in the energy sector up to 2030, also consistent with the Nationally Determined Contribution. In support of the development of the NECP, technical assistance programmes are currently helping BiH to quantify the impact of carbon prices on the electricity sector. Coal-based generation may not be competitive in case of implementation of carbon prices, which would imply that BiH should adopt sustainable and cost-effective solutions to decarbonise its generation capacity.

## **Driver 3: BiH has significant renewable energy potentials that can fulfil its energy demand**

The country has a significant renewable energy potential, featuring high hydropower, biomass, wind, solar and unconfirmed geothermal resources (IRENA, 2020). Biomass and hydropower are strongly represented in the energy matrix, but more stringent sustainability criteria would need to be applied when planning for further development of these sources. Variable renewable energy resources (wind and solar) are currently underdeveloped but considering their consistently low costs – still dropping despite rising material and equipment costs globally (IRENA, 2022b), these sources could provide a solid option for the delivery of stable power prices and a diversification away from unsustainable coal.

## **Driver 4: BiH seeks to diversify its economy and create qualified and sustainable jobs**

The transition to a decarbonised energy mix also should be accompanied by the reconversion of the coal mining sector, currently facing financial issues. The sector employs thousands of miners and the economic impact of the current downsizing of the coal sector may impact entire communities.

The Sofia Declaration on the Green Agenda for the Western Balkans would be instrumental, as it might facilitate the mobilisation of the necessary resources to implement the energy transition, including the shift from labour-intensive coal mining to a more diversified economy, while ensuring a just transition, a concept widely adopted internationally, and part of several programmes such as the Just Transition Mechanism of the European Green Deal,<sup>50</sup> the Energy Community Coal Regions in Transition Project for Western Balkans and Ukraine,<sup>51</sup> the European Bank for Reconstruction and Development's Just Transition Initiative,<sup>52</sup> and the World Bank's Just Transition for All.<sup>53</sup>

<sup>50</sup> [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en).

<sup>51</sup> [www.energy-community.org/regionalinitiatives/Transition.html](http://www.energy-community.org/regionalinitiatives/Transition.html).

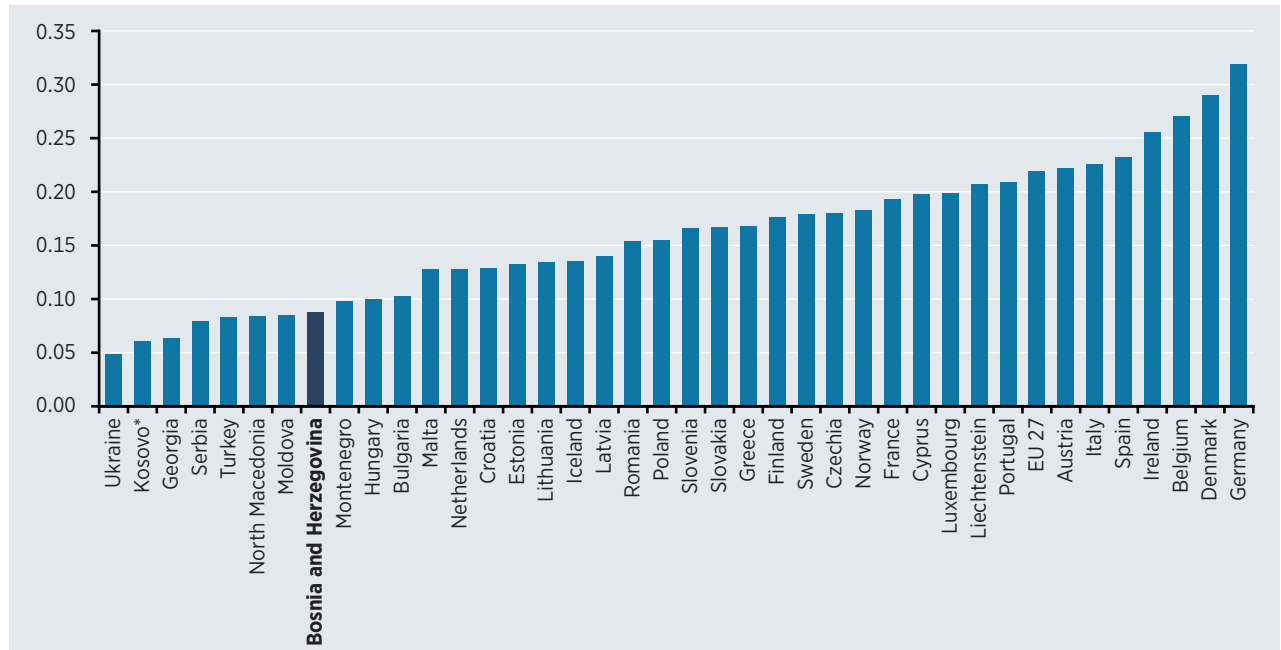
<sup>52</sup> [www.ebrd.com/what-we-do/just-transition-initiative](http://www.ebrd.com/what-we-do/just-transition-initiative).

<sup>53</sup> [www.worldbank.org/en/topic/extractiveindustries/justtransition](http://www.worldbank.org/en/topic/extractiveindustries/justtransition).

## RENEWABLES READINESS ASSESSMENT

With a different narrative, the transition to renewable energy could be promoted as an opportunity to improve the country's resilience, to support its economic diversification and competitiveness, and to secure its energy supply and sovereignty by harvesting its natural renewable resources.

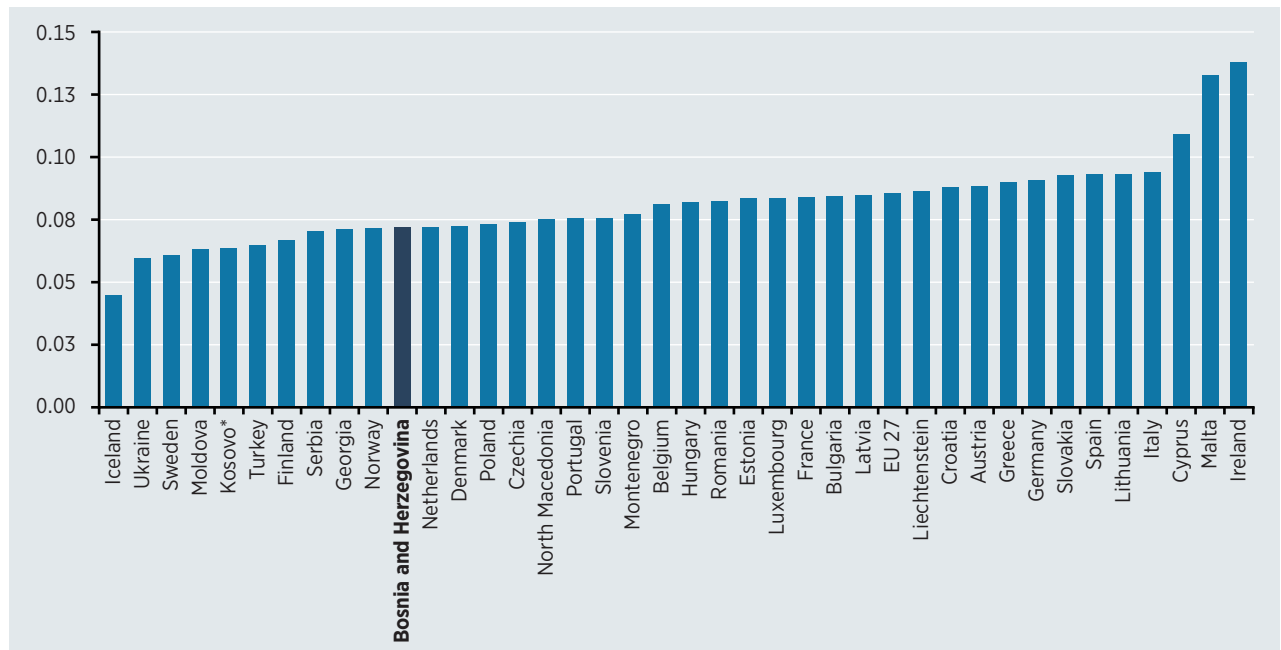
**Figure 12** Electricity prices in EUR per kilowatt hour for households in the first half of 2021, using the Eurostat methodology



Source: (SERC, 2021).

Note: all taxes and levies included.

**Figure 13** Electricity prices in EUR per kilowatt hour for industries in the first half of 2021, using the Eurostat methodology



Source: (SERC, 2021).

Note: all taxes and levies included.

# 5 ACTION PLANS AND STRATEGIES

## Framework Energy Strategy of BiH until 2035 (2018)

Bosnia and Herzegovina (BiH) published in 2018 a Framework Energy Strategy until 2035, where it clearly prioritises the integration of renewable energy resources in accordance with the European Union (EU) Renewable Energy Directive (2009/28/EC) aiming for a share of over 50% for renewable energy in energy consumption by 2040. Based on the Decision of Implementation of Directive 2009/28/EC, a binding objective of 40% of renewable energy in total final consumption by 2020 has been established for the country, which equals 1940 kilotonnes of oil equivalent (ktoe).

A renewable energy goal has been set for both entities. Overall, 56% of the renewable energy share in final consumption would be attributable to the heating and cooling sector. The electricity sector would account for 38% of the total, while transportation would account for 6% of the reduction.

The Framework Energy Strategy (BiH, 2018) foresaw that hydropower plants would maintain the highest contribution to overall renewables share until 2035. The relative contribution of wind was foreseen to increase with the development of additional wind farms. Since solar energy was expected to become competitive by 2035 only (considering the information available then), a minor increase in solar energy's proportion was expected. The Framework Energy Strategy also estimated an increase in the use of solid biomass in cogeneration facilities.

## National Renewable Energy Action Plan of BiH (2016-20)

The National Renewable Energy Action Plan (NREAP) (BiH, National Renewable Action Plan of BiH, 2016) was a legally binding document resulting from the transposition of the EU Renewables Directive (2009/28/EC) when it joined the Energy Community.

By 2020, the Action Plan foresaw a target share of energy from renewable resources in gross final energy consumption of 40%. Of which:

- 52.4% for the electricity sector
- 56.9% in the heating and cooling sector
- 10% in the transport sector.

The NREAP noted that achieving the target is dependent on the accounting of biomass data, which posed challenges regarding the accuracy of the accounting methodology (see section on biomass resources). It noted challenges for the transport sector, due to the lack of regulations; the lack of sustainability criteria for biofuel; lack of incentives and policy framework; and insufficient fuel and biofuel statistics.

Due to the decentralised nature of the regulatory frameworks, the NREAP was cascaded to the entities, which were allocated renewable energy quotas. The quotas system was then implemented through the available support schemes in each entity (see next sections).

According to the Energy Community Secretariat (Energy Community, 2021), for 2019, BiH was slightly under the targets, with an overall share of renewable energy of 37.6%. Of which:

- 45.48% for the electricity sector (against a target of 52.4%)
- 56.27% in the heating and cooling sector (against a target of 56.9%)
- 0.4% in the transport sector (against a target of 10%).

The NREAP was developed based on the consolidated action plans of both entities and was mentioned in the laws on renewable energy and efficient co-generation. According to plans, the indicative targets by 2020 for renewable energy in each entity were:<sup>54</sup>

### **For the Federation of BiH:**

- hydropower: 1566 MW/4 066 GWh
- solar photovoltaic (PV): 12 MW/18 GWh
- wind: 230 MW/575 GWh
- biopower: 10.23 MW/61 GWh

### **For Republika Srpska:**

- hydropower: 1134.22 MW/3 632.08 GWh
- solar PV: 4.20 MW/5 GWh
- wind: 100 MW/200 GWh
- biopower: 25.50 MW/38 GWh

### **Nationally Determined Contribution of BiH for the period 2020-30**

The Nationally Determined Contribution (NDC) (BiH, 2020) was prepared under Decision 1/CP.21 of the Paris Agreement. It revises the first Intended Nationally Determined Contribution submitted by BiH in October 2015.

The report notes the country's vulnerability to climate change due to its geographical position, economic importance of the agriculture, water management and forestry sectors, as well as its limited capacity for climate change adaptation. "The most vulnerable sectors are agriculture and water resources management" (BiH, 2020, 2).

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<sup>54</sup> To be checked and original sources to be reviewed. Source is: <https://cms.law/en/int/expert-guides/cms-expert-guide-to-renewable-energy/bosnia-and-herzegovina>.



In 2014, the major sources of greenhouse gas (GHG) emissions were energy generation (64%) and transport (12%). The overall emissions reduction targets by 2050 are specified as unconditional/conditional value – which includes more intensive international assistance for the decarbonisation of mining areas.

By 2030, the unconditional target in emissions reductions is set to 12.8% compared with 2014 levels or 33.2% compared with 1990 levels. The conditional target is 17.5% compared with 2014 GHG emissions or 36.8% compared with 1990.

The NDC sets GHG emissions reduction targets for 2050 of 50% unconditional and 55% conditional compared with 2014 levels, with more intensive international assistance for decarbonising the power sector and achieving a fair transition in mining areas. The targets also aim to increase GHG sinks in the forestry sector by 93 gigagrams of carbon dioxide equivalent until 2030. The 2020 emissions reduction strategy includes limiting operating hours for inefficient coal-fired thermal power plants, commissioning renewable energy plants, decommissioning carbon-intensive thermal power plants, and gradually using mining locations for renewable energy production. Other measures include reducing coal and heating oil use in buildings, implementing energy efficiency measures, increasing efficiency of heating and cooling systems, and incentivising decentralised and community energy projects.

### **National Energy and Climate Plan until 2030 with projections until 2050 (under preparation)**

The National Energy and Climate Plan (NECP) is a document of high strategic importance, which defines the direction of decarbonisation of BiH until 2030, with projections until 2050. The NECP will replace RES and energy efficiency actions plans, and connect them with the monitoring of GHG emissions, and thus create a planning framework for a multisector approach to combat climate change. The first draft of the BiH NECP was submitted to the Energy Community Secretariat in June 2023, in accordance with defined deadlines.



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## 6 ALIGNMENT OF CLIMATE AMBITIONS IN STRATEGIC DOCUMENTS

Many countries have several international climate and energy commitments that require different updating and reporting processes. Alignment of these different commitments and targets in climate plans is essential for transparency, for providing certainty to stakeholders and for tracking purposes. Additionally, aligning these enables the different processes to be simplified and more efficient.

The targets under Bosnia and Herzegovina's (BiH's) upcoming National Energy and Climate Plan (NECP<sup>55</sup>) must be consistent with the Paris Agreement, the European Union (EU) climate goals, and the Sofia Declaration on the Green Agenda for the Western Balkans. Thus, it is imperative to guarantee that the various climate strategies and targets the country announces are in alignment. Additionally, as a member of the Energy Community, BiH's NECP should reflect the ambition of the European Union, and other energy and climate plans at the national level should do the same.

By reviewing and analysing the national-level assessments that served as input to the NECP (draft as of May 2023) and the most recent update of NDC (2021), IRENA has conducted a comparative study of these documents, focusing on renewable energy targets in the power sector and economy-wide greenhouse gas (GHG) emissions. This analysis was driven by data that BiH provided to IRENA.

This assessment aims to provide high-level advice and strategic guidance to the decision makers in the Government of Bosnia and Herzegovina regarding the alignment of the renewable energy and GHG emissions targets in the NECP presently under preparation and in the recently adopted NDC for 2020-30. It also serves as input for the preparation of the NECP, NDC implementation phase, upcoming NDC updates and long-term plans. A summary of the findings from the comparative assessment carried out by IRENA is presented in this chapter.<sup>56</sup>

### 6.1 COMPARATIVE ASSESSMENT BETWEEN NECP AND NDC SCENARIOS

Different energy scenarios for BiH were explored towards 2050 as part of the developments of the country's NDC and NECP. Both analyses have been conducted using the Low Emissions Analysis Platform (LEAP) software (Heaps, 2022) to assess economy-wide GHG emissions under these different scenarios. This chapter presents the comparative assessment done by IRENA between the analyses and data underlying the two documents. It will focus mainly on the period 2020-30, as this is the focus of the NECP and NDC targets. However, a brief subsection regarding the scenarios' projections towards 2050 is also included.

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<sup>55</sup> When referred to the NECP in this chapter, it refers to draft version of the NECP from May 2023.

<sup>56</sup> An extensive technical report of the comparative assessment carried out by IRENA will be delivered to the country. This publication contains only a summary of the findings.

The NECP explores two scenarios, namely the i) Baseline and ii) Policy scenarios. The Baseline scenario has a low level of ambition for implementing measures and takes into account already planned measures. The recommended scenario in the NECP is the Policy scenario, which is also the most ambitious in terms of economy-wide GHG emissions reductions and renewable energy deployment in the power sector, and the one underlying the targets set in this document. The scenarios explored in the NDC analysis are i) S I (Reference scenario); ii) S II; and iii) S III, with the latter being the most ambitious in terms of GHG emissions reductions and renewable energy deployment in the power sector.

This section will focus on a comparison between the most ambitious scenarios from each analysis: NECP Policy and NDC S III scenarios.

### Electricity supply mix

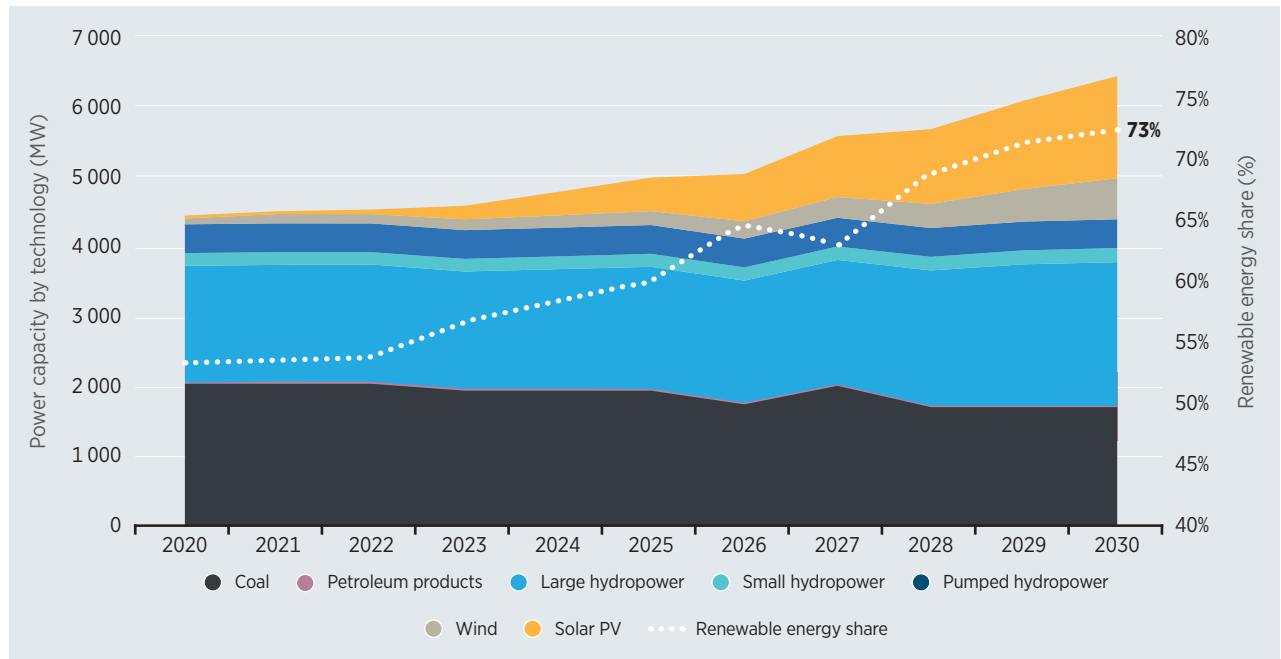
The power capacity by technology and renewable energy share in the capacity mix considered in the NECP Policy scenario for the period 2020-30 is presented in Figure 14 and the NDC S III scenario in Figure 15.

The total net added capacity over the period 2020-30 is 2 039 megawatts (MW) in the NECP analysis and 731 MW in the NDC analysis, whereas the total added renewable energy capacity over the same period is 2 379 MW in the NECP analysis and 934 MW in the NDC analysis. Significant discrepancies are found between the analyses in terms of both total added renewable capacity and added capacity per renewable energy technology. Regarding total added renewable generation capacity, there is 1 445 MW more capacity added in the NECP analysis compared with the NDC analysis. In the NECP analysis, total added hydropower capacity (*i.e.* large hydropower, small hydropower, pumped hydropower) amounts to 415 MW and to 591 MW in the NDC analysis, resulting in a capacity addition difference of approximately 176 MW. However, the NECP presents significantly larger capacity additions for solar power and wind power. Between 2020 and 2030, the NECP analysis adds 1 424 MW of more solar capacity and 207 MW of more wind capacity compared with the NDC analysis.

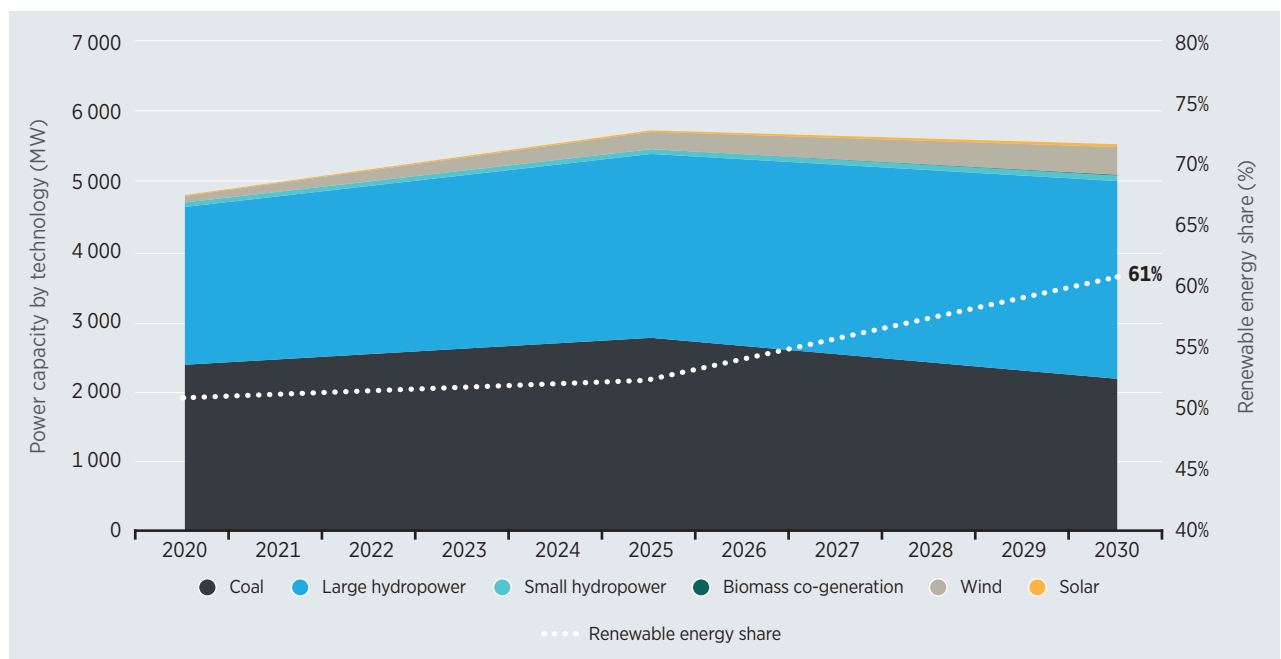
In the NECP analysis, the total installed capacity in 2030 adds up to 6 564 MW in 2030, while in the NDC analysis, the total installed capacity amounts to 5 564 MW in the same year. The share of renewable energy capacity in 2030 is 73% in the NECP versus 61% in the NDC.



**Figure 14** Power capacity deployment and renewable energy share in the capacity mix in the period 2020-2030, NECP Policy scenario



**Figure 15** Power capacity deployment and renewable energy share in the capacity mix in the period 2020-2030, NDC S III scenario

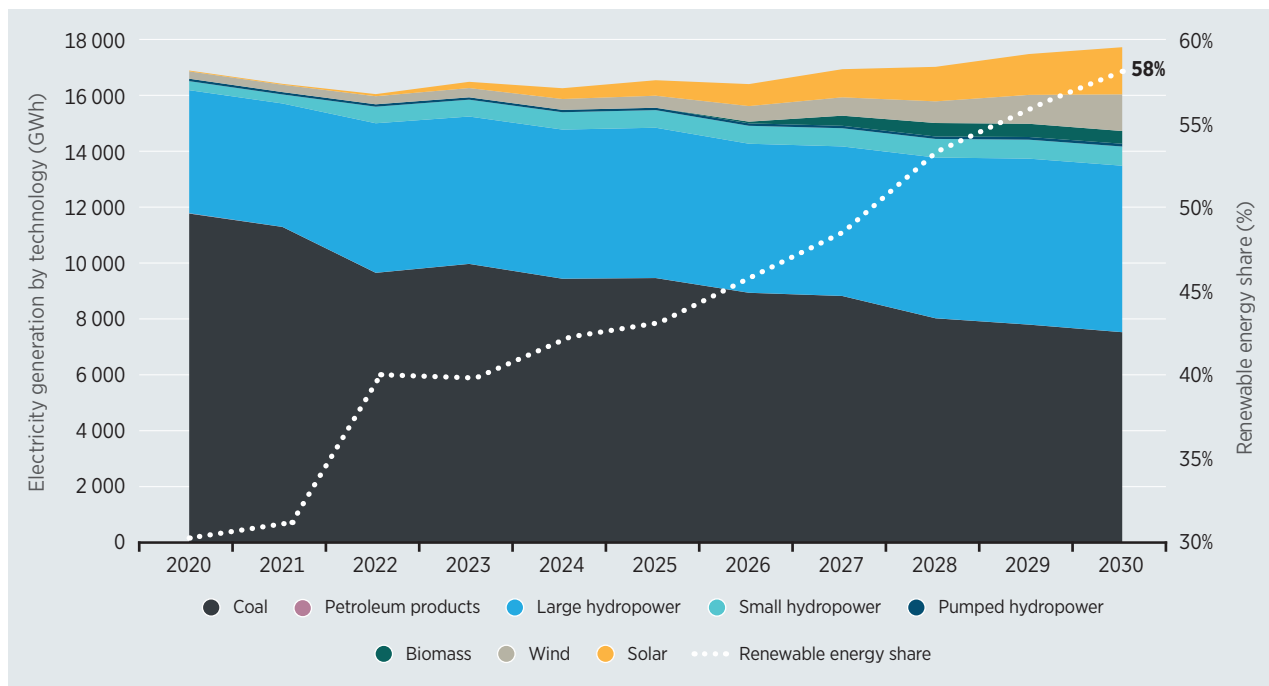


**Electricity generation mix**

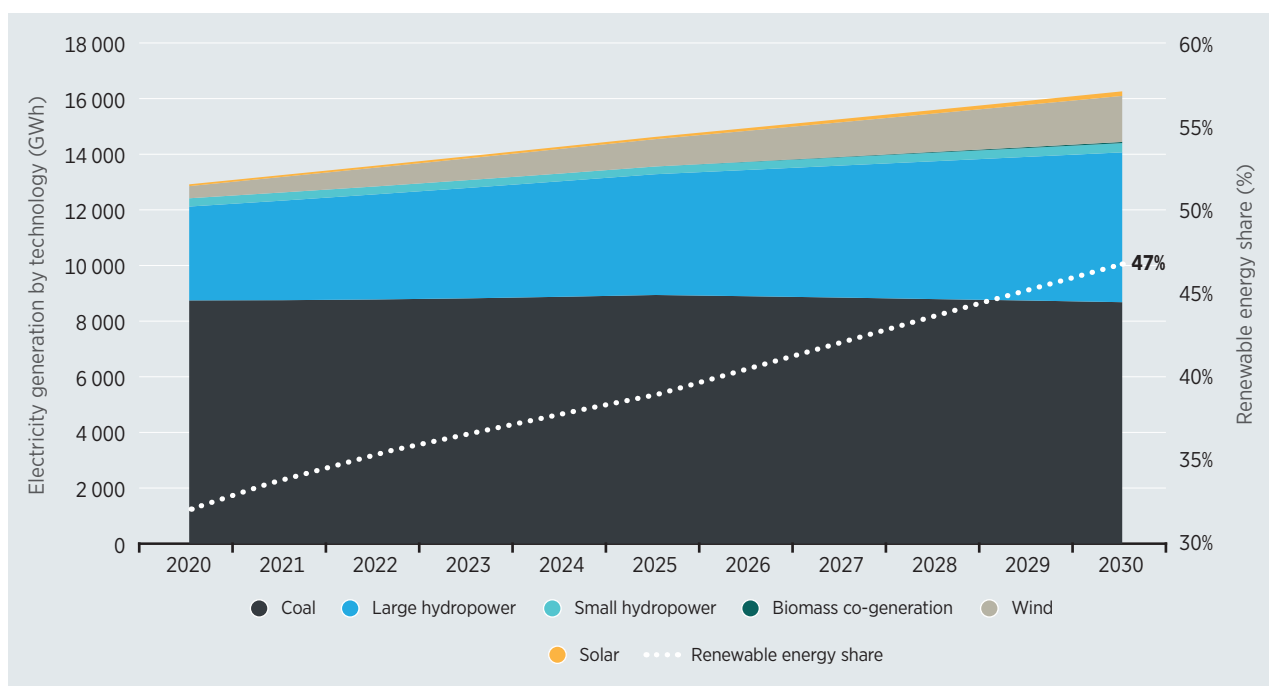
Figure 16 and Figure 17 present the electricity generation by technology and the renewable energy share in the electricity generation mix between 2020 and 2030 in the NECP Policy scenario and the NDC S III scenario, respectively. Under the NECP Policy scenario, a share of electricity will be produced from biomass from 2026 onwards in selected thermal power plants.

The total electricity generated in 2030 is around 6% higher in the NECP, amounting to 17 237 GWh in the NECP and 16 303 GWh in the NDC. The electricity generated from all renewables in 2030 is significantly higher in the NECP – with a difference of 386 GWh in wind, 1473.9 GWh in solar, 821.6 GWh in hydropower and 401.2 GWh in biomass. Electricity generation from coal in 2030 is 19% higher in the NDC (with a difference of 1370 GWh). The renewable energy share in power generation in 2030 is around 58% in the NECP versus 47% in the NDC.

**Figure 16** Electricity generation mix and renewable energy share in the period 2020-2030, NECP Policy scenario



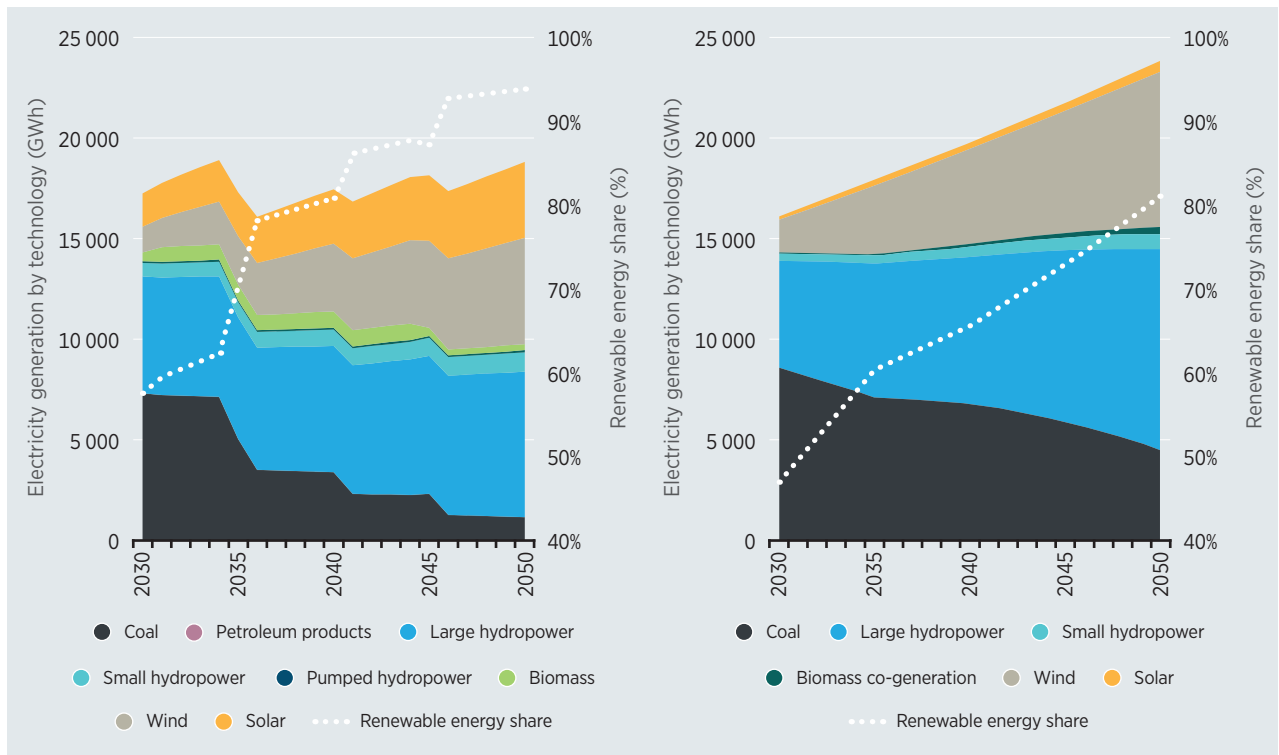
**Figure 17** Electricity generation mix and renewable energy share in the period 2020-2030, NDC S III scenario



■ **Electricity generation mix towards 2050**

To allow a comparison between the NECP and NDC ambition towards 2050, Figure 18 presents the power generation mix and renewable energy share in both analyses between 2030 and 2050. The NECP projections remain the most ambitious in terms of renewable energy penetration in the power sector, reaching 94% in 2050, while in the NDC this projection is 81%.

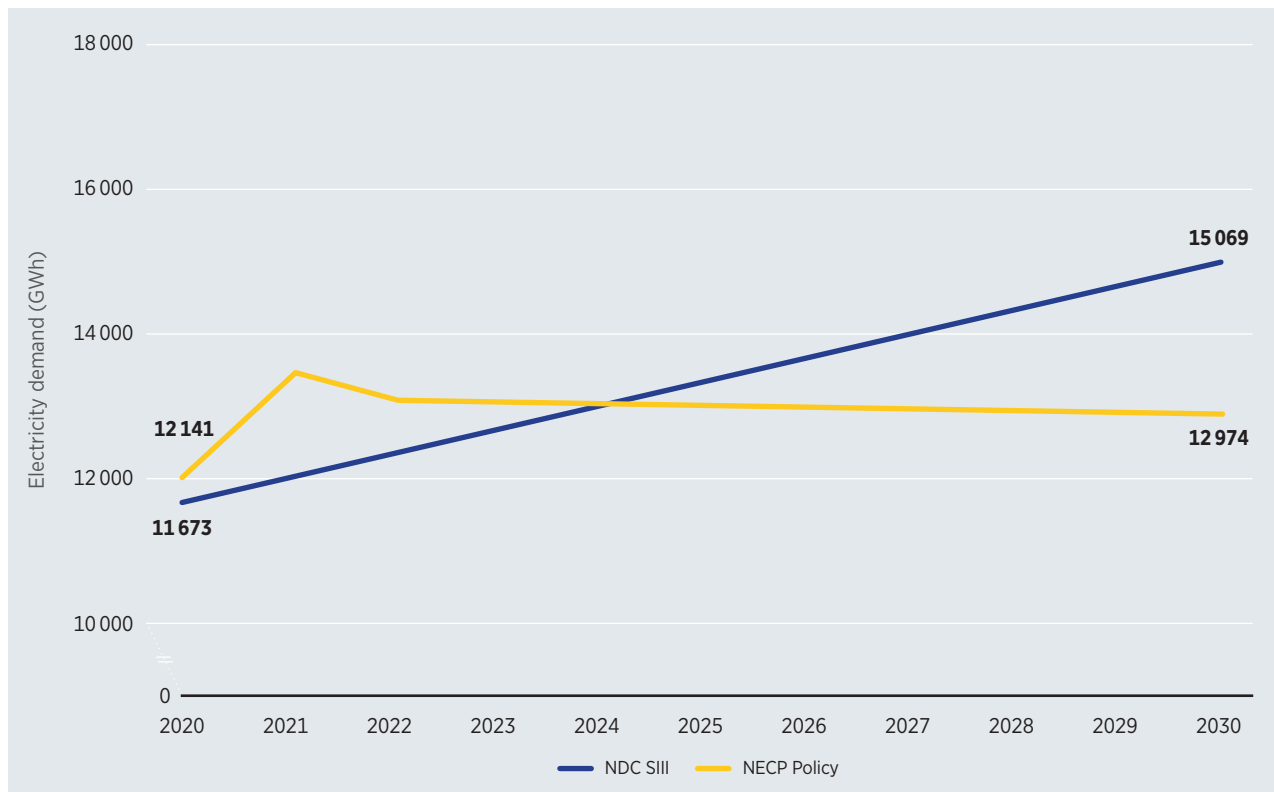
**Figure 18** Electricity generation mix and renewable energy generation share in 2030-2050 in NECP Policy scenario (left) and NDC S III scenario (right)



## Electricity demand projections

Figure 19 presents the electricity demand projections in the NECP Policy scenario and NDC S III scenario for the period 2020-30. The NECP projections present a small increase throughout the period, while the NDC analysis projects a more significant growth up to 2030.

**Figure 19** Electricity demand projections in the NECP and NDC analyses for the period 2020-2030



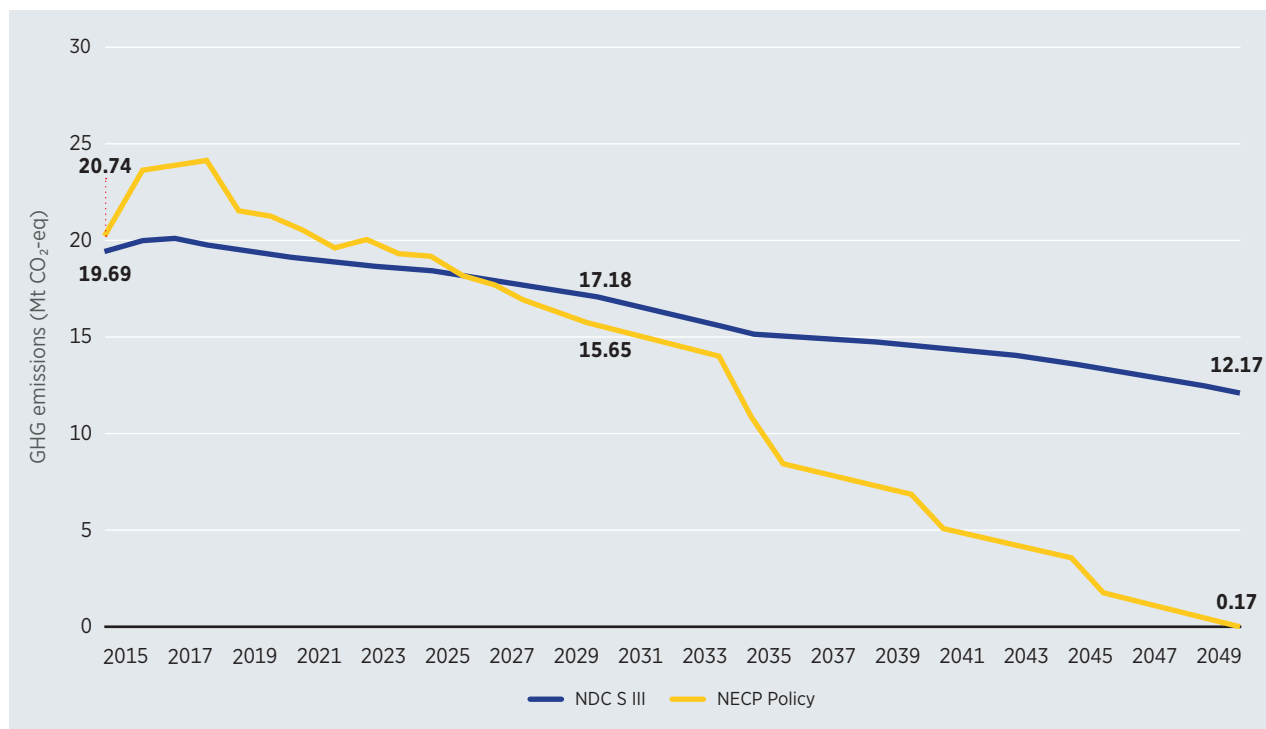
Although not represented in the graph, the sectoral shares of the electricity demand are different between the two analyses. The residential sector has a similar electricity demand in both plans, and it contributes to a slightly higher share in the NECP Policy scenario. On the other hand, larger differences can be observed in the other sectors' demand, with the most significant being in the transport sector, which represents 19% of the electricity demand in NDC S III and only 1% in NECP Policy.

## GHG emissions projections

Figure 20 shows the projected GHG emissions trajectories between 2015 and 2050 based on the most ambitious scenarios developed for the NECP and NDC. Both analyses consider economy-wide emissions. The NDC analysis has the following scope of GHG emissions: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrogen oxides (NO<sub>x</sub>) and hydrofluorocarbons (HFCs); the NECP analysis only considers CO<sub>2</sub>.

The GHG emissions in 2015 are relatively higher in the NECP analysis (around 1 million tonnes [Mt] of carbon dioxide equivalent [CO<sub>2</sub>-eq]) than in the NDC. The NECP Policy scenario has lower emissions in 2030, reaching 15.65 Mt CO<sub>2</sub>-eq, compared with 17.18 Mt CO<sub>2</sub>-eq in the NDC S III scenario. The difference between the analyses is even larger towards 2050, with the NECP Policy scenario reaching 0.17 Mt CO<sub>2</sub>-eq while the NDC S III scenario presents a higher value of 12.17 Mt CO<sub>2</sub>-eq. However, since the scope of emissions is larger in the NDC, it is not possible to determine which analysis is more ambitious.

**Figure 20** Greenhouse gas emissions (incl. LULUCF) projections in the NECP and NDC analyses for the period 2015-2030



**Note:** LULUCF = land use, land-use change and forestry.

In conclusion, through this comparative analysis, it is evident that BiH’s draft NECP reveals a more ambitious path towards renewable energy penetration in the power sector compared with its current NDC. However, it is important to address the significant differences in the projected growth trajectories and sector-specific electricity demands between the two plans.

This highlights the need for streamlining and aligning these varying projections for an effective and consistent energy policy. The NECP Policy scenario outlines a significantly lower GHG emissions path towards 2050, albeit considering a narrower scope of GHG emissions compared with the NDC. This divergence presents the need for a more comprehensive and compatible approach to GHG emissions assessment, to allow a fair comparison. While the draft NECP illustrates an encouraging step towards a greener future for BiH, a thorough harmonisation with the NDC, a holistic view of sectoral demands and an inclusive GHG emissions evaluation are crucial to achieving its energy transition and climate goals.



# 7 ENABLING FRAMEWORKS SPECIFIC TO RENEWABLE ENERGY

As presented previously, the National Renewable Energy Action Plan (NREAP) was adopted in 2016, complemented by the Energy Framework Strategy for Bosnia and Herzegovina (BiH).

Those objectives were implemented through the feed-in tariff scheme under a system of annual energy quotas to be met. The advantage of a quota system is the ability to deliver a certain number of licences while keeping control over the volume of subsidies to the sector and ensuring the balance with the volume of fees retained on end consumers. The feed-in tariff scheme was over-subscribed in both entities, and they were allocated on a first-come, first-served basis, which did not necessarily enable to select the best projects.

As pointed out by the Energy Community Secretariat (Energy Community, 2021), the target quotas expired in 2021, and there was limited information available to understand if they were fulfilled, as the single buyers do not regularly publish the list of projects and incumbents. The tracking of the renewable energy projects has been made more complex by the fact that the tentative registries are submerged with project ideas, due to the lack of maturity indicators for projects and lack of co-ordination among actors.

Yet the renewable energy market is stalled at the moment. Except in the Federation of Bosnia and Herzegovina (FBiH), for small solar photovoltaic (PV) plants under 23 kilowatts (kW), which are eligible for the highest tariff in Table 5 and are not subject to the quota system. Consumers are eligible to develop a production capacity on their premises. However, with the upcoming National Energy and Climate Plan (NECP), the regulatory frameworks had to evolve.

As of January 2023, the regulatory progress of the acquis transposition in accordance with the decision of the Ministerial Council of the Energy Community on the Clean Energy Package is as follows:

- The Government of the Federation approved: 1) revised legislation on renewable energy sources and efficient co-generation; 2) a revised Electricity Law; and 3) a Law on Energy Regulation. The legislative package was adopted in August 2023.<sup>57</sup>
- The Brčko District adopted the Law on Renewable Energy Sources and Efficient Cogeneration and the Law on Energy Efficiency.
- Republika Srpska (RS) adopted the Law on Renewable Energy Sources.

Historically, the legislative background in the energy sector is dense, which shows the intensity of the energy debate. Annex 1 lists the current and passed legislations.

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<sup>57</sup> The draft of this legislative package informed the writing of this report.

The review of the revised renewable energy laws for the three entities shows consistency in the regulatory frameworks with local divergences on the ceilings defining small and large plants, and the eligible technologies in each category.

The new laws establish a single-buyer model with either an independent legal entity (Republika Srpska and the Federation), or as a department within the ministry (Brčko District). The new legislation opens perspectives for auctions, prosumers and energy communities. There are also provisions related to biofuels and electric vehicles.

The implementation of the revised policies depends on the adoption of a high-level auction programme, and a number of rulebooks and methods are mentioned in the documents,<sup>58</sup> which should be adopted within 2023/early 2024. The expectation of the adoption and the implementation of the revised policies, and the absence of transitional measures, creates regulatory uncertainty. It is potentially harming a sector which is currently not supported by local banks but seeking equity and debt internationally.

Auction schemes defined by the revised legislations will be operated by the single buyer. Currently, regulators and (existing) single-buyer entities might be facing staff shortages, which can explain why some parts of the current mandates are not implemented fully. For instance, the Regulatory Commission for Energy in the Federation of BiH (FERK) has 39 staff members, while the renewable energy sources operator in the federation reported 15 staff members, with limited technical capacities. It is therefore possible that delays could be faced in the future organisation of auctions, further delaying projects and the decarbonisation of the power sector.

### 7.1 PERMITTING

Across the legislation, renewable energy sources are encouraged through guaranteed connection and priority dispatch. The legislation includes various provision to simplify permitting and access to the grid, although in practice the permitting process is currently not centralised and involves multiple parties e.g. to comply with spatial planning, acquire a concession, obtain a connection agreement, or request a tariff subsidy or Guarantees of Origin certificates.

USAID (2018) provides detailed guidelines for electricity project permitting in the country. The comprehensive 196-page document recalls that authorities at national level have the authority to issue concessions (for interstate projects) and connections to the transmission network (via the transmission system operator [TSO]). All other permits are issued at the level of entities and Brčko District. The guide was updated in the previous period, and now it has a digital format.<sup>59</sup> However, the permitting process is far from a “one-stop shop”.<sup>60</sup>

Stakeholders also mentioned issues with the quality of the environmental impact studies. In some parts of the value chain, certification frameworks may be missing.

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<sup>58</sup> For example: long-term auction plans, establishment of the incentive operator and its rules, methodologies for determining the guaranteed purchase price and premium for small plants, establishment of a registry of projects, issue of certificates, issue of guarantees of origins, organisation of auctions, rules for prosumers, etc.

<sup>59</sup> The digital guide is available at <https://vodc.usaidepa.ba/>.

<sup>60</sup> On the positive note are the latest development in Republika Srpska where for small solar power plants up to 250 kW, the procedure for awarding a concession is not carried out. In addition, permits are issued by the local community, for the installation of solar panels with an installed power of up to 50 kW, if the object on which the panels are installed has a building permit, certain formalities in the process of obtaining incentives (certificate of registration in the register of projects from renewable sources) have been abolished, etc.

## 7.2 SPATIAL PLANNING

One point of attention has been the lack of spatial planning for renewable energy projects, or the lack of definition of potential zones for projects. Under the current support schemes, this has led entrepreneurs and investors to seek the best project locations and engage with local communities in order to secure land. A risk is to create competition for the best sites and eventually rising opposition to renewable energy projects (IRENA, 2013). Such a case has not been reported yet for solar and wind due to the limited number of actors, but opposition was raised against new hydropower projects.

In the revised legislation, future auctions for large projects can be either open or location-based. Some level of de-risking of the investments should be performed (IRENA, 2019a). There, either a substation availability assessment (for substation-based competitive bidding) or feasibility studies would be a support for the fast development of the sector. Elements for successful auctions are described in detail by the World Bank (2019) and are applied to solar. The need for planning for auctions is, however, relevant for wind power. More elements regarding spatial planning and auction design are included in the recommendation chapter of the Renewables Readiness Assessment (Chapter 9).

## 7.3 TARIFF SYSTEM FOR RENEWABLE ENERGY

For renewable energy, entities have established the principle of a single buyer for renewable energy generated by eligible producers under the available support scheme. The renewable energy tariffs are financed by a levy on end customers. These fees are collected by distribution system operators (DSOs) and are transferred to the single buyer. In the federation, the single buyer is an independent entity, while in Republika Srpska this role is currently fulfilled by the utility until the incentive operator can be established.<sup>61</sup>

These entities are OIEiEK (Operator for Renewable Energy Sources and Efficient Cogeneration) and OSP MH EPS (operator of system for renewable energy sources and efficient co-generation in Republika Srpska). Funds are used for covering operator operating costs and for incentives and balancing costs in the Federation of BiH, whereas collected funds in Republika Srpska are meant for incentives, TSOs' operating costs, balancing costs, and expenses of the Environmental Protection and Energy Efficiency Fund.

End consumers in both entities pay a fee for renewable sources of energy as part of the electricity bill. The fees for renewable energy vary depending on the entity and are defined every year by the decisions of entity governments.

On paper, the laws of entities allowed for a feed-in tariff system, price premiums or Guarantees of Origin, which were intended to be tradable. So far, a feed-in tariff system has been implemented in the Federation, while both feed-in tariffs and feed-in premiums were implemented in Republika Srpska.

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<sup>61</sup> The Law on Renewable Sources of the Republic of Srpska from 2022 defines that an independent institution will be formed to implement the incentive system, but until its establishment, the work will be performed by a unit within the framework of a public company.



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Until 2021, the amount of the feed-in tariff in the Federation of BiH and amounts of feed-in-tariff and feed-in premium in Republika Srpska were decided by the entity regulators depending on the type of renewable source and are reviewed regularly. Between the entities, the renewable energy tariffs varied significantly (Table 10). This was due to the application of different methodologies<sup>62</sup> and tariff categories.

The fact that different levels of tariffs apply to each entity de facto created different opportunities for renewable energy projects and orientated the market towards wind energy and small-scale solar in the federation,<sup>63</sup> whereas Republika Srpska would potentially rather attract small hydropower developers. Other technologies (except wind energy) were also enabled by the support schemes; however, there were only few projects for these technologies.

The revised laws introduce distinctions between small and large facilities, with distinct support schemes (detailed in Annex 1):

- for small producers: a mandatory purchase contract at guaranteed price (RS, FBiH) or with a premium over market price (capped at the guaranteed price value) (RS only)
- for large producers: market premium after auctions either open or location-based.<sup>64</sup>

<sup>62</sup> Republika Srpska is applying a levelised cost of electricity approach, while the Federation is apparently applying an approach based on a premium coefficient to the reference price.

<sup>63</sup> A ban was adopted for small-scale hydropower generation in the Federation.

<sup>64</sup> Contract duration varies from 12 years in the federation to 15 years in Republika Srpska.

**Table 10** Renewable energy support schemes for the entities as of September 2021

	Federation of BiH			Republika Srpska		
In USD per kilowatt hour (kWh)	Size	Reference price	Guaranteed prices (incentive prices)	Size	Reference price	Guaranteed prices (incentive prices) (US cents/kWh)
<b>Hydro</b>	Micro (<=23 kW)	6.65	10.02	-	3.38	-
	Mini (<=150 kW)	-	9.08	-	-	-
	Small (1 000 kW)	-	7.14	<1 MW	-	8.28
	Mid (10 000 kW)	-	6.58	<5 MW	-	6.83
	Large	-	0.00	<10 MW	-	6.60
<b>Wind</b>	Micro (<=23 kW)	-	13.51	-	-	-
	Mini (<=150 kW)	-	11.04	-	-	-
	Small (1 000 kW)	-	9.23	-	-	-
	Mid (10 000 kW)	-	7.76	-	-	-
	Large	-	7.12	-	-	-
<b>Solar</b>	Micro (<=23 kW)	-	17.23	<50 kW	-	12.03
	Mini (<=150 kW)	-	13.25	<150 kW	-	11.48 (10.82 ground-mounted)
	Small (1 000 kW)	-	10.51	<250 kW	-	10.06 (9.38 ground-mounted)
	Mid (10 000 kW)	-	-	< 1 MW	-	8.14
	Large	-	-	-	-	-
<b>Biomass</b>	Micro(<=23 kW)	-	17.05	-	-	-
	Mini(<=150 kW)	-	14.40	-	-	-
	Small(1 000 kW)	-	13.51	<1MW	-	13.63
	Mid(10 000 kW)	-	12.42	<10 MW	-	12.77
	Large	-	-	-	-	-
<b>Biogas</b>	Micro(<=23 kW)	-	31.25	-	-	-
	Mini(<=150 kW)	-	28.55	-	-	-
	Small(1 000 kW)	-	17.87	< 1 MW	-	14.21
	Mid(10 000 kW)	-	-	-	-	-
	Large	-	-	-	-	-
<b>Efficient co-generation plant</b>	Micro(<=23 kW)	-	8.84	-	-	-
	Mini(<=150 kW)	-	8.84	< 1 MW	-	< 1 MW
	Small(1 000 kW)	-	8.84	<10 MW	-	<10 MW
	Mid(10 000 kW)	-	8.84	-	-	-
	Large	-	-	-	-	-

## 7.4 ALTERNATIVE PROCUREMENT SCHEMES

### Auctions

The introduction of auctions is one of the main reforms induced by the revised laws on renewable energy sources in both entities. Entity operators will announce and implement auctions for electricity production from different renewable sources based on quotas defined by entity regulators. Producers will compete for the market premium. Quotas in Republika Srpska will be prescribed by the programme for renewable energy sources, which is prepared by the Ministry of Energy and adopted by the government of RS. In the FBiH, quotas will be defined in the Decree of Quotas, which is prepared by the Federal Ministry of Energy, Mining and Industry and adopted by the government of FBiH.

In the Federation, the premium will be fixed and will be paid on top of the electricity price that the producer quoted during the auction. A lower cap and upper cap will be introduced, which will be defined by the regulator. If the selling price is below the lower cap the producer will get the additional premium on top of the fixed premium to compensate for the difference between the producer's selling price and lower cap price. In case the selling price is higher than the upper cap price the producer will not get any premium. It is expected that there will be a wide range between the lower and upper cap prices, so they would represent extreme cases. The scheme may seem unconventional; however, it might be a mechanism to circumvent the risks of market price volatility in the future.

In Republika Srpska, the premium will be variable. The premium will reflect the difference between the referential price ("market price") defined by the regulator and the price quoted by the producer during auction.

### Power purchase agreements

Power purchase agreements (PPAs) have not been used in BiH so far. However, as in the case of auctions, they are one of the novelties of the new entity laws on renewable energy sources. The type of PPA expected to be commonly used in both entities in the near future is a PPA signed between operator and producers based on an auction. Some other PPA forms are considered; however, the decision has not been made yet.

## 7.5 GUARANTEES OF ORIGIN

According to the legislation, the issuance of Guarantees of Origin (GOs) is decentralised; these are under the responsibility of the single buyer in the federation (OIEIEK), and under the responsibility of the Regulatory Commission in Republika Srpska.

So far, there has not been high demand in entities for issuing GOs for several reasons. Entity operators are not members of the international associations for certification of GOs, such as the Association of Issuing Bodies (AIB), thus GOs issued by operators in BiH are not tradable on the international market. The market pull for Guarantees of Origin is limited to aware customers, for instance companies with a strong internal corporate social responsibility,<sup>65</sup> and there is no real demand.

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<sup>65</sup> Interest from soda companies was reported.

To avoid double counting, the renewable energy facilities under the support scheme regime are not eligible for such certificates. In principle, those renewable energy plants which opted out of the support scheme could be eligible, which has not materialised. Until now, once a producer has sold energy to the operator and received subsidies (feed-in tariff or feed-in premium), operators are obliged, by entity laws, to cancel the GO for that producer and transfer it to the supplier for the obligatory share of the total subsidised electricity that they have received. With the revised renewable energy laws, the GO will be transferred to the single buyer. These will be tradable both nationally and internationally and can represent an income source to finance the renewable incentive scheme.

The Energy Community Secretariat has taken steps to establish a regional scheme for renewable energy GOs, in partnership with the AIB, which defined the protocols for the trade of GOs.

As part of the reforms introduced by the new laws, both entities are undertaking actions towards becoming members of international associations for certification of GOs, which will bring new possibilities for energy producers from the country.

## 7.6 OBLIGATION SCHEMES

The ministries in both entities are designing a model for obligation schemes and preparing the necessary regulatory amendments.<sup>66</sup> Both the model and regulations have been drafted and are in process of approval by relevant government institutions as a step before they are submitted for adoption. According to the draft obligation scheme model, obligated parties are all entities authorised to distribute electrical and heating energy as well as other types of energy. They would collect an obligation scheme fee which would be calculated based on each sector's energy-saving targets. Energy efficiency funds in both entities are envisaged to create energy efficiency programmes for implementation of funds collected through the obligation scheme fee. Once created, energy efficiency programmes would be implemented either by energy efficiency funds in entities or obliged parties. It is possible that, if programmes are implemented by obliged parties, construction of small solar power plants at individual houses and residential buildings would be also supported through these programmes. The effects of such power plants would be twofold: reduction of energy consumption from the system and increase of share of renewable sources in energy production.

### Prosumers

The revised renewable energy laws will open possibilities for consumers to invest in renewable energy and sell electricity to the grid. The laws introduce the consumer-producers "prosumer". The prosumers will be producers of electricity from renewables for their own use, such as individual houses, business premises, etc.

Consumer-producers are enabled to self-produce, store and (for the FBiH) sell excess power. Excess power is credited as an energy credit (or a monetary credit for the Federation). Households and commercial customers can also participate in joint production schemes. These form a community as a legal entity which aggregates buyer-producers.

<sup>66</sup> With support from the United States Agency for International Development's technical assistance.

The legislation also introduces renewable energy communities, which would be further detailed by subsequent legislation in RS. For the federation, these non-profit entities would be entitled to the production, consumption, storage, exchange and sale of electricity from renewable sources, including through contracts on the purchase of energy from renewable sources.

The experience with the current legislation has shown significant complexity and barriers to benefit from support schemes, to address issues of grid charges and value-added tax (VAT), and eventually to connect to the grid, and strong improvements are needed to simplify the process. At this juncture, the awareness and interest of the population in the prosumer market is limited, and information campaigns would be needed to support the new legislation.

There are open questions on the potential impact of the prosumer segment on the demand curves over the distribution systems in BiH.

### **7.7 TECHNICAL, INSTITUTIONAL CAPACITIES AND SKILLS**

When it comes to hydro and biomass, BiH has relatively well-established supply chains and human capacities in terms of project development and operations and maintenance, due to the long presence of these technologies in the country. Furthermore, there are several construction and engineering companies well versed in designing and building power generation facilities over the last decades.

When it comes to other renewable energy technologies, due to its novelty in the market, BiH generally lacks capacities, both human and technological. Based on the feedback from the interviewed financial institutions, local project developers with sufficient capacities to undertake quality renewable energy projects in BiH are few. On the other hand, renowned international developers have been historically discouraged from implementing renewable energy projects in BiH due to the long and complicated procedures and lack of transparency and would require an immersed local partner to support the project facilitation processes.

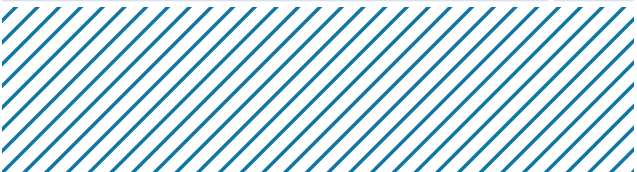
BiH does not produce any renewable energy generation equipment. Project developers are required to import it, however, with adequate incentives in relation to customs and import taxes. Furthermore, there are several private-sector companies that import necessary equipment, especially solar panels, and distribute them in the BiH market. Some of the fossil fuel derivatives distributors, including local business giants, have also recently opened renewable energy branches and integrated solar programmes in their offers and services, which shows a change in the renewable energy market in the country and larger involvement of the private sector. However, due to their smaller size, such developers may not be able to deliver competitive prices in the market without adequate incentives. Nevertheless, such developers, if granted, could be adequate partners in international consortia, allowing facilitated access to the local market and influx of foreign investment.



In order to support BiH in raising its capacities, there have been several initiatives providing technical assistance to the relevant authorities and private-sector developers in developing renewable energy projects and relevant enabling environment with the aim of increasing ownership and creating more sustainable development of the renewable energy sector. In 2016, the International Finance Corporation (IFC) partnered with a private developer to build two wind farms to help diversify the country's energy sources and increase renewable energy generation. The IFC has provided advisory services on the development of the Pločno and Podveležje wind farms, each with a 48 MW installed capacity (IFC, 2016). Other institutions such as the European Bank for Reconstruction and Development (EBRD), the World Bank and GIZ (e.g. development of auctions and renewable energy communities), and USAID (establishment of an electronic registry for projects regarding renewable sources) have also been engaged in supporting the enabling environment.

### Summary of the policy and renewable energy “enabling” regulatory frameworks

**Table 11** Summary of the regulatory framework based on IRENA's classification.

National policy		Regulatory instruments	
Renewable energy law/strategy		Auctions	
Solar heating law/programme		Feed-in tariff	
Solar power law/programme		Premium	
Wind power law/programme		Quota certificate system	
Geothermal law/programme		Hybrid	
Biomass law/programme		Net metering	
Biofuels law/programme		Ethanol blending mandate	
<b>Fiscal incentives</b>		Biodiesel blending mandate	
VAT exemption		Solar mandate	
Fuel tax exemption		Registry	
Income tax exemption		<b>Finance</b>	
Import/export fiscal benefit		Currency hedging	
National exemption of local taxes		Dedicated fund	
Carbon tax		Eligible fund	
Accelerated depreciation		Guarantees	
Other fiscal benefits		Pre-investment support	
<b>Grid Access</b>		Direct funding	
Transmission discount/exemption		<b>Other</b>	
Priority/dedicated transmission		Renewable energy in social housing	
Preferential dispatch		Renewable energy in rural access programmes	
Other grid benefits		Renewable energy cookstove programme	
		Local content requirements	
		Special environmental regulations	
		Food/bioenergy nexus	
		Social requirements	

Based on: (IRENA, 2016).

# 8 RENEWABLE ENERGY FINANCIAL LANDSCAPE

## 8.1 FINANCIAL LANDSCAPE OF THE COUNTRY

According to the Central Bank of Bosnia and Herzegovina (CBBiH) (2021a), the financial system in the country is based on a continental model, where banks play a dominant role and financial markets and instruments are relatively underdeveloped. The financial market in Bosnia and Herzegovina (BiH) is considered a capital market, which focuses on the trade of long-term assets, unlike the money market, where short-term assets with a maturity of less than a year are traded. The market is divided into two capital markets, one in the Federation of BiH and the other in Republika Srpska, and is organised and regulated independently. Securities are traded on two stock exchanges, namely the Sarajevo Stock Exchange (SASE) and the Banja Luka Stock Exchange (BLSE).

In 2020, the domestic credit to the private sector in BiH was 54.8% of the gross domestic product (GDP), according to the World Bank. The country's monetary policy is formulated and executed by the CBBiH, which supervises the operations of banking agencies responsible for overseeing and licensing banks. To support monetary stability, the CBBiH issues the local currency, the convertible mark (BAM), under a currency board arrangement (CBA). The CBA is a fixed exchange rate monetary system (BAM 1 = EUR 0.51129) that operates with open capital markets and mandates that the monetary base can be increased only through foreign exchange transactions. The CBA rules prohibit central banks from creating reserves without foreign currency backing, thus promoting domestic and international monetary financial stability, as explained by Shirley (2013).

BiH's projected real GDP growth for 2023 is 2.0%, the projected current account deficit is 3.7% of GDP, and the fiscal balance is expected to return to surplus 0.6% of GDP for the same year, with a certain amount of reserve accumulation and minor but sufficient international reserves. BiH's public debt remains sustainable and on the lower side (less than 35% of the country's GDP). It was estimated to increase to 38% in 2021 but to return to the normal downturn path and reach 26% by the end of 2025. The fiscal financing gap of 2.1% of GDP (for 2021) has been mainly financed by the International Monetary Fund (IMF), the European Union (EU), and the World Bank (IMF, 2022).

In 2022, Moody's affirmed BiH's credit rating as B3/stable outlook, while in 2023 Standard & Poor's (S&P) revised its previous B/stable outlook to positive. Moody's has assessed the fiscal strength of BiH to be in a better position compared with the countries with the same sovereign rating, given that previous budget surpluses have created sufficient fiscal space to respond to the COVID-19 related crisis and Ukraine war, without a significant increase in fiscal vulnerabilities. According to S&P, the complex political framework, which was the biggest impediment in BiH, has been resolved overall through the prompt formation of a state-level government following the 2022 October general election (SeeNews, 2023). The country has a relatively high default risk spread of 7.95%, and the country risk premium is 11.22%.

Due to inflationary pressures caused by the war in Ukraine and global market disruptions, the annual inflation in 2022 in BiH was one of the highest in the region and is assessed around 14%. The long-term high inflation and slowdown of major trading partners negatively affected the country's economic activity in 2022. In the fourth quarter, however, there were signs of slowdown in inflation, and this trend is expected to last during the first half of 2023, reaching a lower level of around 7% (CBBiH, 2022).

The country has a somewhat sound financial environment, which can provide a level of confidence for investors, with lower severity of financial risks. Furthermore, considering that the local currency is pegged to the euro, there is also a low currency-related risk.

### The banking system

As already mentioned, BiH's monetary policy is defined and implemented by the CBBiH, while two entity banking agencies, namely the Banking Agency of Federation of BiH and the Banking Agency of Republika Srpska, are responsible for bank licensing and oversight.

#### ■ Commercial banks

The banking system in BiH is dominated by commercial banks (EBF, 2020). According to BiH's Foreign Investment Promotion Agency (FIPA) (2021a), there are 23 commercial banks in BiH with approximately 10 000 employees. There are two supervising bodies, the Banking Agency of Federation of BiH and the Banking Agency of Republika Srpska. One of the 23 banks is in majority state ownership. Foreign banks own over 80% of the banking capital in BiH (World Bank, 2015a).

As of December 2021 (CBBiH statistics portal, 2022), the performance of the banking sector in BiH is shown in the following table.

**Table 12** Performance of the banking sector in BiH as of December 2021

	Amount	Growth compared with previous year
Banks net profit	USD 206.7 million	58%
Total assets of banks	USD 20.9 billion	7.6%
Legal entities loans	USD 5 billion	1.4%
Loans to individuals	USD 5.76 billion	1.3%
Deposits	USD 8.44 billion	6.7%

Commercial banks in BiH provide loans only to individuals and private legal companies. Commercial banks currently provide energy efficiency and renewable energy loans, either through equity or loans through programmes of financial support (originating from the European Bank for Reconstruction and Development [EBRD]; KfW, the German development bank; and the International Finance Corporation [IFC] through EU support programmes or directly from the development banks), which are offered across the Western Balkan region (WBIF, 2019). In Table 13 is shown a tabulated overview of the main initiatives offering financing for energy efficiency and renewable energy projects.

**Table 13** Overview of the main financing support programmes offered for renewable energy and energy efficiency initiatives

	Programme	Support
1	Western Balkan Investment Framework (WBIF, 2019)	In December 2009, the European Commission, the Council of Europe Development Bank (CEB), the EBRD, bilateral donors and Western Balkans beneficiaries established the Western Balkans Investment Framework (WBIF). The aim of the WBIF is to provide finance and technical support for strategic investments. The platform was later joined by KfW and the World Bank. The Agence Française de Développement (AFD) became a participant organisation in December 2018. The WBIF combines grants, loans and beneficiary contributions to fund infrastructure development in various sectors, including energy, environment, social, transportation and digital sectors, as well as private-sector development.
2	EBRD's Green Economy Financing Facility (GEFF) (EBRD, 2021a)	The GEFF offers credit lines to support investments in the green economy sector for residential purposes, as well as for businesses that offer energy-efficient and renewable energy products and services to households.
3	EBRD's Western Balkans Sustainable Energy Financing Facility (WeBSEFF) I and II (WeBSEFF, 2021)	The WeBSEFF offers credit lines to partner banks, which then provide the funding to businesses and municipalities seeking to invest in energy efficiency and small-scale renewable energy projects. In BiH, UniCredit Bank and Raiffeisen Bank are among the partner banks participating in the programme.
4	EBRD SME Competitiveness Programme (SME CSP, 2021)	The EBRD in BiH offers a credit line through local partner banks, along with a 15% grant and free technical assistance funded by the European Union. This programme helps small and medium-sized enterprises (SMEs) determine their investment needs to meet priority EU directives. The partner banks involved in this programme include UniCredit Bank, UniCredit Bank Banja Luka, Sparkasse Bank, Sparkasse Leasing and Intesa Sanpaolo Bank.
5	Green for Growth Fund (GGF) (GGF, 2021)	The GGF, which also operates in BiH, is a blended finance structure that combines risk capital provided by public institutions with additional private capital to significantly increase investment volumes. It offers direct financing to projects, refinancing and technical assistance to financial intermediaries operating in the sector. Additionally, it raises funds from donors, international financial institutions (IFIs), and private-sector investors.
6	Regional Energy Efficiency Programme (REEP) (Regional Cooperation Council, 2021)	REEP, which is managed by the EBRD, is a programme that aims to support energy efficiency and renewable energy projects in the public and private sectors of Western Balkan countries. It achieves this by blending policy support to governments with loans, technical assistance and incentives. REEP works both directly and through intermediaries to create an enabling policy environment, support investment preparation and provide medium-term financing. Its ultimate goal is to encourage households, businesses and the public sector to prioritise investment in energy efficiency.
7	IFC-Canada Climate Change Program (IFC, 2021)	The IFC has been utilising its programme funds to support the private sector and local banks in BiH to establish a new lending product and generate a pipeline for energy efficiency and renewable energy investments. Additionally, the IFC aims to enhance the accessibility of long-term financing and sustain confidence in the local banking sector.
8	Bilateral co-operation of KfW and Raiffeisen Bank (Raiffeisen Bank, 2021)	KfW provided financial support to Raiffeisen Bank to establish a credit line aimed at helping SMEs finance their investments in energy efficiency and projects that generate energy savings.
9	USAID/SIDA DCA Loan Guarantee Facility (USAID, 2017)	The Facility raises private cash to fund development projects, as well as demonstrating the financial sustainability of such investments to the local banking industry; credit guarantees provided by the programme help SMEs gain access to cash and take use of technical assistance provided by other initiatives; the bank receives a 50% guarantee on the loan principle under the DCA scheme (partner banks: ProCredit Bank and Sparkasse Bank)

**Note:** USAID = United States Agency for International Development; SIDA = Swedish International Cooperation Development Agency; DCA = Development Credit Authority

## ■ State-owned banks

There are two development banks on the level of the entities, the Development Bank of the Federation of BiH and the Republika Srpska Investment-Development Bank (IRBRS).

The Development Bank of the Federation of BiH is fully owned by the government and is responsible for managing approximately USD 238 million in funds (Development Bank of the Federation of BiH, 2021a). The bank provides a credit line with a maximum loan amount of USD 1.19 million and a maximum repayment period of 12 years to finance renewable energy projects such as wind, solar, hydropower, geothermal energy, biomass and biofuels, as well as other environmentally friendly sources (Development Bank of the Federation of BiH, 2021b). The IRBRS is the Republika Srpska government-owned financial institution that was established to manage the assets of Republika Srpska. The bank's total assets amounted to around EUR 1.2 billion as of 31 December 2017, while the total investments amounted to EUR 1.1 billion (loans and securities) at the end of 2017 (Hungarian Development Bank, 2021). IRBRS does not have credit lines or grants specifically for renewable energy but provides support to entrepreneurs and businesses in the form of loans for the acquisition of fixed assets, working capital and refinancing of existing borrowings in Republika Srpska. The maximum sum available to legal corporations is around USD 2.97 million, while entrepreneurs can receive up to USD 296 890, subject to rules and limitations (IRBRS, 2021).

According to a report by the World Bank (2015a), several domestically owned banks in BiH rely heavily on government assistance. The IRBRS holds a significant number of shares and subordinated debt issued by some of these banks, which would otherwise be undercapitalised. In addition, it has substantial credit lines available for on-lending to all commercial banks in the country and deposits in four domestic banks. The report also notes that BiH's corporate sector, mainly consisting of SMEs, heavily relies on bank credit for financing due to limited alternative sources of funding.

The non-banking financial sector in BiH is relatively small and includes insurance and reinsurance companies, leasing companies, investment funds, and microcredit organisations, with each accounting for around 2-5% of financial system assets as of the end of 2020, according to the CBBiH (CBBiH, 2020).

## Microfinance institutions

The BiH microcredit sector has played a critical role in decreasing poverty and supporting the development of SMEs. The microfinance institutions (MFIs) are supervised by the banking agencies (AMFI, 2021). The total assets in 2020 amounted to around USD 632.39 million. There are several examples of MFIs financing renewable energy projects. The funds of the GGF have been utilised in BiH through four MFIs. The total portfolio to date is USD 6.31 million. The EBRD signed a USD 4.59 million loan agreement with an MFI through its GEFF programme for green investments (EBRD, 2021b). According to project developers, the cost of loans from MFI is still too high, up to 20% in nominal interest rate.

## International finance in BiH

Given that (local) private investment is still in its infancy, much of the financing still comes from foreign aid and international donors. Net official development assistance (ODA) from both Development Assistance Committee (DAC) and non-DAC donors amounted to USD 464.51 million in 2019, which is just over a third the maximum amount of USD 1286.24 million that was ever received through ODA in 1999. The ODA includes loans with a grant element of at least 25% (calculated at a rate of discount of 10%) (World Bank Data, 2021b).

In 2019, six projects, including investments into facilities and project preparation documentation, were set for implementation using the ODA funds. The table below shows the allocated and disbursed funds (as of 2021).

**Table 14** Renewable energy projects funded through ODA for 2019

Project title	Allocated funds (USD)	Disbursed funds (USD)
SBF Consulting services – pumped storage power plant (PSPP) Vriilo	0	18 930
Construction of wind farm Hrgud	225 378	25 880
Rehabilitation and modernisation of the pumped storage hydropower plant Čapljina	16 903 370	0
Promotion of renewable energy in BiH	1 284 656	1 155 725
Use of geothermal energy for the development of Cazin municipality – survey	149 087	149 087
Support for energy self-sufficiency of minority returnees in Western BiH	374 894	374 894
<b>TOTAL:</b>	<b>18 937 387</b>	<b>1 724 518</b>

Source: (Ministry of Finance of BiH, 2022)

USD 72.22 million was allocated to the energy sector in 2019 – USD 34.31 million as grant and USD 37.91 million in loans. USD 18.93 million was allocated to the renewable energy subsector, of which USD 2.03 million was grants and USD 16.9 million was loans (World Bank Data, 2021a).

## Sources of funds for the renewable energy sector

### Domestic funding

Traditionally domestic banks and domestic institutional investors that are more familiar with the national situation are less concerned about the political and other risks that reduce foreign investor confidence.

Even though the country lacks sufficient domestic financing opportunities, in 2020, BiH accrued gross domestic savings of 2.1% of its GDP, which reduced slightly from a bit over 17% in 2019 (most likely due to COVID-19) (World Bank Data, 2021b).

The privately owned renewable energy plants have been developed by local private companies with financing from commercial banks through loans and in a smaller part, their own capital.

IFIs and development banks are keen on encouraging the domestic market either through tailored technical assistance and policy advice or financial support through local financial intermediaries. The financial system of the country is sound enough to attract new investors.

### DFIs and multilateral banks

Development finance institutions (DFIs) and multilateral banks have a developmental role and look primarily for development impacts and sustainability, without profit targets. As a result, they are more “risk friendly” and they are the natural partners of BiH. On the other hand, their due diligence is more thorough and lengthy, especially for environmental and social impact assessment, and their funding capacity is limited. Some multilateral banks will require strong counter guarantees from the Ministry of Finance before they make a commitment, and this may create a problem at the government level.

Most of the renewable energy projects that have been initiated in the last five years have been financed through loans from IFIs. The total cost of the projects amounted to USD 464.73 million. The projects are listed in the table below.

**Table 15** Renewable energy projects in the last five years

No.	Project name	Financing amount (million USD)	Financier	Financier
1	Wind Park Mesihovina	80.09	KfW (loan)	Implemented
2	Wind Park Podveležje	73.24	KfW (loan)	Implemented
3	Hydropower plant (HPP) Vriilo	112.69	KfW (loan)	Cancelled
4	Wind Park Hrgud	67.61	KfW (loan)	Ongoing
5	HPP Janjici	33.81	KfW (loan)	Ongoing
6	HPP Vranduk	97.36	No information	Cancelled
7	Unknown	42.26	European Investment Bank (loan)	No information
8	Unknown	29.29	EBRD (loan)	No information
9	Unknown	25.80	Own source of funding through local commercial banks	No information

Source: (Ministry of Finance of BiH, 2022)

When it comes to large-scale wind projects in BiH, the majority of the projects are in public ownership, financed through loans from IFIs with the support of smaller bilateral grants from public funds.

### ■ Blended finance

In blended finance, the DFI or multilateral institutions provide funding that reduces the perceived risk of the private sector, given their ability to leverage strong bargaining power and the capacity to resolve problems in time. Some of these institutions have a preferred creditor status that details their recourse in the case of the government's default. The private sector thus benefits from the "umbrella" that is provided and reduces its risk premium.

Blended finance instruments include loans (with an A and B tranche), partial risk guarantees, credit and political risk insurance. In the best case, the risk rating of the country will be replaced by the rating of the multilateral or DFI partner. In the case of BiH, institutions such as the European Investment Bank (EIB), the EBRD and the World Bank are natural partners.

### ■ Bonds

In 2019, the government sector issued a total of 17 bonds and treasury bills on both stock exchanges. The Federation of BiH issued six long-term bonds with a nominal amount of USD 117.33 million, ranging in maturity from three to ten years and with interest rates ranging from 0.05% to 0.8%. Additionally, the Federation of BiH held an auction for treasury bills with a total nominal amount of USD 11.73 million and a maturity of nine months, offering an interest rate of -0.195% (CBBiH). The Republika Srpska issued eight bond issues with a nominal amount of USD 159.45 million, ranging in maturity from five to ten years and with interest rates ranging from 2.3% to 4%. The government of Republika Srpska also issued two treasury bills for USD 23.47 million, with a maturity of six months and interest rates ranging from 0% to 0.0993% (CBBiH, 2020).

Given the low interest rates achieved, bonds are an attractive means of raising funds for renewable energy projects. Elektroprivreda of Republika Srpska and the Ministry of Finance of Republika Srpska have announced plans to commence a bond issuance worth USD 162.5 million on the Vienna Stock Exchange, which will be used to finance hydropower plants (Balkan Green Energy News, 2021a). However, there has been no anticipation of bond issuance in the Federation of BiH yet.

### Public-private partnerships

Public-private partnerships (PPPs) can avoid or reduce public investments in infrastructure projects (Amović, Maksimović and Bunčić, 2020).

Republika Srpska has encountered difficulties in implementing PPPs thus far. However, with the support of the EBRD, the municipality of Sokolac has taken steps towards launching a PPP project for a biomass district heating system with co-generation, making it one of the first local communities in Republika Srpska to do so. A similar project was also implemented in Banja Luka, creating a PPP between the city and a regional privately owned company (EBRD, 2021c). Despite the Federation of BiH not yet having adopted a law on PPP, all ten cantons have implemented PPP projects by adopting appropriate PPP laws in line with their competencies. There is currently one official PPP agreement in Brčko District.



However, similar to PPPs, concessions in renewable energy projects can encourage private investment scaling. The laws on concessions in BiH regulate the tendering procedure and the approach to private capital investment in cases of insufficient budgetary funds for projects of general interest, particularly in the field of energy, at both the entity and state levels (UNCTAD, 2015). It is vital to note that all of BiH's concession legislation provides self-initiative offers as one of the ways to begin the procedure for awarding the concession (EBRD, 2014). This means that a private partner may submit directly to the competent ministry a proposal to be granted a concession for which there has been no public invitation announced. The Law on Concessions allows for the investor/financier to take over the renewable energy project (permanently or temporarily) in case the payment has not been implemented accordingly, which may mitigate the perceived project risks (Commission for Concessions, 2021).

- There are two solar plants that will be built soon in Republika Srpska and these will be awarded concessions (Balkan Green Energy News, 2021b). The concession for one of the plants has been initiated by the private utility EFT and the agreement has been signed for 50 years (60 MW). EFT is required to pay around USD 3.2 for each megawatt hour generated, with the municipality where the plant is situated receiving 95% of that sum. The government of Republika Srpska has awarded another concession to the Elektroprivreda of Republika Srpska (73 MW). The same requirements have been offered as in the case of EFT.

## 8.2 FACILITATING RENEWABLE ENERGY PROJECTS

The country has to attract significant investments in order to achieve the energy transition and the conditions set by the European Union. These will come only partially from domestic banks and investors. International commercial banks and investors as well as DFIs and intergovernmental institutions will have a major role. The challenge of BiH is to create the conditions that attract all the funding it needs, at an acceptable cost.

Similar to other energy infrastructure investments, the cost of renewable energy finance can be significant. There are many parties involved – on both the public and the private sides. The environment is highly regulated and even minor changes can affect the viability of a project. Risk mitigation instruments to protect a project are not always available, they come at a cost, and the recourse mechanism can be lengthy.

The result is that any renewable project will be scrutinised from many angles during lengthy due diligence processes. One single negative mark can jeopardise the whole process.

Besides the binary decision of whether a given project or funding proposal meets the minimum criteria for support or not, the assessment by lenders and investors will also include an estimation of the risk that the project carries. The higher the risk – whether real or perceived – the higher the “risk premium” that will be asked. This risk premium is the difference between the revenue that investor or lender can achieve from a “risk free” investment (typically T bills from the US government), and the requested interest rate or return on equity. The premium will provide compensation for the probability that the investment may not be recoupable at some point in time.

As a consequence, even small changes in interest rate and the dividends have a larger impact on the financial costs of renewable energy projects, seen over the entire life span of the project. A renewable project that carries a high risk premium may not be competitive compared with a traditional generation source.

The risk premium depends on multiple factors and there will always be a subjective factor in the assessment, and eventually the “perceived risk” is the focus of inquiry. For example, if the country has no experience or track record with renewable energy auctions or independent power producers, the investors will make an educated guess of the probability that the government or the utility will honour the commitments that it made many years before. The Renewables Readiness Assessment describes a number of uncertainties that will influence the assessment of investors and lenders. In this chapter we highlight some of the more striking elements, as well as the opportunities and strategies for future development.

### Counterparty risk

In the case of projects that are initiated by the public utilities, lenders will always assess the capacity of the utility to service its debt. The balance sheet funding of (public) utilities in BiH is generally not sufficient to cover the costs of large-scale renewable energy projects (also due to their already high indebtedness), and therefore, additional funding will need to be secured. With the involvement in the EU Emissions Trading System (ETS), BiH could access the payments for emissions reductions. This may represent an additional potential source of funding for renewable energy projects in the country in the future, but this will not be available in the medium term.

Currently, there are no organisational funds established for providing financing, guarantees or co-financing for investments in renewable projects. Republika Srpska adopted a new law on renewable energy sources at the beginning of February 2022, while the Federation of BiH adopted a similar law in August 2023. The laws do not envisage the establishment of renewable funds or similar institutions.

Since the pricing for end consumers is not cost-reflective, the utilities depend on subsidisation by the government to continue their operation, which will result in a higher risk assessment by lenders and less favourable conditions.

Some local developers on the other hand may lack the creditworthiness that would enable them to attract funding at low rates. Potential international investors will primarily evaluate the offtaker risk (on the public utilities), but lenders – who traditionally provide 70-80% of the funds – will evaluate any risks associated with both the utility and the equity investors. The weakness of both will negatively impact the cost and availability of the potential loan.

## Tax relief and other incentives

- BiH has implemented a series of measures that can help to attract new investments, at both the national and the entity levels.

### ■ Tax benefits

The base corporate income tax in the country is 10%, one of the lowest in the region, with the overall tax burden comparatively low, even when other minor business taxes are considered. Furthermore, corporate income tax exemptions exist to encourage new investments, exports and job creation. Although the tax regime is generally appealing to businesses, its administration is strenuous and allows for tax engineering and arbitrage (UNCTAD, 2015).

Additionally, the country offers import tax exemptions for foreign investments in all sectors, including renewable equipment for projects. When importing equipment that is not manufactured in BiH for the purpose of new or expanded production, modernisation of production, introduction of new or modernisation of existing production technology, and direct manufacturing activity, foreign investors are free from paying import tax. They are also excluded from paying import taxes on production assets and other equipment belonging to a company that ends operations in another country and relocates to BiH's customs zone to resume operations (FIPA, 2021b).



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## 9 KEY CHALLENGES AND RECOMMENDATIONS

*The draft National Energy and Climate Plan (NECP) was submitted to the Energy Community Secretariat in June 2023, and new energy and renewable energy laws have since been adopted in both entities. Several of the recommendations presented herein were developed with stakeholders during the course of the RRA process in 2021-2022 and are reflected in both the NECP and current legislation.*

The country has made significant efforts to adapt and implement the necessary regulatory and legislative changes committed through the Energy Community acquis<sup>67</sup> to its own constitutional structure, with decentralised legislative responsibilities, distributed between the national level and the entities.

Two decades ago, Bosnia and Herzegovina (BiH) embarked on the liberalisation of its electricity market<sup>68</sup> with continuous efforts made to date. The speed of adoption into national legislation and the level of regulatory performance vary, with gaps in implementation – earmarked in the following sections as issues.

### **Action for improvement of the regulatory performance: Learning from the past reform period**

Originating from a transposition of texts of *the* Energy Community acquis into local legislation, the energy regulatory frameworks of the entities forming BiH show strong similarities. Each has a specific legislative package, which is dense and detailed, and sometimes complex to operationalise.

Current legislative texts may open room for interpretation. For instance, the renewable energy laws feature several support schemes and incentive mechanisms of various complexities, *i.e.* feed-in tariffs, feed-in premiums and Guarantees of Origin. At this juncture, a detailed assessment of the current legal framework has not been carried out. Yet on the ground, the laws are only partly implemented, and authorities implement the instruments most suitable to their case.

The multitude of actors in the energy sector adds another layer of complexity to the regulatory framework. For instance, the country features three regulators with different jurisdictions who regulate the local electricity markets independently. The licensing procedures, price-setting mechanisms, fees and tariff methodologies do not appear to be co-ordinated between entities. Those divergences result in practice in the creation of subnational renewable energy markets, having their own traction, which makes it challenging to implement an overarching national policy.

<sup>67</sup> [www.energy-community.org/legal/acquis.html](http://www.energy-community.org/legal/acquis.html).

<sup>68</sup> Indicated by Decision 48/06 (2006) on Scope, Conditions and Time Schedule of Electricity Market Opening in BiH.

There are also gaps in the capacity of the authorities to absorb and implement such complex regulatory frameworks. For instance, the electronic system for issuance, cancellation and transfer of Guarantees of Origin, in line with the Energy Community acquis, is not in place in the Federation of Bosnia and Herzegovina (FBiH), while it was introduced already in Republika Srpska,<sup>69</sup> among other performance gaps indicated.

Given the complexity of the regulatory frameworks and policies, capacity reinforcement is needed at all levels of governance, in order to ensure that the laws are duly implemented and that interpretations do not lead to market distortions.

In the short term, additional significant reforms will be carried out, with the ongoing implementation of the Clean Energy Package, part of the Energy Community acquis, to be transposed in local legislation by 2023, and full implementation by 2024.

### Recommended actions

- Among the elements to pay attention to is the capacity of the legislators to adopt laws by the agreed timelines, and of institutions to implement the adopted legal framework. To accelerate the adoption and implementation, the staffing and competences of the current institutions (e.g. regulators, renewable energy operators, independent system operator) should be supported and reinforced.
- Synergies between regulators and between renewable energy operators could be built through harmonisation e.g. regarding time frames for implementation, regulatory performance monitoring, information exchange on internal processes, ongoing cases and best practices.
- Beyond building institutional capacities, the complexity of the legal framework remains. For the future renewable energy laws, it is recommended to streamline the texts and operationalise a limited number of options as support mechanisms for renewable energy, to avoid further interpretations of the law during the implementation phase. Based on the first recommendation, a regulatory performance review process should be enforced by the regulators, based on performance indicators, which should lead to recommendations for legal improvements. Co-ordination between entities to achieve a uniform application of the support schemes at entity level would also be recommended in order to ensure consistency between investments in each entity.

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<sup>69</sup> Currently under elaboration, as part of the Energy Community Secretariat's Regional System of Guarantees of Origin in the Energy Community project which was carried out for all contracting parties in the past period. Electronic registers for guarantees of origin were established for the Federation of Bosnia and Herzegovina and the Republic of Srpska, and the necessary training was carried out for the competent publishing bodies (Operator for renewable energy sources and efficient cogeneration of the Federation of Bosnia and Herzegovina and Regulatory Commission for Energy of the Republic of Srpska). The developed registry system is compatible with EU standards to ensure the technical compatibility of the Energy Community guarantee of origin system with wider European markets and as such allows trade in guarantees of origin between contracting parties. In order for Bosnia and Herzegovina to officially start using the developed registers and regional system in accordance with EU practices, it is necessary for the competent publishing bodies in Bosnia and Herzegovina to sign bilateral contracts with the company which carried out the activities in question. Regulatory Commission for Energy of the Republic of Srpska signed a bilateral contract with the relevant company in June 2023, and in the forthcoming period the same is anticipated from the FBiH Operator.

- The design of new renewable energy procurement schemes should be based on the past performance of the current ones, and in line with the recommendations of the Renewable Energy Directive, the main form of procurement should include market-based premiums and competitive bidding (further recommendations hereafter).<sup>70</sup>
- The effective implementation of the NECP will depend on developing renewable energy projects without administrative delays. Specific attention should be put on streamlining and simplifying the administrative procedures for obtaining the necessary authorisation to build, operate, produce and sell energy, e.g. only the necessary institutions should be involved, fewer permits should be required, standardised applications should be defined and specified response timelines from the authorities should be specified on each case. There, the concept of a “one-stop shop” (OSS)<sup>71</sup> for renewable energy projects might be explored as a long-term goal to streamline administrative burdens.<sup>72</sup> Developers should obtain application forms and information about what documentation is to be provided for securing permits and consents at one place. Once the documentation is provided by investors, the OSS would distribute it to competent institutions and monitor the process until permits are issued, after which, the investors would receive the permits from the OSS.

### **Towards integrated strategy for planning and investment in the energy transition and required infrastructure**

As per the Governance Regulation, BiH is currently developing its NECP, with the final draft being submitted by June 2024.<sup>73</sup> Currently, the NECP process is led by the Ministry of Foreign Trade and Economic Relations of BiH (MOFTER) together with the Ministry of Energy and Mining of Republika Srpska; the Ministry of Physical Planning, Construction and Ecology of Republika Srpska; the Federal Ministry of Energy, Mining and Industry; the Federal Ministry of Environment; and the Brčko District government of BiH. However, the complexity of the process shows the lack of regular co-ordination among these institutions that is not only related to the draft of the NECP.

According to MOFTER,<sup>74</sup> the NECP will be central to the co-ordination and consistency between the existing strategies and plans in the field of energy and environment: the Energy Framework Strategy 2035; the Strategy for Climate Change and Low-Emission Development; the Action Plans for Renewable Energy and for Energy Efficiency; the updated Nationally Determined Contribution (NDC); the Environmental Strategy and Action Plan (ESAP 2030+); and the upcoming Building Renovation Strategy. The country does not currently have an integrated strategy for planning and investment for the power sector. This role should be fulfilled by the Independent System Operator in BiH (NOSBiH), in charge of developing the Indicative Generation Development Plan and the Long-term Transmission System Development Plan. The Indicative Generation Development Plan is qualified by the stakeholders interviewed during the Renewables Readiness Assessment process as prospective; however, financial commitments are not in place.

<sup>70</sup> Included in revised renewable energy laws.

<sup>71</sup> Illustrated by Danish Energy Agency (2020).

<sup>72</sup> On this point the Renewable Energy Directive Article 15 might be reminded contracting parties must take necessary measures to streamline administrative procedures and establish predictable time frames for such procedures. It also requires the establishment of simplified and less burdensome authorisation procedures, including a simple notification procedure, for decentralised devices and the production and storage of energy from renewable sources.

<sup>73</sup> Article 9 of the Governance Regulation. Draft NECP has been submitted to the Energy Community Secretariat in June 2023, in accordance with defined deadline.

<sup>74</sup> Presentation at the Renewables Readiness Assessment workshop, December 2021.

In practice, investment planning in generation capacities is carried independently by the incumbent vertically integrated utilities, and the country lacks independent power producers (IPPs) for utility-scale projects. The fleet of generation assets is ageing and inefficient, and new investments are needed in generation. Investments in new coal capacities are being foreseen, despite the risk of creating stranded assets for the decades to come. Therefore, the upcoming NECP is an opportunity to create a predictable pathway for the decarbonisation of the energy sector, through setting up targets, incentives and measures for power sector transformation.

Currently, within the entities, the support scheme allocations follow quota capacity allocations, which were defined until December 2020. Those quotas were extended until December 2021 and are no longer valid.<sup>75</sup> In a case of a lengthy transition period for the submission of the final NECP, and in the absence of quotas under the current system, the path is uncertain with regard to the development of renewable energy projects.

### Recommended actions

- Despite the official extension of the deadlines for submission of the final NECP, the timeline for its preparation should continue being triggered by the national agenda rather than external processes, in order to avoid disruption and further delays in the renewable energy transition. Therefore, release of the final NECP before the deadline is recommended, due to the already existing gap of intermediate measures to support the renewable energy sector in the short and mid-term.
- A further recommendation proposes institutionalising the co-ordination mechanism for implementation and monitoring purposes. Namely, the co-ordination framework organised under the NECP is a key co-ordination mechanism for the energy sector. As the NECP should include a monitoring and review process based on the biannual NECP progress report, the current NECP co-ordination framework should be institutionalised in order to ensure robust co-ordination and monitoring mechanisms. More concretely, this can be done through setting up a permanent energy planning team/office that can also be responsible for co-ordinating with different entities and ministries, with its own capacity to develop and model medium- to long-term capacity expansion within BiH. This also allows the team to focus on regular updates and quality assurance for such activities, keeping up with market developments and political changes, and consistent with the climate commitments formulated by the NDC.
- The International Renewable Energy Agency's (IRENA's) costs studies clearly show that renewable energy is cost-competitive with fossil fuel-fired options in most parts of the world (IRENA, 2022b). For the Southeast Europe (SEE) region, IRENA indicates onshore wind could undercut the levelised cost of electricity (LCOE) of fossil fuels by 2025, and solar photovoltaic (PV) and hydropower can already be generated at competitive levels in SEE (IRENA, 2019b). When setting up its renewable energy targets by 2030, BiH should take into account the most recent cost data for the different technologies in order to capture least-cost planning as well as to review the new trends periodically, which opportunity is given also by the review mechanisms of the NECP.

<sup>75</sup> Although the new Law on Renewable Sources in Republic of Srpska was adopted in 2022, the 1st Amendment to the Law on Energy was made in order to create the basis for the adoption of the Entity Energy and Climate Plan, which is reported as a reason the adoption of the by-law defining the new incentive quotas was delayed. Drafting of the by-law is in the final stage and its adoption is expected in the course of 2023.

- The greenhouse gas (GHG) targets and the renewable energy targets will increasingly have to factor in the carbon trade mechanisms under the Paris Agreement and Glasgow Climate Pact. This will further reduce the cost-competitiveness of coal-based electricity, with potential consequences on the future viability of the utilities and rising prices for consumers, including energy-intensive industries.<sup>76</sup> Therefore, the development of strategies to mitigate the power supply risks and to decarbonise power generation should preserve energy independence and security of supply. The economic impacts in coal regions should be mitigated as part of the Just Transition.
- Setting up coherent plans and targets by 2030 which are in line with the Paris Agreement goals and the long-term strategies by 2050 will bring investors certainty and predictability in their implementation. In this view, the long-term energy planning for renewable energy targets should adopt an integrated approach, which moves from long-term through short-term planning steps, and establishes clear, internally consistent feedback loops within techno-economic assessments (IRENA, 2017b, 2017c).
- The successful implementation of the renewable energy and climate targets should be based on the development of robust implementation plans for electrification and renewable energy targets in all end uses (buildings, transport, industry); the adoption of a reliable enabling framework; and the mobilisation of adequate financing instruments and volumes.
- The generation and transmission plans should be updated to reflect aspirations/targets approved in NECP. These will then help create the solid and bankable project pipeline for BiH, which will need to be deployed according to a phased plan. In order to stimulate the market, the capacities to be allocated under each support scheme, and implementation timelines, should be specified per technology, and transparently communicated through rolling plans, forming an overall NECP implementation plan.<sup>77</sup>

### **Clarity vis-à-vis project capacities and locations with verified solid pipelines of renewable energy projects as a requirement for their implementation**

At the national level, the National Renewable Energy Action Plan (NREAP) was adopted in 2016, complemented by the Framework Energy Strategy of BiH until 2035. The NREAP was developed based on the consolidated action plans of both entities and is mentioned in the laws on renewable energy and efficient co-generation.

Those objectives were implemented through the feed-in tariff scheme under a system of annual energy quotas to be met. The advantage of a quota system is the ability to incentivise projects while keeping control over the volume of support to the sector and ensuring the balance with the additional costs passed on to end consumers.

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<sup>76</sup> Studies are currently being conducted by international organisations to capture the potential impact of carbon mechanisms on the competitiveness of coal assets, and to quantify impacts to final users.

<sup>77</sup> Regulation (EU) 2018/1999 requires an indicative trajectory by 2025, with a 65% share of realisation by 2027. Article 20 requires integrated reporting on renewable energy to include trajectories per technology.



As pointed out by the Energy Community Secretariat (Energy Community, 2021), the target quotas have expired,<sup>78</sup> and there is limited information available to understand if they were fulfilled, as the single buyers do not regularly publish the list of projects and incumbents. The lack of tracking of the renewable energy projects is further complicated by the fact that the tentative registries are submerged with project ideas, which may not mature. Potentially, improved co-ordination among the actors might allow to reference projects that have – at minimum – carried resource measurement campaigns and reached a certain level of maturity.

Yet the renewable energy market lacks direction at the moment. With the upcoming NECP, the regulatory frameworks should evolve, potentially with the opportunity to conduct auctions for large renewable energy capacities and redefine the rules for smaller capacities. The new legislation will open perspectives for auctions, prosumers and electric vehicles (EVs). Currently the renewable energy laws of Republika Srpska and of Federation were adopted. The by-laws are currently being prepared in both entities, with support of GIZ, the German development agency.

However, the regulatory uncertainty, created by the extended revision of the legislation, might seriously impact project developers, in the expectation of the adoption and the implementation of the revised policies. It is potentially harming a sector which is currently not funded by local banks but seeking equity and debt internationally. Intermediate transitional measures might have been preferable, in order to sustain a nascent renewable energy market.

The Renewable Energy Directive allows for the application of support schemes to incentivise renewables.<sup>79</sup> Those support schemes should respond to price signals and be granted under the “form of a market premium” “sliding or fixed”, which should be granted in an “open, transparent, competitive, non-discriminatory and cost-effective manner”, which calls for the implementation of auction systems for large capacities.

Auction systems are complex to operate, and responsibilities of the different stakeholders (e.g. auctioneer, offtaker, bidders, developers) and institutions should be set into details. The capacities of the regulators and single-buyer entities (renewable energy operators) should allow to carry effective and transparent auction mechanisms. Currently, regulators and single-buyer entities might be facing staff shortages, which can explain that some parts even of the current mandates are not fully implemented.<sup>80</sup> Additional resources might be required to design and conduct the new auction schemes.

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<sup>78</sup> According to interviews, the expiry of the quota system is confirmed for the FBiH. However, Republika Srpska had established its action plan, adopted in accordance with the previously defined Law on Renewable Sources, which was valid until December 2021. The new quotas will be determined by the Program on the Use of Renewable Sources, which is expected to be adopted in the course of 2023. However, the interest in obtaining incentives is significantly lower compared to the period of a few years ago, because many small producers as well as investors interested in building facilities with large installed power plan to build facilities without any type of incentives.

<sup>79</sup> Renewable Energy Directive, Article 4.

<sup>80</sup> For instance, the Regulatory Commission for Energy in the Federation of BiH (FERK) has 39 employees, while the renewable energy operator in the federation reported 15 employees, with limited technical capacities.

One point of attention is the lack of spatial planning for renewable energy projects, or the lack of definition of potential zones for projects. Under the current support schemes, this has led entrepreneurs and investors to seek the best project locations and engage with local communities in order to secure land. Although assigning the responsibility of site selection to the bidders can lead to the identification of the most suitable sites, there is a risk that all projects would be concentrated in zones with the highest potential. This could lead to issues with grid connection and the concentration of socio-economic impacts (in terms of benefits such as jobs but also disadvantages such as noise or landscape impacts) in specific zones. In some other countries, this concentration of projects has led to social opposition to renewable energy projects. Designing auctions to be zone- or site-specific can reduce those risks and spread the benefits more equally among regions, but it means the government would have to undertake assessments related to resource and land availability, and grid connection (IRENA, 2013).

### Recommended actions<sup>81</sup>

Several dimensions should be factored in the auction process (IRENA and CEM, 2015), which are categorised as auction demand, qualification requirements, winner selection process and seller's liability. The auction implementation strategy would require a dedicated task force, which should look into critical elements for investors, such as the capacities of the organisation(s) which would be in charge to develop the auction demand and select the auction scheme; to define the qualification requirements; to establish the criteria and process for the winner selection process; and to set the seller's liabilities. At this juncture, recommendations address primarily auction demand and qualification requirements.

- Auction demand should be transparently announced ahead of time, *i.e.* the choice of the auctioned volume and its split among technologies and project sizes.<sup>82</sup>
- Several arrangements are possible, *e.g.* technology-neutral versus technology-specific auctions, and stand-alone or systematic auctioning schemes. As introduced in previous recommendations, a full alignment between the national and the entity levels should be achieved, which entails alignment between the overall NECP objectives, its implementation timeline and the target quotas to be implemented by the entities, accompanied by robust enabling regulatory framework and the mobilisation of adequate financing instruments and volumes.
- Long-term certainty and predictability regarding the upcoming auctioned volumes need to be communicated to investors. As auction schemes for renewable energy projects should become the norm for large capacities, co-ordination, alignment and transparency should be delivered through an auction pipeline with clear capacity targets and timelines, co-ordinated across entities, *i.e.* a systematic auction scheme.

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<sup>81</sup> Many of the recommended actions in this section were included in the draft NECP and revised renewable energy laws in Republika Srpska and FBiH, as well as in draft entity bylaws on auctions for electricity from renewable energy sources.

<sup>82</sup> In the case of Republika Srpska, the new Law on Renewable Resources defines that six months before the auction, the Government adopts a Decision defining the basic elements for the auction and publishes it on the website so that investors are informed in a timely manner in order to prepare for the auction.

- In support of auctions, a key mechanism for implementation will be to maintain a transparent and updated project registry for each category of the auction, consolidated at national level. This information is of great need for potential investors, bidders, grid operators and regulators, and should be publicly available.
- To prevent renewable energy projects from being concentrated solely in areas with abundant resources, location constraints must be considered. These constraints may be implemented to promote geographic diversity, ensure proximity to the grid or loads, or address other concerns. One approach to implementing location constraints is to use demand bands that are specific to certain locations. Another option is to include a “project location” component in the criteria used to select winning projects. Finally, requiring that participating projects be located in specific areas is also a potential strategy, as suggested by IRENA and CEM (2015).
- Those areas should be assigned for renewable energy projects and referenced in spatial plans. Their identification should be based on, e.g. the renewable energy resource, cost-efficient gains in generation adequacy, a first-level grid impact assessment, the feasibility of land acquisition, and environmental and social impact assessment (ESIA), as well as a consultation of the local authorities and populations. The ESIA, in particular, should follow international standards enforced by the international financial institutions (IFIs), which can allow institutional donors to contribute to financing projects.
- Also, considering the long lead times involved in infrastructure development, infrastructure investments should be urgently initiated to enable the delivery of renewable energy projects along the NECP. The previously mentioned spatial planning process should be used to establish the priority reinforcement projects. The Indicative Generation Development Plan and the Long-Term Transmission System Development Plan, under the responsibility of NOSBiH, which formulates recommendations regarding the integration of renewable energy sources to the transmission level, should factor the investments required in the transmission network to accommodate the timely integration of the renewable energy capacities, consistent with the NECP.
- The Renewable Energy Directive seeks to assess the performance of the support for renewable energy sources granted through tendering procedures,<sup>83</sup> including by “achieving cost reductions”, which implies a broad participation in the auction scheme, leading to effective competition. Collusion and price manipulation should be avoided.
- Qualification requirements such as track record are essential, but can create barriers for local new/small players.

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<sup>83</sup> “Analysing in particular the ability of tendering procedures to: (a) achieve cost-reduction; (b) achieve technological improvement; (c) achieve high realisation rates; (d) provide non-discriminatory participation of small actors and, where applicable, local authorities; (e) limit environmental impact; (f) ensure local acceptability; (g) ensure security of supply and grid integration.” (Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources).

- Qualification requirements could include socio-economic benefits, such as recourse to local manufacturing and workforce. Initiatives establishing synergies with the Just Transition concept could be encouraged through the award mechanism (further recommendations in subsequent sections).
- The winner selection process should be established, *i.e.* it defines the bidding procedure, the minimal competition requirements, the selection criteria, the clearing mechanism, and marginal bids and the payment to the auction winner.
- Minimum price criteria may be amended by other non-monetary criteria such as socio-economic benefits, location, developer's experience, etc. Mechanisms also exist to establish ceiling prices over which the bid would be discarded (IRENA and CEM, 2015).
- A seller's liabilities should be set and clear to all participants, *i.e.* rules ensuring high implementation of the awarded projects and timely implementation.
- A balance should be sought between setting stringent compliance rules and the risk of increase transaction costs. The notion of risk should be carefully accounted for; according to IRENA, "risk allocated should be clearly communicated, transparent, fully quantifiable, and enforced".

### Enforcement of retail electricity market reform and consumer empowerment

In the FBiH the power utilities are bundled companies. The separation of accounts for generation, distribution and retail has been postponed to the 2023-25 time horizon, when the distribution assets should be fully unbundled. In Republika Srpska, the utility was unbundled for distribution, while it maintains a bundled generation and retail licence.

The unbundling of the distribution networks has potential to improve their performance, with improved quality of service on some distribution networks. This is illustrated by one example provided by the interviews, where the regulatory commission of Republika Srpska (RERS) was able to implement a revenue requirement methodology for the distribution companies, which led to triggering investments and improving performance of some of the incumbents. The methodology was adopted which should enable the regulator to push the regulatory performance of the distribution sector to meet international standards. In the Federation, the utility EP HZHB also claims to have made improvements. The company is essentially preparing for future unbundling.<sup>84</sup>

Currently, some industrial companies express interest in power purchase agreements (PPAs) with renewable energy project developers. Those companies may introduce energy management and renewable energy for the purpose of security of supply due to the exposure to carbon prices in the future, and to secure stable electricity prices.

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<sup>84</sup> The information is pending for EP BiH, as it was requested after the interview took place.

With the revised legislation (introduced in Republika Srpska and in the Federation), prosumers segment is open for consumers to invest in renewable energy, self-consume and deliver surplus electricity to the grid (Balkan Green Energy News, 2023b). However, at this juncture, the awareness and interest of the population in the prosumer market is limited.

Complaints were raised on the lack of benefits of the levies for renewable energy feed-in tariffs to the end consumers. There are open questions on the potential impact of the prosumer segment on the demand curves over the distribution systems in BiH.

### Recommended actions

- The “free choice of supplier”<sup>85</sup> is addressed in current legislation but is not yet effective. The blocking point lies in the enforcement of market-based supply prices.<sup>86</sup> The operationalisation of the free choice of supplier should be carried out to allow the emergence of end customers and retailers willing to source power exclusively from renewable energy sources. The competitiveness of renewable energy should rely on the implementation of Guarantees of Origin, and market-based retail pricing. A prerequisite for activating customer switching is a competitive offer on the market, which may happen after the introduction of the emissions trading system mechanism (gradual), more intensive construction of renewable energy sources in BiH and the establishment of an organised electricity market and its connection with neighbouring markets.
- The transition towards market-based retail pricing can create a level playing field for renewable energy, which is increasingly cost-competitive. At the same time, it is important that the price reform is accompanied by mitigation measures to protect vulnerable consumers and small and medium-sized enterprises (SMEs). For the deprived consumer categories, the directive allows for public intervention regarding electricity price, but with strict boundary conditions.<sup>87</sup> Regulators should ensure those requirements are met.
- Building on current experiments on smart metering, active customers, which should among other things be entitled to self-generate electricity, participate in energy efficiency schemes and flexibility schemes. The Electricity Directive strongly recommends promoting energy efficiency and empowering final customers through, among others, the adoption of smart meters. The policy guidelines formulated by the Energy Community Secretariat<sup>88</sup> should be enforced.
- In parallel, the unbundling of distribution system operators (DSOs)<sup>89</sup> should be enforced to allow for the efficient management, transparent and non-discriminatory access of the distribution networks. It is acknowledged that the operation of the DSOs would be impacted by the emergence of the prosumer market, evolving towards “smart grids”. Participants in the Renewables Readiness Assessment workshop recommended a progressive evolution of the regulatory framework, based on regular regulatory performance evaluation by the entities’ regulators.

<sup>85</sup> *Electricity Directive, Article 4.*

<sup>86</sup> *Electricity Directive, Article 5.*

<sup>87</sup> *Set by Directive (EU) 2019/944 Article 5.7.*

<sup>88</sup> *See Policy Guidelines of the EnC on Integration of Renewable Self-Consumers, PG 03/2020, 28 September 2020.*

<sup>89</sup> *Energy Directive, Article 35.*

- The experience with the current legislation has shown significant complexity and barriers to benefit from support schemes. Issues of grid charges, value-added tax and eventually connection should be addressed. In this regard, strong improvements are needed to simplify the process and enable interested consumers to contribute to the energy transition through becoming prosumers.
- In order to promote the opportunities for prosumers introduced in new legislation information, campaigns would be needed to make consumers aware and willing to engage in the prosumer market.
- Active customers should also be enabled, through implementing the newly defined framework for renewable self-consumers, acting individually or aggregated, as well as renewable energy communities.<sup>90,91</sup>

### **Towards a transnational wholesale power market that incentivises efficient investments**

On the generation segment, there is no evidence of an operating competitive market, as internal trading is limited due to the absence of an internal power market, and competition is limited. It is also understood that each utility balances its own generation as part of its own balancing groups, each utility operating its own dispatch centre with its own internal constraints. Complementary balancing is then operated at national level through a competitive balancing market organised by the independent system operator (ISO).<sup>92</sup>

The internal balancing, combined with bundled supply and retail licences, lacks transparency regarding the costing methodologies on the generation side. It is also noticeable that the power system in BiH is performing local dispatch of the generation assets, while the principle of capacity credits for renewable energy would call for larger balancing areas, which would harvest the statistical complementarity between wind and solar and lower the “intermittency” of variable renewables.

Currently, the balancing groups tend to create a need for each of the utilities to consider increasing the hydropower capacity for storage<sup>93</sup>. Potentially, some joint efforts could be made regarding the development of balancing capacities at national level, in order to seek optimisation of storage at system level, rather than through individual balancing areas.

With the practice of balancing groups, the actual benefit of renewable energy plants in a portfolio would essentially rely on the dispatch strategy of the utility. For assets not owned by the utilities (independent power producers [IPPs]), the merit order effect of renewable energy projects is possibly implemented by the obligation to purchase and dispatch the electricity purchased by the single buyer (the operators for renewable energy sources in each entity). Yet, within the current scheme, there might be situations where a cost-reflective price is not guaranteed, nor is the financial viability of each asset in the portfolio guaranteed. Eventually, some assets within the generation fleet might be subsidising underperforming investments.

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<sup>90</sup> *New laws in BiH prescribe role of aggregators, prosumers and energy communities.*

<sup>91</sup> *Renewable Energy Directive, Articles 21 and 22.*

<sup>92</sup> *The ISO is in charge of maintaining the overall balancing of the system. A balancing market has been operational since 2016; the balancing market involves balancing groups (the bundled utilities) and some minor contributors.*

<sup>93</sup> *Interviewees did not consider battery storage at large scale as economical.*

## Recommended actions

- Efforts were made towards the establishment of an organised day-ahead and intraday electricity market in BiH. These efforts were supported by technical assistance projects to the development of a regulatory framework necessary for the establishment and operationalisation of an organised electricity market, expected, among others, to provide relevant price signals for new investments into the renewable energy sources. The coupling of such a day-ahead and intraday market should be implemented in line with the newly adopted Electricity Package in the Energy Community. This will increase cross-border trade, competition and integration of renewable energy sources, thus contributing to security of supply and sustainability. More specifically, to support the uptake of renewable energy and lowering GHG emissions in a cost-efficient manner, the established day-ahead and intraday market should be integrated into the European single electricity market. To get an exemption of electricity imports to the European Union from the Carbon Border Adjustment Mechanism (CBAM), which will apply as of 1 January 2026, BiH shall complete market coupling before the end of 2025 as one of the preconditions for obtaining the exemption from CBAM.<sup>94</sup>

## Action to integrate socio-economic aspects of the energy transition and renewable energy deployment

IRENA (2022c) models the impact of an energy transition roadmap towards the 1.5°C temperature goal of the Paris Agreement and quantifies impacts in terms of gross domestic product (GDP), employment and welfare. The scenario involves a rapid phase-out of coal and expansion of renewable power in the period 2021-30, and a phase-out of oil for transport and feedstock on period 2031-50. For the SEE region, half of the total final energy use should rely on electricity by 2050, of which 86% should come from renewable energy sources, rising to 7 000 terawatt hours (TWh). The transition could result in 2.5% in GDP improvements and nearly 50 000 additional jobs.<sup>95</sup>

Last year, IRENA and ILO (2021) noted that the renewable energy sector performed better than conventional energies during the 2020 COVID-19 pandemic and showed better resilience. The socio-economic benefits of renewable energy deployment vary with the ability to enable local content and local employment through “contracting arrangements, technical development and co-operation, and local capacity development” (IRENA and ILO, 2021, 9).

The economy of BiH is performing below its potential, and facing brain drain (see Chapter 1). In this context, new opportunities for growth can arise from the diversification of the economy and the energy mix, if managed in a way that acknowledges both the challenges and the benefits that derive from it. The transition to a decarbonised energy mix should be accompanied by the reconversion of the coal mining sector, currently facing financial issues. The sector employs thousands of miners and the economic impact of the current downsizing of the coal sector may impact entire communities.

<sup>94</sup> Article 2 of the Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism (Text with EEA relevance), OJ L 130, 16.5.2023, p. 52-104, EUR-Lex - 32023R0956 - EN - EUR-Lex (europa.eu).

<sup>95</sup> IRENA presentation to the Renewables Readiness Assessment workshop, 7 April, 2022.

The Sofia Declaration on the Green Agenda for the Western Balkans would be instrumental, as it might contribute to channel the necessary resources to implement the energy transition, including the shift from labour-intensive coal mining to a more diversified economy, while ensuring a just transition, a concept widely adopted internationally, and part of several programmes and initiatives such as the Just Transition Mechanism of the European Green Deal,<sup>96</sup> the Energy Community Coal Regions in Transition Project for Western Balkans and Ukraine,<sup>97</sup> the European Bank for Reconstruction and Development's (EBRD's) Just Transition Initiative,<sup>98</sup> or the World Bank's Just Transition for All.<sup>99</sup>

### Recommended actions

- An economic assessment considering the adoption of the carbon price impact, and how carbon price revenues can be reinvested in the Energy Transition, is fundamental to scaling the efforts in support of the Energy Transition. Special attention should be paid to the social implications on employment, energy prices, impact on industry, and energy poverty and vulnerability. The coal regions in transition should be an integral part of the discussion.
- To gather support from citizens for the energy transition, the benefits of renewable energy and energy efficiency measures should be visible to them, a few examples being building renovation programmes or district heating improvements. Also, public awareness should be raised regarding the social benefits of the energy transition, environmental aspects and empowerment of consumers.
- In the short term, the targeted skills, entrepreneurial capabilities and industrial capacities required to implement the NECP should be assessed, with the objective to leverage local competences and engage local industries to create renewable energy value chains. An industrial policy would need to be based on an assessment of which parts of the value chain can be localised. A green industrial strategy and an education and skills development strategy should support the NECP. It should elaborate strategies to transfer the current skills into other sectors, including renewable energy projects.
- The development of renewable energy training and educational programmes and the integration of climate and energy issues in the educational curriculum should be considered, with the long-term view to move towards a green economy – low carbon, resource efficient, socially inclusive. In that regard, there is a need to assess existing skills and how they match with the evolving needs in the renewable sector. There is a need to co-ordinate between private-sector firms and educational institutions.
- The EU and Energy Community initiatives for coal regions in transition should be leveraged for exchanging best practices and building capacities. The World Bank also initiated a new technical assistance programme related to the energy transition in coal regions in BiH, which identified pilot mines, and may chart the way for future repurposing of land in coal regions for energy and non-energy applications.

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<sup>96</sup> [https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism\\_en](https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en).

<sup>97</sup> [www.energy-community.org/regionalinitiatives/Transition.html](http://www.energy-community.org/regionalinitiatives/Transition.html).

<sup>98</sup> [www.ebrd.com/what-we-do/just-transition-initiative](http://www.ebrd.com/what-we-do/just-transition-initiative).

<sup>99</sup> [www.worldbank.org/en/topic/extractiveindustries/justtransition](http://www.worldbank.org/en/topic/extractiveindustries/justtransition).



## Actions for decarbonisation of the heating sector

The residential sector is the largest consumption sector, accounting for 40% of the total final energy consumption. This energy is primarily supplied from biofuels and waste (64%), with forest wood being used primarily for heating and cooking. In the future, the 2030 Low Emissions Analysis Platform (LEAP) modelling foresees a large increase of wood consumption as 13 000 000 square meters of households are not connected to the heat networks and use forest biomass.

The biomass potential study commissioned by GIZ (Pfeiffer *et al.*, 2019) notes the energy balances may largely underestimate the household biomass consumption, due to the use of unregistered biomass, and the fact that the consumption is self-declared, which does not account for illegal activity and unregistered wood extraction. The margin of error could be as high as 56% more than the current estimates. In addition, UN WCMC (2020) presents some insights on illegal activity in the wood sector. It is noted that one-third of the illegal wood exported to the European Union was firewood. It also refers to illegal logging, without locating specific values.

On the other hand, the Renewable Energy Directive defines “sustainability and greenhouse gas emission savings criteria for ... biomass fuels”.<sup>100</sup> More specifically, biomass fuels should not be obtained from land with a high biodiversity value, for land having the status (as of January 2008<sup>101</sup>) of “primary forests and wooded land of native species”, with the absence of noticeable human activity, or other highly biodiverse forest and other wooded land which is species-rich and not degraded.

BiH has one of the most significant biomass technical potentials in the region, equivalent to more than 80% of the country’s total energy demand (IRENA, 2019b). The potential of residues appears to be very sizeable, in terms of forest residues (5 petajoules [PJ]), agricultural and woody residues (2 PJ), pulp and paper residues (2 PJ), and biowaste (10 PJ).

### Recommended actions

- The country is primarily dependent on wood for heating built-up space, which can create sustainability challenges. There is a need to improve the sustainability governance on forestry management through dedicated regulations on the sustainability of biomass and forest, as well as promote voluntary certificates for sustainable forest management, to avoid negative impacts on environmental and social aspects.
- The dependency on wood should be mitigated to modern, efficient heating technologies:

<sup>100</sup> Renewable Energy Directive, Article 29.

<sup>101</sup> Whether or not this land continues to have that status.

- Expanding and utilising waste- and residues-based modern forms of bioenergy for residential heating, instead of burning wood for heating while causing pollution and health impacts. Residues and waste-based bioenergy, including forestry and agricultural residues, sawmill and pulp industry processing residues, and organic waste, can meet most of the residential heating need in BiH (IRENA, 2019b). These feedstocks can be used to produce biogas and biomethane through the anaerobic process, which can be injected into the existing natural gas grid. They can also be used to produce pellets to replace inefficient residential heating options, or produce liquid biofuels for transport.
- Deploying geothermal energy for the provision of reliable baseload heat through district heating systems. Several regions in the country have access to thermal waters which are used for various applications and could be used for heating in buildings (Samardžić, Hrvatović and Skopljak, 2019). Detailed assessment of these geothermal resources will be required to determine their potential for heating.
- Solar thermal systems, including water heaters and large-scale solar thermal projects, can provide renewable heat for domestic use. In cities, solar thermal mandates or similar regulations can be used to require the installation of solar water heaters in all new residential buildings or public buildings, or a specific share of hot water supplied by solar thermal projects. Combined with heat pumps, large-scale solar thermal projects can also be used for pre-heating.
- Heat pumps are highly efficient appliances that can provide both heating and cooling services to individual houses (and then combine with small-scale rooftop solar PV systems) or entire districts through district heating and cooling (DHC) networks. Grants or subsidies and time-of-use tariffs are necessary to reduce the upfront and operational costs of heat pumps.
- DHC networks are a key enabling infrastructure option for integration of renewable heat, such as geothermal, solar thermal, bioenergy or heat pumps based on renewable electricity. DHC networks are more cost-effective when they use recovering waste heat from industrial processes or other available excess heat. Beyond direct investments, policies, particularly at municipal level, can also support retrofitting existing DHC networks through land-value capture strategies, synchronisation with transport construction to minimise costs, and other financial or fiscal incentives. To support the deployment of new DHC networks, policies should include heat mapping to ensure sufficient heat demand, and connection demand for new districts to avoid overlapping investments.
- Energy efficiency measures can improve the cost-effectiveness of heating and cooling technologies, such as building envelopes. Building codes (at national or city level) should include higher efficiency requirements.
- Remove existing price regulations in heat supply to improve the competitiveness of renewable energy solutions. However, measures should be in place to address energy poverty in economically weaker sections of the population when promoting renewable energy options and high-efficient appliances.

- Energy efficiency could be enhanced through consumption-based billing. This could be achieved through the installation of energy meters at the apartment level, to measure the actual energy usage per household.
- Adopt a strategic heat planning approach in the implementation of renewable-based heating systems, which enable cities and municipalities to address their energy needs today and in the future. Strategic heat planning entails mapping and evaluation of the locally available renewable energy sources (that currently remain largely untapped), e.g. geothermal, solar thermal and sustainable waste heat; matching them with the current and future heating demand centres in cities; and developing enabling frameworks to facilitate their deployment in the heating sector. It also helps to identify existing technical and regulatory barriers and propose potential solutions, as well as supporting the identification of key stakeholders and developing strategies for their engagement. Through the strategic heating plans, cities and municipalities can adopt tailored ownership models, harmonised regulations across different sectors, energy pricing mechanisms, and project financing options that promote investment in renewable-based heating and cooling.

### Actions to decarbonise the transport sector

The NREAP included a 10% renewable energy target for the transport sector. Currently, this share is estimated at 0.4% by the Energy Community Secretariat, which identifies challenges for the transport sector, due to the lack of regulations, the lack of sustainability criteria for biofuel, the lack of incentives, and insufficient fuel and biofuel statistics.

Transport electrification has started to develop in the country, despite the absence of regulation for the sector. At the moment, for EVs there are reports of the implemented charging stations that are delivering power for free.

In order to fulfil the obligations from the Energy Community Treaty and the Sofia Declaration, BiH's MOFTER has launched a series of activities related to the establishment and operation of electromobility in BiH. With the support of the Swedish International Development Cooperation Agency (SIDA) and the United Nations Development Programme (UNDP), activities have been launched to develop a "Study of e-Mobility and Markets in BiH",<sup>102</sup> which will provide an overview and analysis of the existing market and institutional framework, as well as analysis of business models for the rapid introduction of electromobility infrastructure, and recommendations on necessary policies and measures.

MOFTER also formed the Working Group for Electromobility in BiH, which includes representatives of all relevant institutions from the entity and BiH levels, as well as organisations and projects, such as the Energy Community Secretariat; GIZ project Decarbonization of the Energy Sector in BiH; the Open Regional Fund for Southeast Europe – Energy, Transport, Climate Protection; and the UNDP in BiH Green Economic Development Project. In the coming period, the working group will work on identifying the main obstacles to the development of electromobility in BiH and drafting proposals for solutions for the development and effective improvement of the field of electromobility.

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<sup>100</sup> Study has been finalised and publication is expected in the coming period.

## Recommended actions

- It is recommended to set targets on the renewable share in the transport sector and each subsector, including road transport, and aviation, with the support of EVs and advanced biofuels. These targets can be reflected in NDCs and may also include needed EV charging infrastructures and sustainability requirements on biofuel supply chains.
- Based on “avoid-shift-improve” principles, sustainable transport frameworks should be developed at the national and city levels to support this sector’s renewable targets and strategies by:
  - avoiding and reducing the need for motorised travel, *e.g.* through integrated urban planning or land-use policies and changed activity patterns
  - shifting transport modes to more environmentally friendly modes to improve trip efficiency, *e.g.* active transport such as walking and cycling, rail-based transit systems, bus rapid transit systems and other public transport, and car sharing
  - improving energy efficiency of transport modes and switching to renewable fuels through promoting EVs, biofuel blending mandates, restricted use of internal combustion vehicles and fuel economy standards.
- The key component should be promotion of sustainable urban transport. Mixed land-use planning, transport-oriented development and other planning tools could significantly improve transport efficiency. Urban transport should also encourage non-motorised transport and public transport. Beyond financial and fiscal policies to sustainable transport options, cities usually can also release other incentives and mandates, such as low-emissions zones, preferred car parking, exempted toll fees, use of tidal lanes, vehicle plate restriction and others.
- EVs could be promoted through purchase subsidies, tax rebates or exemptions, fuel economy standards, and vehicle credit schemes. EV charging infrastructures could be supported by introducing mandatory EV charger installation to parking lots in new buildings and building refurbishment. In addition, combining EV charging with solar PV could be encouraged through financial incentives and demonstration projects.
- To minimise impact to the grid, adoption of peak-valley electricity tariffs would encourage EV charging at valley time period. New business models should be encouraged to utilise the potential of EVs as prosumers and improve the flexibility of the power system.
- Electrification of the transport sector is a strong trend within the European Union, and would gain momentum in neighbouring countries, including in BiH, but sustainability should be at the core of the planning, as increases of electricity consumption could mean an increase in coal-fired generation. This issue needs to be carefully considered within the NECP. The impact of EVs should be considered in electricity demand projections and grid planning.

## Streamline and strengthen capacity in renewables project preparation phase

Prior to the construction of energy production facilities from renewable energy sources, developers are obliged to prepare a certain set of documents and obtain necessary consents and permits. These are prepared for and obtained from different competent institutions, and very often, the same documentation is to be provided by developers to obtain consents and permits. The documentation can be lengthy and cumbersome, and a further deterrent for developers is the lack of information and guidelines in which order to prepare certain documents, and how to obtain the necessary consents and permits. The documentation and permitting process requires various analyses and assessments such as resource measurement, environmental and social impact assessments, grid impact assessments, etc., which generate significant project transaction costs before there is any certainty that the project will mature. Furthermore, once the project is ready for construction, there are no defined clear rules on how much time it would take for the project to receive subsidies or commence operations in the absence of subsidies.

### Recommended actions

- Targeted support by the government before launching the procurement in the project (confirmation of the availability of the resource, guarantee availability of land and transmission lines, geological mapping, etc.) could support project preparation phase. If the government could complete a part of these feasibility studies and preparation tasks before launching the procurement, it would not only show that the government is a strong supporter of the project, but it would also attract far more attractive bids when the procurement is launched. The savings in the tariffs would more than compensate for the initial expenses incurred.
- It is recommended to draft a guide on developing renewable energy projects. The document should provide all information about the project preparation process – at which stage certain documentation is to be prepared, which permits need to be obtained, which technologies are eligible, etc.
- Creation of special subsidy schemes such as feasibility studies, environmental impact assessments, resource measurements, etc. should aim at subsidising the preparation of project documentation, and lower project transaction costs before there is any certainty that the project will mature.
- Develop a suite of standardised project agreement templates to provide certainty to investors about the project operation timeline and conditions, which would be in the form of contracts among the utility, the government and the developers that are internally consistent and allocate the risks fairly (PPA, implementation agreement, supply agreement, installation agreement).<sup>103</sup> Based on such contracts, developers will have clearly defined project operation models (connection to grid, sale prices) once constructed. In addition, adopting (and adapting where needed) standard contracts that have proven their bankability reduces the length of negotiations and the risk that banks will object to the wording.
- Facilitating access for local developers to technical assistance and project facilitation initiatives that are available (GET.invest, Climate Investment Platform, etc.) could increase the awareness and provide targeted support.

<sup>103</sup> IRENA's Open Solar Contracts at <https://opensolarcontracts.org/>. Also note *Scaling Solar (IFC)* and *GET-FIT (KfW)*.

### Restricted opportunities in renewables project financing phase

In general, renewable energy projects in BiH are financed either from developers' own funds or through loan financing provided by local banks or IFIs. Local banks or IFIs provide financing to "risk-free" projects, while looking at two key elements: historical project performance and collateral. As the renewable energy market is a new and emerging market in BiH, the majority of renewable energy projects can be considered as start-ups, thus not having a historical financial performance record. Only projects that include extension of existing capacities would have such a record.

Collateral for securing the loan repayment could be in the form of land, equipment, buildings, cash, etc. To finance projects without a historical financial record, financial institutions would require a disproportionately higher amount of collateral compared with total project investment costs, *i.e.* 1:2 or 1:3. This represents a significant barrier for a majority of developers requiring project financing.

There is a lack of tax incentives to (international and local) developers whose project is awarded (according to the transparent procurement rules). Typically, they include any import duties, value-added tax (VAT) reductions, taxes on profits and capital gain taxes (*e.g.* after minimum five years of operations). In order to have an impact on the pricing and the decision to invest, these incentives should be guaranteed for a long period.

An additional barrier for developers is the structure of the project investment costs, which include a significant portion of parafiscal charges related to obtaining permits, construction, land acquisition, etc. In the light of the above, it can be concluded that interventions from governments in BiH are essential to enhance investments into renewable energy projects.

### Recommended actions

- Creation of exemption schemes for fiscal and parafiscal charges could facilitate the renewables project financing phase. There are already customs duties exemptions relating to the importation of foreign equipment. However, there are parafiscal charges, such as shelter fees, construction land fees, etc., which place an additional burden on renewable energy investments. Such charges should be either eliminated or allowed a "grace period" for their payment by developers, *i.e.* one to five years after project operation commencement. The grace period should be provided for payment of VAT on goods and services, profit tax payments, etc.
- The establishment of the guarantee fund would provide guarantees for loan financing of renewable energy projects. In this case, developers would only need to have a bankable project while collateral would be a government guarantee, which would significantly ease the process of getting project financing for developers.
- Since government-owned development banks exist in both entities within BiH, governments should create dedicated credit lines for renewable energy projects through these banks with special conditions regarding interest rates, grace periods, collateral type and amount, etc.

- It is recommended to create subsidy schemes. Governments should subsidise locally manufactured equipment to enhance the development of domestic production capacities. Similar subsidies should be provided to companies installing renewable energy equipment to enhance capacity building in other renewable energy subsectors as well. These subsidies would have a twofold effect of lowering the investment costs of developers and contributing to the development of supportive subsectors for renewable energy projects.
- Issuance of bonds in the international capital markets could fund the investments of the utilities. Considering the successful introduction of bonds and other securities by BiH and the low interest rates that were achieved, BiH could consider issuing sovereign “green bonds” that are dedicated to renewable energy infrastructure and certified by international reviewers. Many asset managers are trying to improve their “green” portfolio. The advantage of such a structure is that it can also attract domestic savings and reduce the international indebtedness.
- Blended finance structures are encouraged. Non-traditional structures such as blended finance would allow the participation of local banks and institutional investors in addition to development finance, which would spread the risk among multiple parties and ultimately reduce the risk exposure for a single financier.

### Improve financial flows in renewables project performance phase

Currently, there are subsidies for electricity sales produced from renewable energy sources only in the form of feed-in tariffs in BiH and feed-in premiums in Republika Srpska.<sup>104</sup> New laws on renewable energy sources in both entities bring additional subsidy models such as auction premiums, net metering, etc. The new law on renewable energy sources was adopted only in Republika Srpska in 2022, while the by-laws are still not in place and therefore, have not been fully operational. In FBiH, the law was adopted in August 2023 and adoption of by-laws is expected.

Carbon allowances under the EU Emissions Trading System and emissions reduction certificates that can be sold in a transparent way will generate additional revenue. Research by IRENA has shown that this can help to attract investments, provided that the income is assured over a long period.

This lack of financial flows in the project performance phase increases already high risk for interested investors.

### Recommended actions

- New by-laws for the new legislation both in Republika Srpska and in the Federation need to be adopted. These would ensure conditions for full implementation of subsidy mechanisms.

<sup>104</sup> New FBiH legislation was adopted during the final production stages of this report; all references herein therefore relate to the draft version of the legislation.

- Once the renewable energy projects are operational, they might face liquidity issues, especially those financed through loans. There may be discrepancies between the due dates for payment of loan instalments and the collection of receivables for the energy sold. For such cases, dedicated credit lines for liquidity financing should be created and possibly implemented through entity development banks.
- Membership of entity renewable energy operators in international associations is encouraged. Different parties issue guarantees of origin for energy produced from renewable energy sources. However, as they are not members of international associations, Guarantees of Origin cannot be traded on international markets.
- Development or access to emissions carbon trading markets could be supported by the European Union in addition to advising on the practical implementation.
- Invite multilateral banks and DFIs to invest equity capital in the utilities. There are multilaterals and DFIs that have a private-sector department or subsidiary that invests in the equity of companies (e.g. KfW-DEG, AFD-Proparco). Bringing such shareholders not only helps to improve the financial status of the utility, but it also improves the governance and adds to the credibility and creditworthiness of the utility without the government support.
- Improvement of access to risk mitigation instruments is needed. These products enhance the creditworthiness of the offtaker in order to protect developers and investors, and mitigate the uncertainty regarding timely payments by the utilities, the risk of war and civil war (political force majeure), the risk of currency inconvertibility and inability to transfer money outside the country, etc. If BiH could provide such cover, the risk perception would improve, and the risk premium would decrease significantly.

### **Towards alignment between the country's NDC and draft NECP**

The national renewable energy and GHG reduction targets set forth in the NECP<sup>105</sup> for BiH, which is now under development, will determine the country's energy and climate course up to 2030. The NECP targets should be incorporated in all subsequent national climate and energy plans, including the nation's NDC, sectoral plans and long-term plans, given BiH's other international commitments, such as the Paris Agreement. IRENA carried out a comparative analysis between the NECP (draft as of May 2023) and the updated NDC (April 2021) to assist in the alignment between national plans.

IRENA's comparative assessment establishes that the renewable energy deployment scenarios and targets in the two documents are not currently aligned:

- The NECP has a far higher level of ambition, with a greater share of renewable energy in terms of installed capacity and electricity generation. The capacity of each renewable energy technology also varies between assessments, with the NECP focusing on far bigger solar and wind technology capacities while the NDC relies heavily on hydropower capacity.

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<sup>105</sup> When referring to the NECP in this section, it refers to draft version of the NECP from May 2023.



- The electricity demand projections between the most ambitious scenarios of each analysis present growing differences towards 2030, with lower demand projections in the NECP and significant differences in the sectoral shares.
- Regarding electricity capacity and generation mixes, and GHG emissions, the reference scenarios of the NECP and the NDC do not currently match.
- The GHG emissions scope of the two documents is different, with the NECP considering a tighter scope.

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- With BiH's vast and varied renewable energy resources, it is proposed to elevate the ambition of renewable energy integration in the power sector for the forthcoming NDC update. This should align with the more ambitious NECP targets currently under development. The share of renewable energy within the NECP scenarios significantly outweighs that in the NDC analysis, concerning both electricity capacity and generation.
- BiH's goals for the NECP should be guided by the ambition of the European Union's targets, including any intermediate yearly targets and sector-specific targets, in addition to the European Union's 2050 climate-neutrality target and other pertinent policy objectives at the EU, United Nations Framework Convention on Climate Change (UNFCCC) and Energy Community levels.
- It is worth noting that the current NDC includes a 2050 GHG emissions reduction target that is less ambitious than the European Union's 2050 goal of achieving carbon neutrality. The upcoming round of updates of the NDC cycle should be informed by the more ambitious targets of the NECP. Additionally, these goals should also be reflected in the country's other sectoral strategies and plans, including the long-term low-emission development strategies (LT-LEDS), which parties of the Paris Agreement are recommended to communicate.
- The NECP's renewable energy target is expressed as a share of renewable energy in the energy mix by 2030. It is recommended to establish renewable energy targets as "base year" targets. This adjustment would improve transparency and simplify the monitoring, reporting and verification processes, since targets set against a forecast scenario prove harder to measure and track.
- While both the NECP and NDC include quantitative targets for GHG emissions reduction, it is suggested that this economy-wide target be broken down by sector as well as by specific quantitative targets and measures. Furthermore, it is recommended that for each target, if possible, details such as estimated GHG reductions relative to the base year; investment requirements; funding source; implementation timeline; measurable milestones; responsible parties for implementation; and actions, supporting measures, opportunities and implementation barriers are included. Identifying and listing specific renewable energy and energy efficiency projects and their associated costs can support attracting financing in addition to boosting transparency and making progress tracking easier. A risk assessment can be conducted to identify risks and challenges to implementation, as well as implementation needs such as technology and investment requirements, capacity building, structural/organisational/regulatory requirements, supporting policies and measures, and incentive structures.

- It is advised that methodological documentation be created in order to accompany the NECP, as well as the next NDC update. This documentation should include the overall methodological approach, data sources and assumptions, as well as an explanation of how the targets were created (for instance, if they were derived from a strategic document and/or stakeholder consultations). Additionally, it is essential to maintain ongoing procedures for gathering and maintaining data such as GHG inventories and forecasts. This would not only improve and facilitate model assessments and alignments but would also facilitate future revisions to respective plans.
- With the institutionalisation of an NECP co-ordination framework, there is the opportunity to extend this framework and responsible stakeholders to the next update of the NDC. This will ensure a more efficient process for approval of the NDC and facilitate its update in accordance with the NECP document. Moreover, an update of NECPs is foreseen during the period 2023-30 and additional updates may be considered. The NECP and NDC are cyclic processes that can interact with each other over time. One example is merging the subsequent reporting processes for the Energy Community and UNFCCC, ensuring that the requirements for each are met. The Ministerial Council of the Energy Community also advises that the implementation of Progress Reports for the NECP be linked to the UNFCCC reporting requirements. A holistic framework that is in alignment can ensure that synergies are generated and the updating and reporting procedures are simplified.



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# ANNEX 1

## KEY REGULATORY AND LEGISLATIVE DOCUMENTS

**Table 16** Key regulatory documents and main features of the enabling framework for renewables as of January 2023

Entity	Title	Source	Ref
BiH	Decision on Scope, Conditions and Time Schedule of Electricity Market Opening in Bosnia and Herzegovina	Official Gazette of BiH	48/06
BiH	Law on Transmission of Electric Power, Regulator and Electricity System Operator in BiH	Official Gazette of BiH	7/02, 13/03, 76/09 and 1/11
BiH	Law on Establishing an Independent System Operator for the Transmission System of BiH	Official Gazette of BiH	35/04
BiH	Law on Establishing the Company for the Transmission of Electric Power in BiH	Official Gazette of BiH	35/04, 76/09, 20/14
BiH	Law on Concessions	Official Gazette of BiH	32/02 and 56/04
BiH	Rulebook on Amendments to the Rulebook on Licences	Official Gazette of BiH	98/15
BiH	Rulebook on Connection	Official Gazette of BiH	95/08, 79/10, 60/12
BiH	Rulebook on Tariff Procedure	Official Gazette of BiH	44/05
Federation of BiH	Electricity Law	Official Gazette of BiH	60/23
Federation of BiH	Electricity Law	Official Gazette of Federation of BiH	66/13, 94/15 and 54/19 In replacement of previous Law 41/02, 24/05, 38/05, 61/09 and 83/11
Federation of BiH	Law on the Use of Renewable Energy Sources and Efficient Cogeneration	Official Gazette of BiH	60/23
Federation of BiH	Law on the Use of Renewable Energy Sources and Efficient Cogeneration	Official Gazette of Federation of BiH	70/13 and 05/14
Federation of BiH	Law on Energy and Regulation of Energy Activities	Official Gazette of Federation of BiH	60/23
Federation of BiH	Regulation on Incentives for Generation of Electric Power from the Operator for Renewable Energy Sources and Efficient Cogeneration and Defining of Incentive Fees	Official Gazette of Federation of BiH	48/14
Federation of BiH	Rulebook on Methodology for Defining Guaranteed Price for Electric Power from the Plants for Use of Renewable Energy Sources and Efficient Cogeneration	Official Gazette of Federation of BiH	50/14
Federation of BiH	Decision Establishing the Operator for Renewable Energy Sources and Efficient Cogeneration V. no. 1281/2013, 06.11.2013	Official Gazette of Federation of BiH	90/13
Federation of BiH	Law on Spatial Planning and Land Use	Official Gazette of Federation of BiH	2/06, 72/07, 32/08, 4/10, 13/10 and 45/10

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Federation of BiH	Law on Concessions	Official Gazette of Federation of BiH	40/02 and 61/06
Federation of BiH	Rulebook on Licences	Official Gazette of Federation of BiH	87/12, 98/15
Federation of BiH	Law on Energy Efficiency	Official Gazette of Federation of BiH	22/17
Republika Srpska	Energy Law	Official Gazette of the Republika Srpska	49/09 (68/20)
Republika Srpska	Renewable Energy Action Plan of Republika Srpska	Official Gazette of the Republika Srpska	45/14 and 111/15
Republika Srpska	Law on Electricity	Official Gazette of the Republika Srpska	8/08, 34/09, 92/09 and 01/11
Republika Srpska	Law on Fees for Use of Natural Resources for Electricity Generation	Official Gazette of the Republika Srpska	52/14
Republika Srpska	Law on Renewable Sources and Efficient Cogeneration	Official Gazette of the Republika Srpska	39/13, 108/13 and 79/15, 26/19 and 15/22
Republika Srpska	Law on Energy Efficiency	Official Gazette of the Republika Srpska	59/13
Republika Srpska	Law on Spatial Planning and Construction	Official Gazette of the Republika Srpska	40/13, 106/15 and 3/16
Republika Srpska	Rulebook on Incentives for Generation of Electricity from Renewable Sources and in Efficient Cogeneration	Official Gazette of the Republika Srpska	59/13
Republika Srpska	Rulebook on Incentives for Generation of Electricity from Renewable Sources and in Efficient Cogeneration	Official Gazette of the Republika Srpska	114/13
Republika Srpska	Rulebook on Issuance of Licenses	Official Gazette of the Republika Srpska	114/13, 65/13
Republika Srpska	Rulebook on Issuance of Certificates for the Generation Facility which Generates Electricity using Renewable Energy Sources or in Efficient Cogeneration	Official Gazette of the Republika Srpska	112/13
Republika Srpska	Rulebook on the Issuance of Guarantees of Origin of Electricity	Official Gazette of the Republika Srpska	1/14
Republika Srpska	Decision on the Level of Guaranteed Redemption Prices and Premiums for Electricity Generated from Renewable Energy Sources and in Efficient Cogeneration	Official Gazette of the Republika Srpska	116/13, 88/14 and 14/16
Republika Srpska	Instruction on Keeping Register of Projects in Renewable Energy Sources and in Efficient Cogeneration	Official Gazette of the Republika Srpska	76/13
Republika Srpska	Regulation on Types, Contents, Quality, and Share of Biofuels in Transport	Official Gazette of the Republika Srpska	8/16
Brčko District of BiH	Law on Energy Efficiency	Official Gazette of the Brčko District of BiH	01-02-3311/22-1, 14 July 2022
Brčko District of BiH	Law on Renewable Sources and Efficient Cogeneration	Official Gazette of the Brčko District of BiH	01-02-2732/22, 8 June 2022
Brčko District of BiH	Electricity Law	Official Gazette of the Brčko District of BiH	36/04, 28/07, 61/10 and 4/13
Brčko District of BiH	Law on Tariff System for Sale of Electricity	Official Gazette of the Brčko District of BiH	37/04, 28/07, 4/13
Brčko District of BiH	Law on Concessions	Official Gazette of the Brčko District of BiH	41/06, 19/07, 2/08

# ANNEX 2

## GENERATION PLAN, CURRENT AND PLANNED ON THE TRANSMISSION GRID, 2023-2032

**Table 17** Forecast generation per plant, current and planned on the transmission grid, 2021-2030

Production per plant (GWh)	Year									
	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
RAMA	650.0	650.0	650.0	650.0	650.0	650.0	650.0	650.0	650.0	650.0
ČAPLJINA	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
MOSTAR	247.0	247.0	247.0	247.0	247.0	247.0	247.0	247.0	247.0	247.0
JAJCE 1	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9
JAJCE 2	157.0	157.0	157.0	157.0	157.0	157.0	157.0	157.0	157.0	157.0
PEĆ-MLINI	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0	82.0
JABLANICA	719.0	680.0	740.0	740.0	740.0	740.0	740.0	740.0	740.0	740.0
GRABOVICA	268.9	255.7	275.0	275.0	275.0	275.0	275.0	275.0	275.0	275.0
SALAKOVAC	367.1	350.8	390.0	390.0	390.0	390.0	390.0	390.0	390.0	390.0
TREBINJE 1	380.0	380.0	380.0	380.0	380.0	380.0	380.0	380.0	380.0	380.0
DUBROVNIK	650.0	650.0	650.0	650.0	650.0	650.0	650.0	650.0	650.0	650.0
VIŠEGRAD	925.0	925.0	925.0	925.0	925.0	925.0	925.0	925.0	925.0	925.0
BOČAC	273.0	273.0	273.0	273.0	273.0	273.0	273.0	273.0	273.0	273.0
MOSTARSKO BLATO	167.0	167.0	167.0	167.0	167.0	167.0	167.0	167.0	167.0	167.0
DUB I USTIPRAČA	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4	35.4
<b>Total hydropower</b>	<b>5 354.3</b>	<b>5 285.8</b>	<b>5 404.3</b>	<b>5 404.3</b>	<b>5 404.3</b>	<b>5 404.3</b>	<b>5 404.3</b>	<b>5 404.3</b>	<b>5 404.3</b>	<b>5 404.3</b>
TUZLA G-3	251.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TUZLA G-4	108.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TUZLA G-5	1 126.8	1 138.0	1 116.0	1 116.0	0.0	0.0	0.0	0.0	0.0	0.0
TUZLA G-6	1 270.3	1 266.0	1 225.0	1 225.0	1 225.0	1 225.0	1 225.0	1 225.0	1 225.0	1 225.0
KAKANJ G-5	133.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
KAKANJ G-6	651.1	617.4	552.0	535.0	521.0	512.0	487.0	428.0	395.0	338.0
KAKANJ G-7	375.6	1 331.7	1 309.0	1 309.0	1 309.0	1 295.0	1 295.0	1 295.0	1 230.0	1 169.0
GACKO	1 300.0	1 560.0	1 800.0	1 800.0	1 800.0	1 800.0	1 800.0	1 800.0	1 800.0	1 800.0
UGLJEVIK	1 600.0	1 400.0	900.0	1 730.0	1 730.0	1 730.0	1 730.0	1 730.0	1 730.0	1 730.0
STANARI	2 000.0	1 980.0	1 980.0	1 980.0	1 790.0	2 000.0	1 980.0	1 980.0	1 980.0	1 980.0

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<b>Total thermal</b>	<b>8 817.6</b>	<b>9 293.1</b>	<b>8 882.0</b>	<b>9 695.0</b>	<b>8 375.0</b>	<b>8 562.0</b>	<b>8 517.0</b>	<b>8 458.0</b>	<b>8 360.0</b>	<b>8 242.0</b>
VE MESIHOVINA	165.2	165.2	165.2	165.2	165.2	165.2	165.2	165.2	165.2	165.2
VE JELOVAČA	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
VE PODVELEŽJE	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0
<b>Total wind</b>	<b>405.2</b>	<b>405.2</b>	<b>405.2</b>	<b>405.2</b>	<b>405.2</b>	<b>405.2</b>	<b>405.2</b>	<b>405.2</b>	<b>405.2</b>	<b>405.2</b>
<b>Total existing facilities</b>	<b>14 577.1</b>	<b>14 984.1</b>	<b>14 691.5</b>	<b>15 504.5</b>	<b>14 184.5</b>	<b>14 371.5</b>	<b>14 326.5</b>	<b>14 267.5</b>	<b>14 169.5</b>	<b>14 051.5</b>
HE ULOG	82.3	82.3	82.3	82.3	82.3	82.3	82.3	82.3	82.3	82.3
HS LJUTA (1 faza)	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6
HE JANJICI	-	-	-	39.0	39.0	39.0	39.0	39.0	39.0	39.0
HE DABAR	-	-	251.8	251.8	251.8	251.8	251.8	251.8	251.8	251.8
<b>New hydropower</b>	<b>116.9</b>	<b>116.9</b>	<b>368.7</b>	<b>407.7</b>	<b>446.0</b>	<b>446.0</b>	<b>446.0</b>	<b>446.0</b>	<b>446.0</b>	<b>446.0</b>
TE TUZLA, blok 7	-	-	-	-	2 626.9	2 626.9	2 626.9	2 626.9	2 626.9	2 626.9
TOPLANA Zenica	109.3	109.3	109.3	109.3	109.3	109.3	109.3	109.3	109.3	109.3
<b>New thermal</b>	<b>109.3</b>	<b>109.3</b>	<b>109.3</b>	<b>109.3</b>	<b>2 736.2</b>	<b>2 736.2</b>	<b>2 736.2</b>	<b>2 736.2</b>	<b>2 736.2</b>	<b>2 736.2</b>
VE BALJCI	148.0	148.0	148.0	148.0	148.0	148.0	148.0	148.0	148.0	148.0
VE OŠTRC	30.0	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3	84.3
VE GREBAK	25.9	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0
<b>New wind power</b>	<b>203.9</b>	<b>412.3</b>	<b>412.3</b>	<b>412.3</b>	<b>412.3</b>	<b>412.3</b>	<b>412.3</b>	<b>412.3</b>	<b>412.3</b>	<b>412.3</b>
SE BILECA	95.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0
SE TREBITJE 1	0.0	36.6	73.3	107.0	105.0	104.5	104.0	103.5	103.0	102.5
<b>New solar power</b>	<b>95.0</b>	<b>146.6</b>	<b>183.3</b>	<b>217.0</b>	<b>215.0</b>	<b>214.5</b>	<b>214.0</b>	<b>213.5</b>	<b>213.0</b>	<b>212.5</b>
<b>Totals (GWh)</b>										
Total thermal (current + new)	8 926.9	9 402.4	8 991.3	9 804.3	11 111.2	11 298.2	11 253.2	11 194.2	11 096.2	10 978.2
Total renewables	6 175.3	6 366.8	6 773.8	6 846.5	6 882.8	6 882.3	6 881.8	6 881.3	6 880.8	6 880.3
<i>Of which</i>										
Hydropower (current + new)	5471	5 402.7	5 773.0	5 812.0	5 850.3	5 850.3	5 850.3	5 850.3	5 850.3	5 850.3
Wind power (current + new)	609	817.5	817.5	817.5	817.5	817.5	817.5	817.5	817.5	817.5
Solar power (current + new)	95	146.6	183.3	217.0	215.0	214.5	214.0	213.5	213.0	212.5
<b>Total</b>	<b>15 102.2</b>	<b>15 769.2</b>	<b>15 765.1</b>	<b>16 650.8</b>	<b>17 994.0</b>	<b>18 180.5</b>	<b>18 135.0</b>	<b>18 075.5</b>	<b>17 977.0</b>	<b>17 858.5</b>
Share thermal	59.1%	59.6%	57.0%	58.9%	61.7%	62.1%	62.1%	61.9%	61.7%	61.5%
Share renewables	40.9%	40.4%	43.0%	41.1%	38.3%	37.9%	37.9%	38.1%	38.3%	38.5%
Share hydropower	36.2%	34.3%	36.6%	34.9%	32.5%	32.2%	32.3%	32.4%	32.5%	32.8%
Share wind power	4.0%	5.2%	5.2%	4.9%	4.5%	4.5%	4.5%	4.5%	4.5%	4.6%
Share solar power	0.6%	0.9%	1.2%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%

Source: (SERC, 2022a)

# ANNEX 3

## POTENTIAL PHOTOVOLTAIC AREAS IN BOSNIA AND HERZEGOVINA

**Table 18** Potential photovoltaic areas in Bosnia and Herzegovina, before dynamic power system studies are considered

Area [hectares]			Irradiation (optimal) kWh/m <sup>2</sup>	Combined scenarios [MW]		Photovoltaic scenario [MW]
Location	Straight	Mixed		KSE	PV	PV
Ljubomir dolina	400	0	1 730	50	-	170
Uboško polje	0	100	1 730	-	40	40
Fatničko polje	300	0	1 670	50	-	130
Zubačko polje field	250	150	1 740	50	60	170
Gatačko polje field	1 200	0	1 630	200	-	260
Gatačko polje 2	800	0	1 610	150	-	350
Postoljani	400	0	1 660	50	-	170
Nevesinje	300	0	1 670	50	-	130
Crnići	300	0	1 840	50	-	130
Lakat	0	200	1 500	-	80	80
Vilino polje	0	200	1 490	-	80	80
Kružanj	0	200	1 750	-	80	80
Mostarsko Blato	500	0	1 790	100	-	100
Popovo polje	400	0	1 790	50	-	170
Kočela	0	150	1 720	-	60	60
Duvanjsko polje	550	400	1 660	100	150	280
Livanjsko polje	600	0	1 600	-	260	260
Šuičko polje	0	150	1 530	-	60	60
Vukovsko polje	0	500	1 490	-	220	220
Rakitno field	0	150	1 610	-	60	60
Željava	400	0	1 400	-	180	180
Kladovo polje	0	150	1 480	-	60	60
Manjača	0	300	1 410	-	130	130
Kupreško polje	150	300	1 460	-	200	200
Glasinačko polje	0	150	1 450	-	60	60
Glasinačko polje 2	0	200	1 450	-	80	80
Glamočko polje	0	300	1 490	-	130	130
Dubrave	0	400	1 450	-	170	170
				<b>900</b>	<b>2 160</b>	-
<b>TOTAL</b>				<b>3 060</b>		<b>4 010</b>

Source: (Parsons Brinckerhoff, 2014)

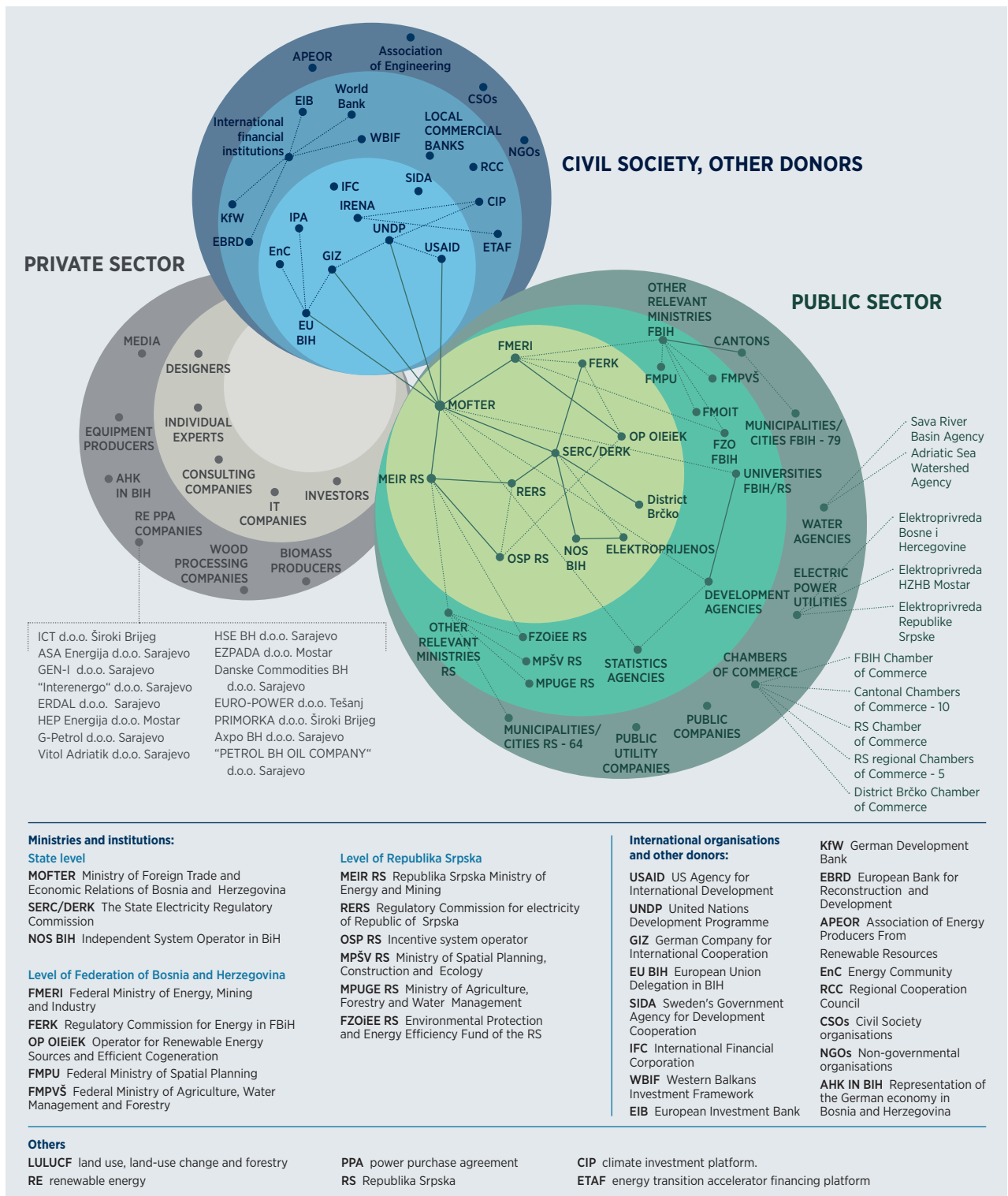
Note: MW = megawatts; kWh = kilowatt hours; m<sup>2</sup> = square meters; PV = photovoltaic, KSE = concentrated solar power plants.

# ANNEX 4

## STAKEHOLDER MAPPING

Figure 21 presents an overview of the institutional framework for BiH. The main institutions are detailed hereafter.

**Figure 21** Stakeholder mapping (June 2023)





## Institutions

- **MOFTER** Ministry of Foreign Trade and Economic Relations of BiH
- **SERC/DERK** The State Electricity Regulatory Commission
- **NOSBIH** Independent System Operator in BiH
- **Elektroprenos** The transmission system operator in BiH

### ■ Level of Federation of BiH

- **FMERI** Federal Ministry of Energy, Mining and Industry
- **FERK** Regulatory Commission for Energy in FBiH
- **OIEiEK** Operator for Renewable Energy Sources and Efficient Cogeneration
- **FMPU** Federal Ministry of Spatial Planning
- **FMPVŠ** Federal Ministry of Agriculture, Water Management and Forestry
- **FMOIT** Federal Ministry of Environment and Tourism
- **FZO FBiH** Environmental Fund of the FBiH

### ■ Level of Republika Srpska

- **MEIRRS** Republika Srpska Ministry of Energy and Mining
- **RERS** Regulatory Commission for Electricity of Republic of Srpska
- **OSP RS** Incentive system operator
- **MPŠV RS** Ministry of Spatial Planning, Construction and Ecology
- **MPUGE RS** Ministry of Agriculture, Forestry and Water Management
- **FZOiEE RS** Environmental Protection and Energy Efficiency Fund of the RS State level

## International organisations and donors

### ■ Climate Investment Platform

The Climate investment Platform (CIP) is a platform established by IRENA, UNDP and SEforALL, in co-operation with the Green Climate Fund (GCF) (IRENA, 2021b). It supports project developers in developing investment-ready projects for matchmaking with relevant donors and investors. Requirements of the donors and investors are taken into consideration when preparing the project proposals in the form of a project information document (PID). The PID contains information on the main problem the project is addressing; environmental, social, and governance aspects; the project's financing structure; profile of the project proponent; planned project timeline; and risk management measures, among other. Projects must be beyond the conceptual stage and have already undertaken some of the initial assessments, such as pre-feasibility studies or feasibility studies to be eligible for support. With the CIP, the partners are aiming at bridging the gap when it comes to sourcing investment-ready projects, assessing projects' investment readiness and assisting project developers to reach stringent requirements of the potential donors and investors.

### ■ **European Bank for Reconstruction and Development**

The EBRD generally offers a variety of financial instruments, such as loans, equity investments and guarantees, as well as provides assistance through financial intermediaries (EBRD, 2021d). The EBRD supports projects that:

- have a good chance of becoming profitable
- have significant equity commitments in cash or in kind from the project sponsor
- boost the local economy
- meet the EBRD's and the host country's environmental standards.

The EBRD can support up to 35% of a greenfield project's total cost or 35% of an established company's long-term capitalisation. Sponsors and other co-financiers need to provide additional funds. In the private sector, most projects require at least a third equity investment. The developers must contribute a significant amount of equity and should own a majority of the company or have sufficient operational control. Equity contributions in kind are accepted.

In the energy sector, the latest investments include:

- Development, construction and operation of two adjacent solar photovoltaic plants located at Gracanica, on top of a rehabilitated mine site previously used for coal exploitation (EUR 38.5 million).
- In 2021, the modernisation of the telecommunication system of Elektroprenos – Elektroprijenos BiH a.d. Banja Luka (EUR 23.65 million).
- Former projects involve activities at municipal level, such as the refurbishment of the Zenica hospital for energy efficiency (2018) and Banja Luka district heating (2018).

### ■ **European Investment Bank**

The European Investment Bank (EIB) offers support by virtue of a variety of financing products and assistance to support projects that are fully aligned with the Paris Agreement and Green Agenda for the Western Balkans. The bank's activities focus on four separate themes: i) unlocking energy efficiency; ii) decarbonising energy supply (with investments in renewable energy); iii) supporting innovative technologies and new types of energy infrastructure; and iv) securing the enabling infrastructure (e.g. electricity transmission and distribution infrastructure, district heating and cooling infrastructure).

The current pipeline of EIB in BiH consists of several projects in different subsectors with a focus on diversification of energy supply where EIB is considering financing two projects:

- Wind Farm Vlašić (approved). A 50 MW wind farm promoted by JP Elektroprivreda BiH – Sarajevo for a cost of EUR 75 million (potentially financed by loan from EIB in the amount of EUR 36 million)
- Wind Farm Poklečani (under appraisal). A 132 MW wind farm promoted by JP Elektroprivreda HZHB d.d. Mostar for a cost of EUR 192 million (potentially financed by loan from EIB in the amount of EUR 75 million).

It is also important that energy targets are aligned with climate-neutrality goals to ensure environmental and economic sustainability and resource efficiency. To this end, the EIB also contributes to a green and just transition for all by coupling up climate objectives with positive socio-economic outcomes, preventing job losses and negative impacts on the most vulnerable communities.

#### ■ **Energy Community**

The Energy Community is an international organisation that aims to establish a unified energy market across Europe by bringing together the European Union and neighbouring countries. The organisation was established in 2005 through the treaty establishing the Energy Community and has been in effect since 2006. Its primary goal is to extend the principles and regulations of the European Union's internal energy market to countries in the southeast Europe and Black Sea regions and other relevant areas through a legally binding framework. In particular, the Energy Community monitors the adoption of the EU acquis, which is legally binding for the Contracting Parties of the Energy Community. It ensures the acquis is implemented through national legislation.

#### ■ **Energy Transition Accelerator Financing Platform**

The Energy Transition Accelerator Financing Platform (ETAF) is an inclusive, multi-stakeholder climate finance platform maintained by IRENA to accelerate the global energy transition in the agency's 168 members (IRENA, 2023a). The platform, initially anchored by USD 400 million funding from the United Arab Emirates' Abu Dhabi Fund for Development, now holds a total pledge of USD 1 billion, owing to the recent addition of new partners during the 27th Conference of the Parties. The ETAF plans to increase this pledge to USD 5 billion by 2030, drawing from a variety of financial partners, investors, the private sector and donors. The ETAF encourages the implementation of ambitious NDCs to satisfy the Paris Agreement's aims and achieve the Sustainable Development Goals, while also achieving vital national goals. To date, the ETAF has facilitated the financial closing of three solar PV projects in Uzbekistan with a total capacity of 890 MW costing nearly USD 1 billion, demonstrating its effective implementation.

The ETAF provides a diverse range of financial products, as well as creative financing options. Renewable energy project financial matchmaking will be subject to funding partners' compliance procedures, due diligence, and credit financing or investment criteria. IRENA will provide technical help as well as project facilitation. The ETAF's key objectives are set to be achieved by 2030, including the goal for a total deployment of 5 gigawatts by then. As the platform grows, it continues to invite new financing partners to join via a master co-operation agreement.

The open call for projects has been launched and is currently receiving proposals. IRENA member countries should submit projects to the platform that are accounted for as part of their NDC targets. IRENA will channel and suggest a solid pipeline of renewable energy projects for financial consideration by ETAF partners from throughout the world.

### ■ **European Union Delegation in BiH**

The European Union Delegation role in Bosnia and Herzegovina aims at presenting, explaining and implementing EU policy, analysing and reporting on the policies and developments in the country, in addition to conducting negotiations in line with its mandate.

It is led by the High Representative of the Union for the Common Foreign and Security Policy/Vice-President of the Commission and it promotes the European Union's interests that are embodied in common policies relating to, among others, environment, transport, etc. Finally, it plays a key role in the implementation of the European Union's external financial assistance, primarily the funds allocated under the Instrument for Pre-Accession Assistance (IPA).

### ■ **Instrument for Pre-Accession Assistance**

As the main financial instrument of the European Union towards countries that aim for EU accession, the IPA assists BiH in progressive alignment with the standards and policies of the European Union, including the *acquis*.

Through financial, technical and expert support to the reforms, the IPA represents a comprehensive support to the process of European integration (European Commission, 2021).<sup>106</sup> Regardless of whether the country has a status of a candidate or a potential candidate, the financial assistance was available with the budget of EUR 11.7 billion for the period 2014-20, in all the policy areas. IPA III was adopted in 2021 to cover the period 2021-27. Funds from IPA III are intended for projects aimed at sustainable economic recovery of the energy sector, transport, environmental protection, climate change and digital transformation.

*EU4Energy – Technical assistance in the energy sector of BiH*, funded with EUR 4.9 million by IPA, is currently ongoing. Project activities started at the end of 2022 and will last until 2025. The project aims to:

- continue the energy sector reforms
- improve capacity buildings at all levels of government
- increase public awareness of energy-related issues.

As of the middle of 2023, the inception report has been drafted and meetings with key stakeholders have been held.

### ■ **GIZ, German agency for international co-operation**

GIZ is supporting BiH in increasing domestic stability and achieving economic integration with the European Union by transitioning the economy from a centrally planned to a competitive and market-based system (GIZ, 2021). Since 2017, a working group consisting of representatives of BiH institutions with legal competences in the energy sector and supported by GIZ had been engaged in developing a concept for a reform of renewable energy support schemes in BiH, including renewable energy auctions.

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<sup>106</sup> [www.dei.gov.ba/en/instrument-for-pre-accession-assistance](http://www.dei.gov.ba/en/instrument-for-pre-accession-assistance).

GIZ implements the project on “*Decarbonization of the energy sector in BiH*” (6/2020 – 12/2023), supported by the German Federal Ministry for Economic Cooperation and Development (BMZ), and implemented with the Ministry of Foreign Trade and Economic Relations (MOFTER). The total project’s value is EUR 3.2 million EUR.

GIZ provides a financial contribution to the recipient that is intended for a certain purpose in order to undertake certain development measures when giving financing. Subsidies, grants and financing agreements are three main forms of financing agreements that can be used.

GIZ also engages in the Open Regional Fund for Southeast Europe – Energy, Transport and Climate Protection, commissioned by BMZ and co-funded by the European Union. The executing agency is the Secretariat of the Regional Cooperation Council (RCC) for Southeast Europe. The fund focuses on developing regional capabilities in planning and implementing decarbonisation measures in the energy, climate and transport sectors.

#### ■ **International Finance Corporation**

The International Finance Corporation (IFC) has been supporting BiH in providing resources to raise capacities of local institutions and developers to scale up sustainable financing in the country (IFC, 2021). It has been providing consultancy services to help the private sector thrive and attract new investment. The programmes are divided into four categories: value addition to businesses, access to capital, infrastructure consulting services and the business enabling environment. In 2016, the IFC provided advisory services in developing two wind farms of 48 MW each under in the programme called Clean Energy Infrastructure in Southeast and Eastern Europe, a partnership with the Federal Ministry of Finance of Austria. Furthermore, the IFC has provided on-lending to local banks to support the renewable energy development. However, the IFC has not directly invested in any renewable energy projects in the country.

#### ■ **KfW, German development bank**

In BiH, KfW mainly focuses on financing of capital projects, including renewable energy, as well as providing financial assistance to small and medium-sized enterprises to boost local development and ensure sustainability (KfW, 2021).

In order to better exploit the huge potential for renewable energies, KfW is promoting the reconstruction of hydropower plants and financing the country’s first wind farms. Improvements are also to be made to the low energy efficiency of the economy in Bosnia and Herzegovina. The most recent KfW-funded projects relevant to the energy sector involve the refurbishment of Rama hydropower plant in 2020 (EUR 27.7 million funding, of which 38.7% equity and 61% funding).

Furthermore, KfW also provides microloans to improve energy efficiency as part of the REEP Plus programme. Among the other initiatives, the bank provides direct financial support through local commercial banks, as mentioned in one of the previous sections.

### ■ **Multilateral Investment Guarantee Agency**

The Multilateral Investment Guarantee Agency (MIGA) has been mostly issuing guarantees covering equity investments by local and regional banks operating in BiH for mandatory and cash reserves coverage. In the last ten years there have also been a few projects where MIGA issued guarantees to the private sector; however, so far there have not been any projects directly related to renewable energy (MIGA, 2021).

### ■ **United Nations Development Programme**

The United Nations Development Programme (UNDP) is financing some key projects to improve the regulatory environment, increase the use of renewable energy sources, improve energy efficiency and reduce GHG emissions:

- Green Economic Development (GED) consists of three phases (2013-2024) and aims to create a favourable environment for investing in measures to improve energy efficiency in BiH. According to the project assessment, the project effectively implemented 12 energy efficiency/renewable energy infrastructure projects, developed “Study on improvement of energy efficiency in 1368 households in Sarajevo Canton used by people in social need”, and developed “Study of e-mobility and markets in BiH related to the installation and use of RES for charging electric vehicles”; 5 800 public-sector buildings are monitored through EMIS database, among other performance indicators.
- Inclusive Decarbonization (IDA) (2022-April 2023) supported BiH in fulfilling its national climate pledge to work towards the 2050 target of carbon-neutrality. Some of the project’s main outcomes include developing a blueprint for BiH’s Just Transition for All” 2020-2030, implementing 20 decarbonisation projects to support a just transition in carbon-intensive small and medium enterprises (SMEs), supporting fulfilment of the overall NDC target to reduce GHG emissions by 33.20% by 2030 and NDC targets for electricity generation and industry. Total project value amounts to USD 1.87 million. The project is financed by the government of Japan, implemented by UNDP with MoFTER BiH as the main partner.
- Accelerating Clean Energy Transition Through Utilization of Solar Energy Potential BiH (SolarCET) (2021-December 2023) has the objective to stimulate the citizens and private and public buildings owners to use solar panels and collectors for production of renewable energy, as a measure to support the clean energy transition, combat air pollution and energy poverty, and reduce GHG emissions and the number of citizens suffering from respiratory diseases in BiH. The project is financed by Slovak Aid and implemented by UNDP with MoFTER BiH as the main partner. Total value of the project is USD 649 000.
- Catalyzing Environmental Finance for Low-Carbon Urban Development (*URBANLED*) (2017-2024) provides technical support for the implementation of technically and financially feasible low-carbon solutions in key urban sectors. Some of the project outcomes include integrating energy service companies (ESCOs) into the rulebook on income tax in FBiH, introducing accounting and bookkeeping standards for ESCO projects in FBiH and RS, developing and operationalising the waste management system, and many others. The project is financed by Global Environment Facility (GEF) and implemented by UNDP with MoFTER BiH as the main partner. The total project’s value is USD 2.37 million.
- Decarbonization of Residential Sector (2021-2024) aims to build foundations for the development of municipal financial mechanisms for the implementation of energy efficiency measures on residential buildings while generating green jobs and reducing GHG emissions. The project is financed by the Swedish government and implemented by UNDP. Total value of the project is USD 2.84 million.

- Scaling-Up Investment in Low-Carbon Public Buildings (2018-2026) will result in an increase in the level of investment in low-carbon public buildings, which will enable BiH to meet its stated objective to reduce GHG emissions from public buildings. In 2022, the project contributed to developing almost 2 000 full-time-equivalent jobs and the renovation of almost 190 buildings was supported, with co-financing by the World Bank, KfW, the EBRD and internal budgets. The main donor is GCF.
- Capacity-Building Initiative for Transparency (CBIT) (2020 -August 2023) aims to improve the accuracy and localisation of the national GHG inventory and strengthen the national GHG inventory process. As of the middle of 2023, training centres have been developed, MRV trainings have been finished, Climate Action Week has been organised and a roadmap for the implementation of the Sofia Declaration has been defined. The project is financed by GEF Trust Fund, and co-financed by MoFTER, Federal Ministry of Environment and Tourism, Ministry of Spatial Planning, Construction and Ecology of RS and Hydrometeorological institutes of FBiH and RS. The total project's value is USD 1.2 million.
- Enhancing BiH Environmental Policies planning by introducing and developing local environmental and energy action plans (2007-22) is ongoing. Results are not yet posted.

#### ■ **United States Agency for International Development**

The Energy Policy Activity of the United States Agency for International Development (USAID) is assisting Bosnia and Herzegovina in enhancing co-ordination, management and transparency in the gas and electricity sectors by offering specific technical assistance to simplify and enhance the legal and policy framework. In the electricity sector, the programme aims to create a fully operational market that enhances competitiveness. USAID is also working to streamline and simplify the permitting system in BiH by developing a tailored permitting guide for investors, while supporting the establishment of a sustainable and systematic mechanism to finance energy efficiency measures for end users (USAID, 2018).

Currently ongoing, USAID's Assistance Project to the Energy Sector (2019-2024) will help BiH in the process of transforming the energy sector so that it meets its full potential and becomes a trigger for economic growth, especially in the natural gas and electricity subsectors. As part of the project activities, a roadmap for the security of network and information systems in the energy sector in BiH was prepared. The project is financed with USD 7.5 million by USAID.

#### ■ **Regional Cooperation Council**

The RCC is a co-operation framework, chaired by a board of 13 participants of the Southeast Europe region. RCC is part of the South-East European Cooperation Process (SEECP), initiated in 1996. The founding document of the SEECP is the Charter on Good-Neighborly Relations, Stability, Security and Cooperation in Southeastern Europe. According to the RCC mandate, within the issue of environmental protection, the organisation promotes:

- decarbonisation (through clean energy and transport sector, contributing to climate change mitigation)
- depollution: improving air quality, protecting water and soil
- protection and restoration of natural capital, protection of ecosystem services, and improving protection and sustainable use of biodiversity

- supporting a sustainable food production and distribution system
- introducing principles of circular economy in terms of sustainable production and consumption.

### ■ **Swedish International Development Cooperation Agency**

The Swedish International Development Cooperation Agency (SIDA) works on three priority areas in BiH, one of them being environment and climate change. In 2020, SIDA engaged a total of USD 2.40 million for its assistance in BiH (SIDA, 2021). One of the relevant projects supported is the Green Economic Development Project, which is implemented by UNDP and co-financed by the Environmental Fund of the Federation of BiH and the Environmental Protection and Energy Efficiency Fund of Republika Srpska (UNDP, 2021). Total project contributions so far amount to a bit over USD 16 million.

### ■ **The World Bank**

The World Bank provides financing to governments to help achieve their development goals and supports policy and institutional reforms. Civil society organisations may also have access to grant funding sources. There are three main types of financing: investment project financing, development policy financing and program-for-results. MIGA and IFC provide additional funding and investment options to the private sector. The World Bank also offers guarantees for private-sector initiatives. Since 2014, the World Bank has been financing the Energy Efficiency Project in Bosnia and Herzegovina with the aim of improving energy efficiency in public-sector buildings and establishing scalable financing models. The project is implemented by the Republika Srpska Ministry of Spatial Planning, Construction and Ecology.

### ■ **Western Balkans Investment Framework**

The Western Balkans Investment Framework (WBIF) is a collaborative effort among the European Union, financial institutions, bilateral donors and the governments of the Western Balkans to support socio-economic development and EU accession in the region. The WBIF provides financial and technical assistance for strategic investments to help achieve these goals.

Currently, the WBIF is supporting:

- the preparation of a EUR 197.18 million Poklečani wind farm investment by JP Elektroprivreda HZ HB dd Mostar, co-financed by EIB (34.55%), KfW (34.55%) and equity (1.30%)
- the implementation of a EUR 124.9 million investment in smart meters (700 000 customers) by JP Elektroprivreda BiH dd Sarajevo, co-financed by EIB (48.04%), equity (11.64%) and other sources (39.95%)
- the preparation of a EUR 91 million Vlačić-Travnik 50 MW wind farm investment co-financed by EIB (39.55%), KfW (20.32%) and equity (17.51%)
- The preparation of a EUR 29.35 million solar farm investment (2.7% WBIF; 8.8% equity; 88.5% KfW).

The next table gives a comprehensive overview of the main details regarding mentioned projects currently financed/co-financed by international organisations and donors.



**Table 19** Review of main details regarding projects currently financed/co-financed by international organisations and donors

Project name	Implementation period	Source of funding	Total value	Brief description of the project
<b>Construction of two adjacent solar PV plants located in Gracanica</b>	2021	EBRD	EUR 38.50 million	Project includes development, construction and operation of two adjacent solar PV plants located on top of a rehabilitated mine site previously used for coal exploitation.
<b>Decarbonization of the BiH energy sector</b>	6/2020-12/2023	GIZ	EUR 3.20 million	The project will contribute to fulfilling the obligations of BiH assumed in accordance with the Treaty on the Energy Community, provide technical assistance to partners in the promotion of framework conditions for the decarbonisation of the energy sector, with an emphasis on encouraging energy efficiency and renewable energy sources.
<b>Green Economic Development (GED)</b>	3/2021-3/2024	Financed by GCF and implemented by UNDP	USD 16.73 million	The project contributes to the establishment of a sustainable energy management system at all levels of government in BiH, with the aim of reducing harmful gas emissions, improving the energy efficiency of public buildings and public lighting systems, and reinvesting the financial savings achieved. The project also includes activities related to renewable energy sources and support to SMEs incentive schemes.
<b>Inclusive Decarbonization (IDA)</b>	4/2022-4/2023	Financed by the government of Japan and implemented by UNDP	USD 1.87 million	The project helped BiH to establish a strategic basis for a just transition to a low-carbon economy by reducing high dependence on fossil fuels through the just transition mechanism, with a focus that no one is left behind. The IDA project seeks and explores the interconnections among gender, poverty and access to sustainable energy, and identifies important elements specific to the domestic context in BiH that should be considered in the transition from fossil fuels to a low-carbon economy to ensure that transition does not worsen inequalities, but improves gender equality (among others). The project will also provide financing for the decarbonisation of at least 20 SMEs.
<b>Accelerating Clean Energy Transition Through Utilization of Solar Energy Potential in BiH (SolarCET)</b>	5/2021-12/2023	Financed by Slovak Aid and implemented by UNDP with MoFTER BiH as the main partner	USD 649 000	<p>The project will enable the development of an environment conducive to investments in technically and economically feasible solar solutions in BiH.</p> <p>The project will support the development of a publicly available Interactive Solar Atlas (ISA) for accurate solar potential data (Component 1); co-operate with relevant public authorities to help prepare a financial mechanism to accelerate the investment of citizens, owners of private and public buildings in solar energy (Component 2) and work with interested citizens on the development of technically and economically feasible solar systems and provide guidelines for optimal design and implementation of solar projects.</p>

## RENEWABLES READINESS ASSESSMENT

<p><b>Initiation of environmental financing for the purpose of low-carbon urban development (URBANLED)</b></p>	<p>9/2017-6/2024</p>	<p>Funded by GEF and implemented by UNDP</p>	<p>USD 2.37 million</p>	<p>The goal of the project is to enable investments for a transformational shift towards low-carbon urban development in BiH, thereby promoting safer, cleaner and healthier cities and reducing GHG emissions in cities.</p> <p>The project provides technical support for the implementation of technically and economically feasible low-carbon solutions in key urban sectors and promotes their wider adoption by municipalities and the private sector through dedicated financial mechanisms.</p>
<p><b>Decarbonization in the housing sector in BiH</b></p>	<p>3/2021-2/2024</p>	<p>Financed by the government of Sweden and implemented by UNDP</p>	<p>USD 2.84 million</p>	<p>The overall goal of the project is to build the foundations and open space for increasing investments in residential buildings with low carbon emissions in BiH, which is achieved through three activities:</p> <ul style="list-style-type: none"> <li>• Activity 1. Preparation of energy efficiency studies of the housing sector in each of the local self-government units involved</li> <li>• Activity 2. Development of overall financial and policy mechanisms at the level of local self-government units for the implementation of energy efficiency measures within this project and beyond</li> <li>• Activity 3. Facilitating a campaign to raise public awareness and educate citizens in support of energy efficiency.</li> </ul> <p>During 2021-2022, 20 energy efficiency studies were carried out. These studies will serve as a basis for the development of efficient financial mechanisms and the formulation of plans and activities to increase the level of energy efficiency. The remaining energy efficiency studies for 16 municipalities/cities have already been contracted and are in various stages of development.</p>
<p><b>Scaling-Up Investment in Low-Carbon Public Buildings</b></p>	<p>5/2018-5/ 2026</p>	<p>Financed by GCF and implemented by UNDP</p>	<p>USD 17.35 million</p>	<p>The goal of the project is to increase investments in low-carbon public buildings through the development and implementation of the National Framework for Low-Emission Investments in Public Buildings. In 2022, the project supported the creation of 1996 full-time-equivalent jobs (cumulative since the start of the project: 4987 jobs).</p>
<p><b>Capacity-Building Initiative for Transparency (CBIT)</b></p>	<p>9/2020-8/2023</p>	<p>Financed by the GEF Trust Fund, and implemented by UNDP with co-financing* from the institutions of FBiH and RS</p>	<p>USD 1.20 million</p>	<p>The project aims to help BiH develop its capacity to fulfill its obligations under Article 13 of the Paris Agreement under the United Nations Framework Convention on Climate Change.</p> <p>As of the middle of 2023, training centres have been developed, MRV trainings have been finished, Climate Action Week has been organised and a roadmap for the implementation of the Sofia Declaration has been defined.</p>

\*Co-financed by MOFTER (USD 50 000), Federal Ministry of Environment and Tourism (USD 50 000), Ministry of Spatial Planning, Construction and Ecology of the RS (USD 50 000), Hydrometeorological Institute of the RS (USD 50 000) and the Federal Hydrometeorological Institute (USD 50 000)

<b>Assistance Project to the Energy Sector</b>	2019-2024	USAID	USD 7.50 million	<p>The project will help BiH in the process of transformation of the energy sector so that it realises its full potential and becomes an engine of economic growth, especially in the natural gas and electricity subsectors.</p> <p>Through this project, USAID provides assistance to MoFTER BiH and competent entity ministries in the improvement of energy strategies and action plans, including the development of National Energy and Climate Plans. In addition, USAID is helping BiH develop a roadmap for IT security in the energy sector.</p>
<b>Component 1: EU4Energy - Technical assistance in the energy sector of BiH</b>	9/2022-8/2025	IPA	EUR 4.90 million	<p>The project aims to achieve the following three results:</p> <ul style="list-style-type: none"> <li>• Providing the reforms in the BiH energy sector, including the development of energy and climate policy and harmonisation of relevant legislation with the EU energy acquis</li> <li>• Capacity building at all levels of government in BiH to assume their role in the process of transposition and implementation of the acquis in the field of energy, meeting the requirements of the energy market and planning and implementation of energy policy</li> <li>• Increasing public awareness of energy-related issues, to support dialogue with both the general public and stakeholders in the energy sector and to inform and make them understand the full benefits of energy reform.</li> </ul> <p>A draft of the inception report was prepared and meetings were held with key stakeholders.</p>

### Civil society and non-governmental organisations

- **Association of Energy Producers from Renewable Resources (APEOR)**
- **Sustainable Energy Transition Centre (RESET) – Centar za održivu energetku tranziciju Sarajevo**
- **Center for Environment Banja Luka (CZZS) – Centar za životnu sredinu Banja Luka**
- **Ekologija The Center for Ecology and Energy Tuzla – Centar za ekologiju i energiju Tuzla**
- **EkoForumZenica – Eco Forum Zenica**

