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State of the Art

A photograph of a renewable energy landscape. In the foreground, there is a large array of solar panels. In the background, several wind turbines are silhouetted against a sky with soft, wispy clouds, suggesting a sunset or sunrise. The overall scene is a mix of green and blue tones.

RENEWABLE ENERGY IN BULGARIA

FLANDERS INVESTMENT & TRADE MARKET SURVEY



MARKET STUDY: RENEWABLE ENERGY IN BULGARIA

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Introduction

In compliance with the European Union (EU) climate and energy targets, Bulgaria will strive to achieve a share of at least 27 % of energy from renewable energy sources (RES) in the gross final energy consumption by 2030. This national target should be achieved by increasing the consumption of RES in all three sectors: electricity, heat, and energy for refrigeration and transportation. Bulgaria is a major producer and exporter of electricity in the region. The electricity sector will play a primary role in the long-term decarbonisation process, as all sectors are gradually electrified. The process has already begun and is proceeding at a rapid pace in the construction sector, but a similar approach will be needed in mobility and industry, where the removal of fossil fuels will be a challenge. To be able to deploy its significant renewable energy resource potential, the country will need investments in technology, infrastructure, and capacity.

The present market study is intended to help Flemish business operators in their analysis of the renewable energy market in Bulgaria and its potential for trade, investment and partnerships deployment. The report presents a dedicated section focused on wind energy as a market segment considered to hold untapped potential.

For additional information, the specialized websites and sources of information referred hereto can be consulted. Flanders Investment & Trade Sofia office remains as well at your disposal for further questions and assistance. Detailed contacts lists of stakeholders - potential customers, service providers and partners of interest can be additionally provided upon request.

Overview of the energy sector in Bulgaria

Key drivers of the Bulgarian economy, the energy and climate change sectors, are currently strongly affected by geopolitical, economic, and regulatory pressures.

Bulgaria remains the most energy-intensive economy in the EU and by a wide margin. The economy in Bulgaria consumes 3.5 times more energy resources per unit of its GDP than the EU average. Nearly 75% of Bulgaria's carbon footprint is caused by energy production. Bulgaria is highly dependent on coal and nuclear power.

The government is slowly decreasing its coal power capacity to gradually replace it with renewable power capacity. With coal powered plants accounting for ~ 40% of the energy mix alone, developing renewable energy substitutes is key for offsetting the pollution.

During this energy shift, nuclear power is expected to remain dominant as the government plans to rely on nuclear generation to meet the major electricity demand.

Oil and gas have a joint contribution of around five percent, and the renewables share is dominated by hydropower, followed by solar, wind, and biofuels. Renewable electricity generation in Bulgaria - from

solar, wind, and hydro sources - stood at 17% of the country's power mix in 2021 while Bulgaria has the goal of using 27% of renewable energy sources (RES) by 2030.

The Bulgarian power market is dominated by state-owned producers. The highly regulated electricity market is dominated by a few major players. Bulgarian Energy Holding (BEH) manages the most important companies in the energy sector, the Kozloduy nuclear power plant, Maritsa Iztok 2 coal power plant, the National Electric Company (NEK), Electricity System Operator (ESO), Bulgargaz, Bulgartransgaz, and Bulgartel. Deregulation of the households' electricity market is not expected to come live before 2026.

The largest-scale mining activities are situated in the Maritsa East Mining and Energy Complex situated in South Central Bulgaria, in the region of Stara Zagora. The mining complex itself stretches over 240 km² and produces nearly 97 percent of the lignite in the country, directly employing some 12,500 people.

In addition to Stara Zagora, Bulgaria has two other coal regions in transition, namely Pernik and Kyustendil in the South-West of the country. Despite several reminders from the European Commission, Bulgaria remains the only member state that has not yet presented its territorial transition plans for the coal regions, thus putting at risk significant funding under the EU Just Transition Mechanism. The final deadline for submission is quarter four of 2023 and reporting of the funding for a later absorption is not admissible. Key challenges in Bulgaria's coal regions are the fossil-fuel dependency of the local economies and the energy-intensive industry that is slow to take up low-carbon technological solutions or diversify away from its dependence on fossil fuels.

An important element of Bulgaria's energy transition is also the upgrade of the country's transmission networks. Bulgaria's energy strategy foresees the replacement of ordinary power transmission networks with smart grids supported by EU funds. The issue of how to deal with overcapacity in the electricity market is critical for the integration of renewables into the electricity grid in Bulgaria. ESO, the country's transmission system operator, has already invested more than EUR 25 million in the digitalization of the grid. Modernization and digitalization of the medium-voltage grid are still ongoing. ESO has signed preliminary agreements for 4,000 MW, and it must secure the connection for 4,500 MW, according to the target set in the National Recovery and Resilience Plan. The plan also sets a goal to increase the cross-border transmission capacity by 2,000 MW.¹

The Renewable energy sector in Bulgaria– the green plan

The 2020s kicked off with a rather unique all-around interest in Bulgaria's market for projects in the Renewable Energy Sector. Some saw the opportunity to pull foreign investments, others – ways to incorporate better use for a property, but all agreed that this sector would be prominent in the future. Soon after, the Ukraine invasion brought perhaps the biggest shock in decades to Europe's energy security

¹ *Link to the National Recovery and Resilience Plan of Bulgaria - https://www.nextgeneration.bg/upload/36/Bulgaria_Recovery_and_Resilience_Plan_ENG.pdf*

– on the one hand, a gas crisis, on the other, galloping electricity prices in its wake. The crisis, together with the ever-lower installation costs and the need to reduce its carbon footprint, created an opportunity for Bulgaria to expand renewable energies and invest in energy efficiency solutions.

Renewable electricity generation in Bulgaria - from solar, wind, and hydro sources - stood at 17% of the country's power mix in 2021, according to the National Statistical Institute (NSI). This contribution is expected to increase in the coming years as investor interest in developing new renewable energy projects in Bulgaria was especially strong in 2021 and 2022. In a sign of the growing attractiveness of the sector, ESO said it received 2,377 applications for the construction of renewable energy projects in 2022, for a total capacity of 17.5 GW, up from the 15.2 GW in 2021. Bulgaria plans to use EU funding available under its Recovery and Resilience Plan to boost much-needed development and use of renewables.

The renewable energy sector falls under one of the four main pillars in the National Recovery and Resilience Plan of the Republic of Bulgaria or the so-called Green Bulgaria. 37% of the resources of the Plan will be used in making Bulgaria more environmentally friendly. A focus on sustainable management of natural resources allows to meet the current needs of the economy and society while maintaining environmental sustainability so that these needs can continue to be met in the long run. The country will need to invest in improving the wind energy sector, more solar panels, among others, in order to gain more renewable energy. Though a sensitive topic in the Bulgarian political and economic environment, Bulgaria intends to burn coal until 2030 to ensure energy security, while at the same time developing solar, wind, hydropower, battery storage, and hydrogen projects, according to a proposed energy strategy until 2053².

At the start of 2023, Bulgaria was establishing itself as the Balkan country with the largest photovoltaic (PV) capacity (1,186 megawatts for 2021). According to a report by Solar Plaza, over the next three years, 61% of the total growth for the Balkans is expected in Bulgaria, with capacity in the country projected to reach 2784 megawatts in 2024.

However, according to an article published by the business intelligence platform SeeNews on 19.01.2023, Bulgaria recorded the lowest share of gross final energy consumption from renewable sources in 2021 among the five EU members from Southeast Europe (SEE), namely - 16.8% - well below the EU average of 21.8 %.

² Link to the energy strategy of the Bulgarian Ministry of Energy with a horizon till 2053 - https://www.me.government.bg/uploads/manager/source/NRRP/%D0%B2%D0%B8%D0%B7%D0%B8%D1%8F_2023-2053_1.pdf

The renewable energy sector in Bulgaria - market landscape

The Bulgarian renewable energy sector can be divided into three main segments:

- operation, maintenance, and asset management;
- construction, engineering and project development;
- manufacturing batteries, engines, and turbines for renewable power.

The first two segments are further divided into five sub-segments, namely:

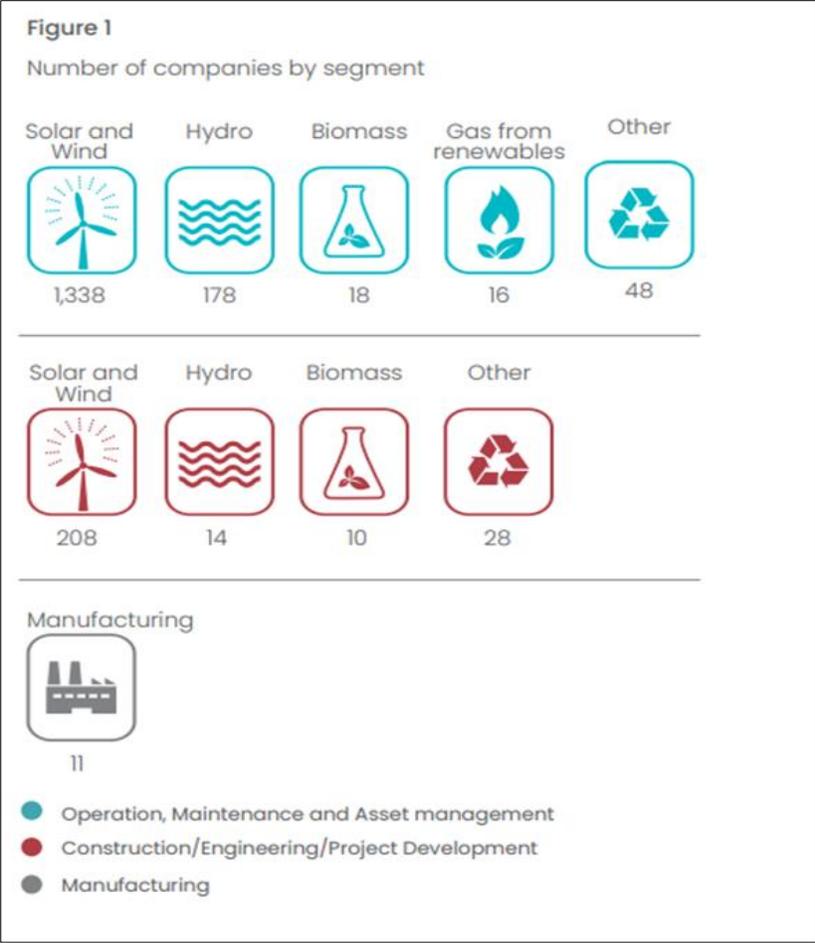
- solar and wind;
- hydropower;
- gas from renewable sources;
- biomass;
- others (covers all companies with activities spanning more than one of the other sub-segments).

In 2021, Bulgaria's renewable energy sector continued to be dominated by companies active in the operation, maintenance, and asset management segment. In 2021, close to 86% of all vendors were engaged in the generation of electricity from renewable sources, while companies focused on the construction, engineering, and project development of renewable power plants accounted for less than 14% of the total. The third major segment – manufacturing batteries, engines, and turbines for renewable power consisted of only 11 companies.

At a sub-segment level, operation, maintenance, and asset management of solar and wind power facilities was by far the largest sub-segment with 1,338 representatives or three-quarters of all companies in the sector. The Bulgarian renewables market is characterized by the relatively eased market entry for solar companies, so a large number of players in this field can be attributed to that.

The second most numerous sub-segment was the operation, maintenance, and asset management of hydropower plants with 178 companies. Vendors operating in the other sub-segment of operation, maintenance, and asset management were 48, while power generation from the less popular subsegments of biomass and gas from renewable sources were represented by 18 and 16 companies, respectively.

The sub-segment distribution in the construction, engineering, and project development segment was similar. Solar and wind accounted for 80% of the total, with 208 representatives. The other sub-segment, which encompasses vendors engaged in the construction and development of several types of power plants, came in second with 28 companies.



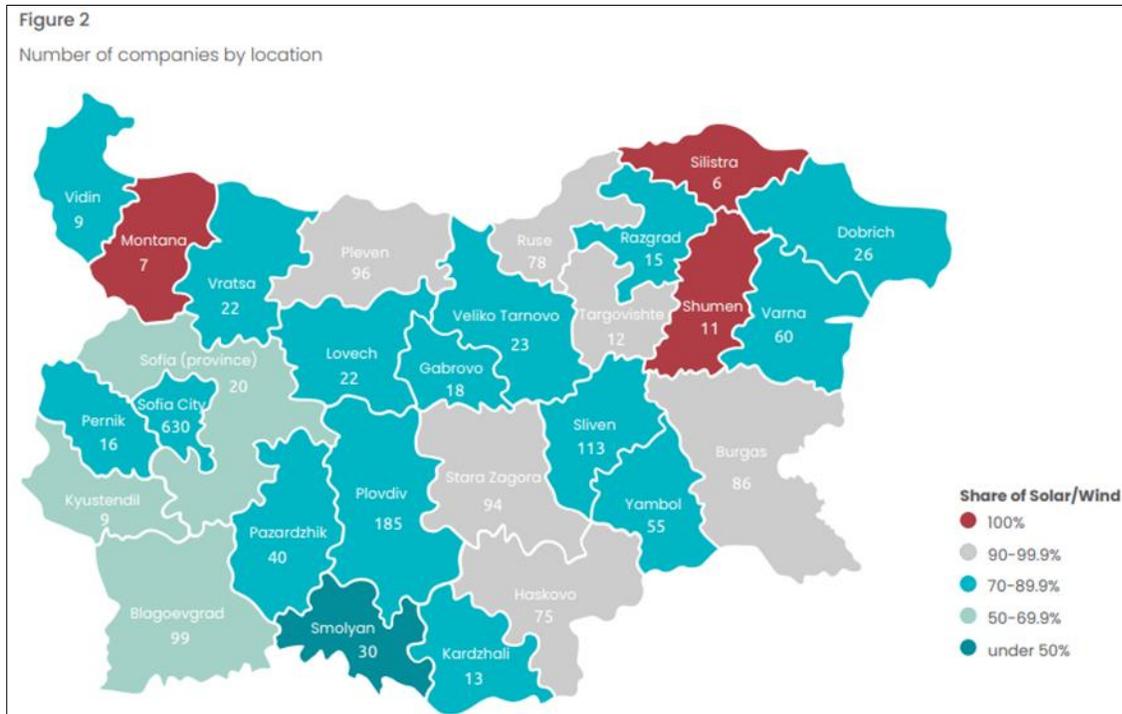
Source: SeeNext's Report "The Renewable Energy Sector in Bulgaria", 2023

The capital city of Sofia is the undisputed administrative center of the Bulgarian renewable energy industry, with 630 registered entities or more than a third of all vendors being headquartered there. However, it should be noted that all major companies headquartered in Sofia in fact operate facilities throughout Bulgaria. Additionally, the dynamics in the number of newly established companies paint a different picture. With a total of 47 newfound entities in 2020-21, Sofia City district came in second and was followed closely by Ruse district with 36 companies. Pleven district was on top of the rank with 60 new companies established on its territory in the 2020-21 period. This points to a gradual uniform distribution of the companies in the sector and an improving business environment throughout the country. Of course, the distribution is also affected by the size and location of the respective district as well as its terrain as environmental conditions play a key role in the operations of the sector.

In terms of the total number of companies registered, the capital district is followed by Plovdiv with 185 companies and Sliven district, which, albeit smaller, offers favorable wind conditions and thus had 113 registered entities in the period under review.

Solar and wind electricity generation companies and those related to construction and engineering vendors are the most widely spread across the country, due to the favorable climate in almost all districts.

Their share varies from 100% of the registered renewable energy producers in regions with scarce water resources such as Shumen and Silistra to less than 50% in mountainous Smolyan. The latter is the only district in Bulgaria where solar and wind companies are not dominant in terms of number of companies, outpaced by hydropower plants.



Source: SeeNext's Report "The Renewable Energy Sector in Bulgaria", 2023

Between 2013 and 2019, there was a period of relative stagnation in Bulgaria's renewable energy sector. However, the years 2020-2021 marked a resurgence, with a notable increase in the count of established renewable energy companies in the country. A total of 325 new entities were founded - 153 in 2021 and 172 in 2020. These figures almost match those recorded in the 2008-2012 period, when investment activity in the Bulgarian renewable energy sector was booming. The current activity could be attributed to high electricity prices and the fact that many businesses and even households resorted to the construction of renewable energy sources for their own needs.

Hydropower facilities generated the most electricity in 2021 - a total of 5,127,000 MWh. This was also an impressive increase of 51% on the year. Likewise, hydro installed capacity advanced by 24.7% year-on-year to 3,213 MW, according to the Electricity System Operator.

Photovoltaic plants also increased their total installed capacity, by 9.6% y/y, followed by wind facilities with 5.4%. Biomass climbed to 79 MW, notching up by 0.6% on the year.

In terms of financial performance, Bulgaria's renewable energy industry saw its aggregate operating revenue surge by 41% to EUR 1.5 bln in 2021, due to the effect of rising electricity prices and increasing demand for alternative energy sources from both businesses and consumers.

The segment of operation, maintenance and asset management saw its operating revenue jump 40.3% on the year to EUR 1 bln, while the construction, engineering and project development segment almost doubled its operating revenue to EUR 212 mln. Manufacturing of batteries, turbines and engines gained 17.6% to its turnover, reaching EUR 260 mln.

The operation, maintenance and asset management segment accounted for almost 67% of renewables' overall operating revenue in 2021, which is a slight decrease compared with the sizable share of 70% from 2020. The construction, engineering and project development segment recorded sound growth of nearly two times after stagnating in 2019 and then recovering in 2020. As a result, it sliced a 14% share in the renewables sector. Manufacturing narrowed its share for third consecutive year, to just over 17%, down from 21% in 2020 and 24% in 2019.

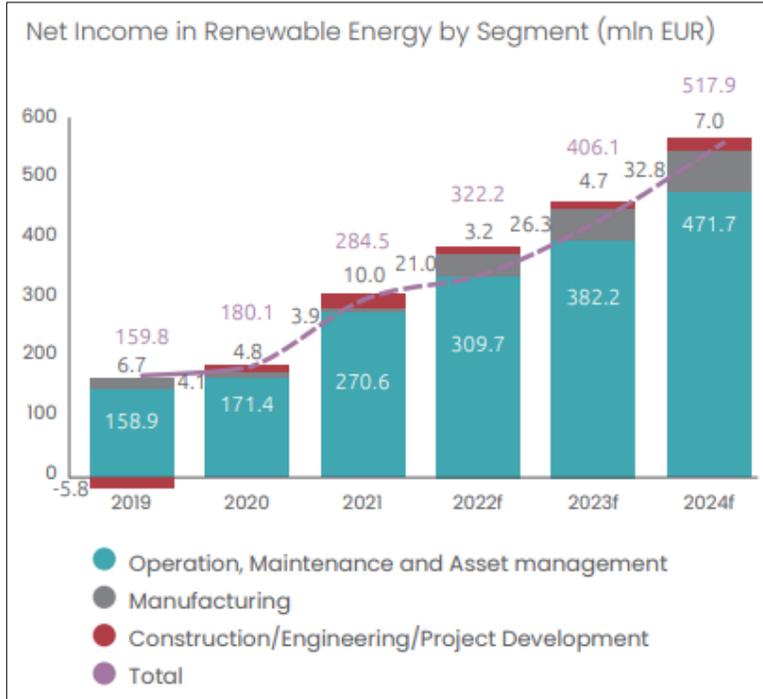
Most operation, maintenance and asset management sub-segments recorded positive annual growth rates in operating revenue in 2021. Speaking in terms of percentage increase, the other sub-segment recorded the most impressive increase, of nearly 96%, but it is worth noting that this field has a negligible size. Hydropower was, in fact, the best-performing sub-segment with a 78% increase in operating revenue to EUR 147 mln.

The most significant sub-category, in terms of absolute size, which encompasses the operation, maintenance, and asset management of solar and wind farms, experienced a substantial annual growth rate of 39.4%. By 2021, its combined revenue surged to a total of EUR 811 million. Biomass was the last sub-segment to report a y/y increase, of 4.2% to EUR 15 mln, while operation, maintenance, and asset management of gas from renewable sources saw its operating revenue fall on an annual basis in 2021, by 7.3% to EUR 41 mln.

Projections show that the operation, maintenance, and asset management of solar and wind facilities will continue to hold the biggest share of operating revenue in the sector, expanding at a compound annual growth rate (CAGR) of 24.8% to around EUR 1.6 bln in 2024. The importance of hydro power plants will remain high and its turnover is expected to be close to EUR 330 mln in 2024.

The share of gas from renewable sources will further decline and its turnover is expected to decrease to EUR 35 mln by the end of 2024. Solar and wind was also the dominant sub-segment within the construction, engineering, and project development segment in terms of size with a share of more than 98% of the segment's total operating revenue in 2021. Thus, its operating revenue practically determines the financial performance of the whole segment. In 2021, the turnover of construction, engineering, and development of solar and wind projects grew by 95.4% y/y to EUR 208 mln. Expected to expand at a CAGR of 49.8%, this field of renewables is set to reach an operating revenue of almost EUR 700 mln in 2024.

Figure 3



Source: SeeNext's Report "The Renewable Energy Sector in Bulgaria", 2023

In terms of foreign investment interest towards Bulgaria, the country's renewable energy sector seems the most attractive for German and Italian investors, together accounting for almost a third of all foreign-owned companies. Austria and the Czech Republic occupy the third and fourth spots, followed by Greece.

The renewable energy sector in Bulgaria – regulatory framework

The implementation of Bulgaria's energy strategy is largely driven by its National Recovery and Resilience Plan (NRRP), where it holds a 53.66% share in total expenditure. The Bulgarian National Recovery and Resilience Plan (NRRP) outlines a series of proposed changes and additions to current laws with the aim of increasing the proportion of renewable energy sources (RES). Its main goals are related to simplifying the procedure for installing renewable energy installations for own consumption as well as the licensing and permitting procedures, avoiding unnecessary delays, reducing grid connection times, etc.

Spatial Development Act

According to the most recent amendments in the Spatial Development Act, published in the State Gazette on 20 January 2023, approval of development-design projects shall not be required for the issuance of a building permit for RES installations with a total installed capacity of up to 1 MW on roof and facade

structures, their adjacent lots etc. No detailed plan shall be required in the cases where the installations are located outside urbanised territories. In addition, no building permit shall be required for the construction, major repair and replacement of installations for the production of energy, thermal energy and/or energy for cooling from RES to existing single-family residential and villa buildings and in their adjacent land properties, if they are used for own consumption and their total installed power does not exceed 20 kW. In these cases, before the start of construction, the assignee of the installation must submit a notification to the chief architect of the municipality attaching thereto the documents required by law documents. After the installation, a new notification shall be submitted by the owner of the building and the assignee notifying the chief architect of the municipality and the operator of the electricity distribution network that the installation is placed under voltage and is performing in line with technical documentation. The amendments significantly shorten the administrative procedure.

Energy Act

Furthermore, the existing legal gap regarding the regulation of energy storage has been filled by amendments in the Energy Act published in the State Gazette on February 2nd, 2023. Energy storage now qualifies as one of the energy activities and is defined in accordance with the definition in Art. 2, para. 59 of Directive (EU) 2019/944. The activity of energy storage shall be carried out freely in the market, i.e., no license shall be required. The basic concepts related to the activity such as operator and storage facility are regulated. By means of the same amendments, the power generation subject to licensing of energy projects has been increased from 5 MW to 20 MW of installed capacity. In addition, exchange market guarantees of origin have been introduced. Under the amendments, the entity which has been issued a license to organise an exchange market for electricity is also responsible for organising an exchange market of guarantees of origin.

Renewable Energy Sources Act

Two bills for amendments of the Renewable Energy Sources Act (RESA) have been submitted to the National Assembly on January 16th and January 17th, 2023 for the purposes of fulfilling the objectives related to the transposition of the harmonization of the Directive 2018/2001 the term for which expired in 2021. The draft proposals aimed at regulating the energy communities, providing a definition for “producing end-consumer” and providing incentives applicable to them. On a separate note, the amendments aim to create the necessary conditions for the implementation of the reforms provided for in the NRRP. A subsequent easing of the connection procedures for RES projects is also planned. The draft proposals are subject to public discussions, as a result of which they may be amended.

The renewable energy sector in Bulgaria – Incentives for investments

The national strategic documents such as the National Development Programme Bulgaria 2030 and the Integrated Energy and Climate Plan of the Republic of Bulgaria 2021-2030³ provide for the necessary steps to archive the ambitious goals of the European Green Deal for gradual decarbonization which imply significant efforts to increase the share of energy from renewable energy sources (RES) in gross final energy consumption and to reduce emissions from greenhouse gases (GHG). State incentives for stimulating the production of electricity from RES play a crucial role in reducing the administrative burden on renewable investments regarding the installation, connection, and operation of the facilities in industrial areas and urban environments.

The Bulgarian legislation provides for a system of incentives and measures (administrative, financial and regulatory) that is used to stimulate newly build RES projects in Bulgaria, namely:

- ‘Feed-in tariff’ contracts providing obligatory purchase of the electricity produced by RES power plants with an installed capacity of less than 500 kW under preferential prices for a long-term period;
- A simplified procedure for grid connection is provided to power plants with a total installed capacity of up to and including 30 kW, which are planned to be built on roof and facade structures of buildings connected to the electricity distribution network and on real estate in urban areas;
- A simplified notification regime (to the electricity transmission network operator, the relevant electricity distribution network operator, or the closed electricity distribution network as the case may be) in the cases where an end customer installs a power plant with a total installed capacity of 5 MW on a roof or facades of structures of buildings and on real estate in urban areas, the energy from which will be used only for own consumption. On the contrary, prior to entry into force of the amendments, the investors had to follow the procedure for connecting to the grid, which, in some cases, could have taken considerable time. The procedure optimizes the deadlines for the construction of power plants for covering own consumption and optimization of the electricity costs;
- New RES or green hydrogen projects that entered exploitation after January 1st, 2021 are exempted from the obligation to contribute 5% of their future income to the Fund for Security of the Electricity System;
- Tax incentives are provided to companies that supply the market with liquid fuels of petroleum origin mixed with bio-components at a certain percentage;

³ Link to the National Development Programme Bulgaria 2030 - <https://www.minfin.bg/en/1394>
Link to the Integrated Energy and Climate Plan of the Republic of Bulgaria 2021-2030 - https://energy.ec.europa.eu/system/files/2020-06/bg_final_necp_main_en_0.pdf (A summary of the plan can be found here - https://energy.ec.europa.eu/system/files/2019-06/necp_factsheet_bg_final_0.pdf)

Currently, discussions are taking place with the aim of adopting a special regulation on energy from RES in marine spaces (drafts have already been prepared), which would be a basis for attracting investors in offshore wind farms.

The NRRP envisages preparing and approving a national roadmap to improve the conditions for unleashing the potential of hydrogen technologies and mechanisms for producing and supplying hydrogen. As a result, a more favorable regulatory framework shall be introduced.

Further measures have been proposed in the recently published draft version of 'Strategic Vision for Sustainable Development of the Energy Sector of the Republic of Bulgaria with a horizon of 2053'⁴ which reflects the state's vision for the development of the electricity sector in Bulgaria until 2053. Among the key measures set out in the draft are the construction of new energy capacities with a focus on nuclear and green energy; the construction of green hydrogen production capacities as a substitute for gas and a means of balancing the energy system; and the construction of new energy storage capacity based on usage of national resources. By 2050, it is expected that 12 GW of solar and 4 GW of wind capacity should be built on the basis of private investments. Furthermore, 5 GW of electrolyzers and 1.5 GW of seasonal storage systems should be deployed through financing from MFI⁵ (*Microfinance Institution*) and strategic investors financing. Geothermal energy is foreseen as suitable for local heating purposes. In accordance with the applicable rules, the proposed strategy must be presented to the National Assembly. One shall note however that the 2053 Strategy has been prepared by a caretaker government so amendments are not be excluded.

The renewable energy sector in Bulgaria - Financing programs for renewable energy projects

In line with EU priorities for the accelerated deployment of RES, the Bulgarian government has undertaken measures to encourage and concentrate investments in the fields of efficient production, RES energy use, resources, and environmental infrastructure, thus contributing to the gradual decarbonization of the economy. Part of these measures includes ensuring financing for projects for energy efficiency and renewable sources, schemes for support of green hydrogen and biogas production projects, and schemes to support the construction of batteries. Most of the financing is provided by EU structural funds. Financial institutions also have an essential role in realizing the green transition, and they are increasingly working towards including in their portfolio attractive products to support energy efficiency and RES projects.

The Bulgarian Development Bank oversees the contribution of small and medium enterprises to sustainable green growth and will finance viable RES projects. The European Investment Bank,

⁴ Link to the Strategy - https://www.me.government.bg/uploads/manager/source/NRRP/%D0%B2%D0%B8%D0%B7%D0%B8%D1%8F_2023-2053_1.pdf

⁵ MFI - <https://www.mfi.bg/en/>

the European Development Bank, and the World Bank also provide budgets and instruments aimed entirely at financing projects related to energy efficiency, transition to clean energy and use of RES. The applicable financial instruments and aid funds at a national level are provided in the National Energy and Climate Plan (NECP) for the period 2021-2030⁶ and the NRRP through the following funds and mechanisms:

National Decarbonisation Fund (NDF)

The NDF aims to support low-carbon investments through sustainable and targeted financing to a broad group of beneficiaries – end-users of energy, in order to achieve, to a maximum extent, the goals for the decarbonisation of the Bulgarian economy. The NDF is expected to invest in all areas of sustainable energy development – from the renovation of buildings and the installation of RES to providing business support. It will use existing EU funds and offer grant-in-aid financial and technical assistance combined with financial instruments, including credit lines and guarantees and/or a combination thereof. A key element for the success of NDF is the planned participation of local banks and financial institutions in their role as financial intermediaries, as their participation will not only contribute to the co-financing of the scheme, but it should also significantly simplify the financing process of projects.

Modernisation fund

In the period 2021-2030, Bulgaria shall benefit from the investment support that will be provided under the Modernisation Fund. It is meant to facilitate investments in the generation and use of energy from renewable energy sources, energy efficiency, energy storage, modernization of energy networks, and the just transition in carbon-dependent regions. Bulgaria will receive nearly 6% of the fund's total resources or about EUR 16 mln.

A significant share of the resources (at least 70%) shall be invested in areas defined as a priority such as:

- Generation and use of electricity from renewable sources
- Improvement of energy efficiency, including in transport, buildings, agriculture, waste, and except in energy efficiency related to energy generation using solid fossil fuels
- Energy storage
- Modernisation of energy networks, including district heating pipelines, grids for electricity transmission, and increase of interconnections among member states
- Support for a just transition in carbon-dependent regions

⁶ Link to the Integrated Energy and Climate Plan of the Republic of Bulgaria 2021-2030 - https://energy.ec.europa.eu/system/files/2020-06/bg_final_necp_main_en_0.pdf (A summary of the plan can be found here - https://energy.ec.europa.eu/system/files/2019-06/necp_factsheet_bg_final_0.pdf)

Energy Financing Mechanism (EFM)

EFM is a specific financial instrument provided in the NRRP that aims to expand the possibilities for implementing measures and projects to increase energy efficiency and use of energy from RES in the conditions of limited financial resources. EFM shall contribute to the improvement of the energy efficiency of various projects and will help businesses install their electricity generation systems in combination with local energy storage facilities with an effect on energy consumption and reflecting on the electricity costs. It is expected that Bulgaria will receive EUR 100 mln financing support in grants under EFM.

Grant for RES construction

The grant aims to integrate into the grid a higher percentage of RES with a minimum capacity of 1.4 GW combined with the minimum required electricity storage capacity (batteries). The grant shall be available through CAPEX support aiming to provide the highest capacity at the lowest CAPEX support per MWh of produced electricity (according to the p50 simulation for the plant's annual average annual production in the first ten years of production). The expected results are for at least 54 MW of battery capacity installed in the systems by 2026. The solar power plants will probably reach a capacity of at least 300 MW.

Structural funds

As an EU member, Bulgaria has access to project financing in the form of EU structural funds. In line with the European Green Deal and the signed Partnership Agreement, to contribute financially renewable projects, Bulgaria can benefit from several funds and programs like the European Regional and Development Fund (ERDF), the Cohesion Fund (CF), the Just Transition Fund, and other funds mostly subject to centralized management by the European Commission. A total of EUR 2.4 bln from the ERDF and CF will support Bulgaria in achieving its climate targets. In particular, EUR 600 mln will help increase the share of renewable energy to 27% of the total energy consumption as well as reduce energy consumption and greenhouse gas emissions in public buildings.

Innovation and Competitiveness

A variety of operational programs financed by EU funds are implemented at a national level. "Innovations and Competitiveness" 2021-2027 is one of the programs with wide applicability in the field of energy and climate aimed at the storage and conversion of renewable energy, efficient methods for the capture and utilisation of carbon dioxide, hydrogen-based technologies and ecomobility, such as the transition to a low-carbon competitive economy, etc. The program shall finance infrastructure projects in the field of energy and energy efficiency and also large enterprises that aim to implement energy efficiency measures to achieve sustainable growth and competitiveness of the economy. There is an urgent need for a decisive transition from free financing of energy-efficient projects to implementing mechanisms to attract private financing. This will be the crucial reform that will accelerate the energy transition that Bulgaria will inevitably face in the coming months and years. A common vision for co-financing with financial

instruments and aid funds needs to be further supported at the state level and popularised among the key market segments.

Cohesion Fund

The EU's Cohesion Fund aims to reduce the economic and social disparity between EU countries and promote sustainable development. The fund supports energy-related projects that benefit the environment, for example, by reducing greenhouse gas emissions, increasing the use of renewable energy or improving energy efficiency.

The wind power energy sector in Bulgaria

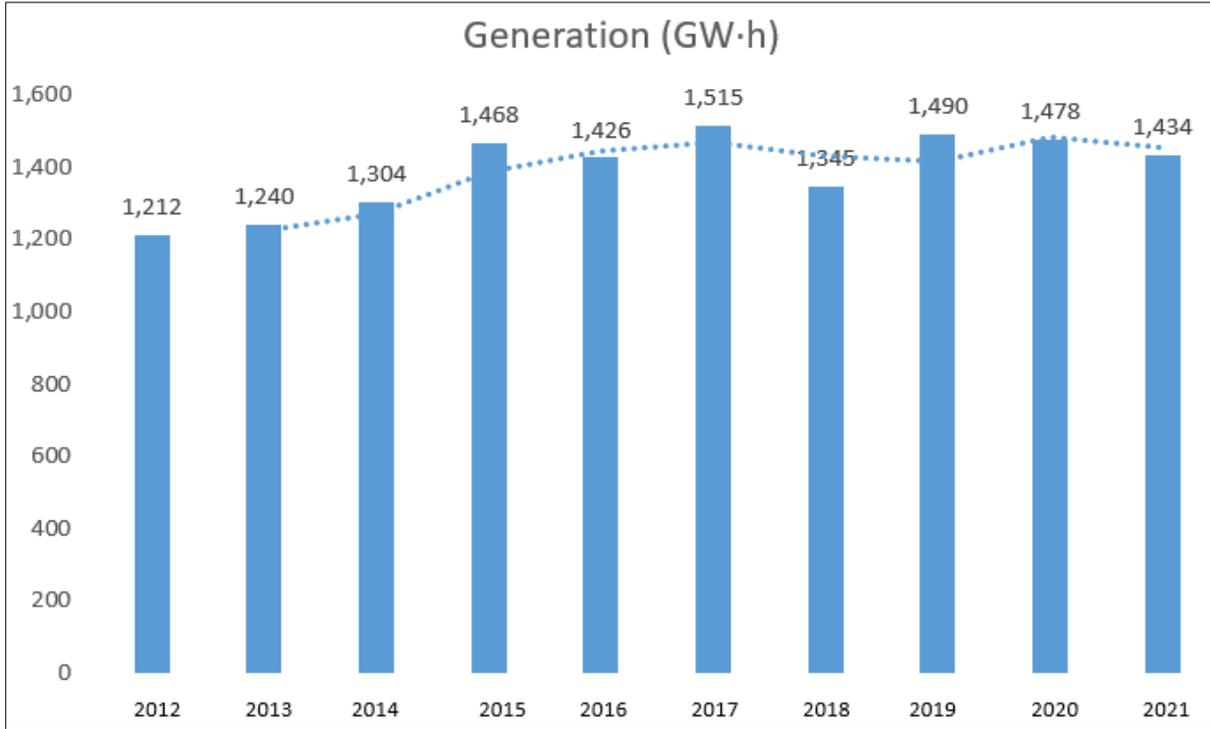
The growing need to substitute traditional energy sources with renewables, as well as growing awareness of carbon footprints and their negative impacts on the environment, is predicted to boost the wind energy industry. Furthermore, wind power has a higher efficiency than traditional fossil energy sources such as coal, natural gas, and oil. Wind turbines emit among the fewest greenhouse-gas emissions of any energy source across their full life cycle. The Global Wind Energy Market Size was valued at USD 79.7 bln in 2021 and the worldwide wind energy market size is expected to reach USD 151.47 bln by 2030, according to a research report published by Spherical Insights & Consulting.

In 2022, wind supplied over 2000 TWh of electricity, which was over 7% of world electricity and about 2% of world energy. With about 100 GW added during 2021, global installed wind power capacity exceeded 800 GW. To help meet the Paris Agreement goals to limit climate change, analysts say it should expand much faster - by over 1% of electricity generation per year.

In Europe, wind power energy becomes more and more important to total energy production. Wind power has provided 17 percent of Europe's total electricity consumption in 2022. According to Paweł Czyżak, senior energy and climate data analyst at the think tank Ember, wind power is the most important technology for Europe's decarbonisation, in many countries the cheapest and potentially largest domestic source of electricity that can replace volatile imported fossil fuels. Based on the data from the industry group WindEurope, Denmark took the top spot last year, with the highest contribution of wind power to energy consumption (55 percent). Ireland came in second (34 percent), the UK third (28 percent), and Germany fourth (26 percent).

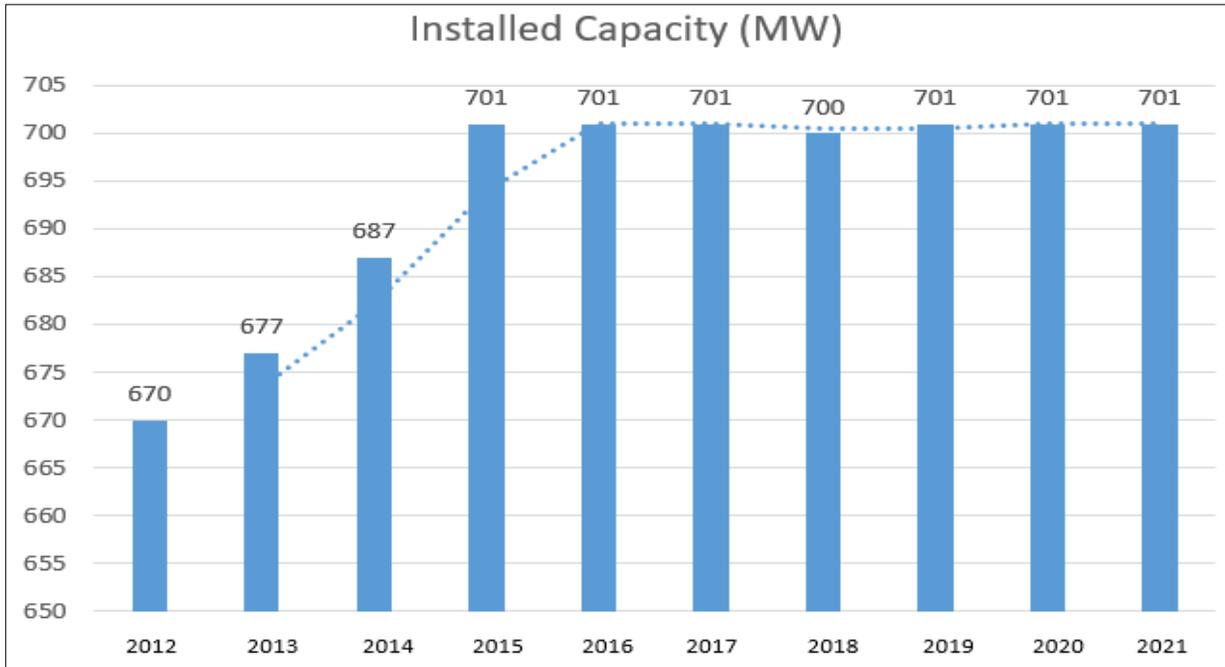
When it comes to Bulgaria the graphics below present the installed and generated wind power capacity in the period 2012 to 2021.

Figure 4



Source: Wikipedia – Data for the Wind Energy Generation in Bulgaria

Figure 5



Source: Wikipedia – Data for the Wind Energy Generation in Bulgaria

Bulgaria is a country where the wind energy market is still in its development stage. Wind power generated 3% of Bulgaria's electricity in 2021. It holds a potential that has not yet been fully utilized by the country though Bulgaria has the conditions to expand this segment of gaining renewable energy.

Bulgaria's wind energy potential is largely due to its geographical location, which features a long coastline along the Black Sea and mountainous terrain in the southern and western parts of the country. The annual average wind speed for Bulgaria ranges from 3.7 to 9.5 m/s and the mean wind power density is from 80 to 167 W/m² at the standard height of 10 m. These factors create favorable conditions for the development of both onshore and offshore wind farms. According to the European Wind Energy Association, Bulgaria has the potential to generate up to 3,400 MW of wind power, which would be enough to meet approximately 40% of the country's electricity demand.

In Bulgaria, most onshore wind parks are located in the northeastern part of the country, in the region of Dobrich near the Black Sea coast north of Varna.

Listed here below are the five largest active onshore wind power plants by capacity in Bulgaria, according to GlobalData's power plants database:

- Saint Nikola - In 2009, AES Geo Energy built the 156 MW Saint Nikola Wind Farm near the town of Kavarna. With its 52 Vestas wind turbines, the Kavarna project is the largest wind farm in the country.
- Kazanlak - This 72.50MW Kazanlak onshore wind power project is located in Stara Zagora. Vetrocom has developed the project.
- Suvorovo - MET Renewables owns this 60MW onshore project. The project was developed by Eolica Bulgaria. It is located in Varna.
- Tcherga Wind Farm - This onshore wind project has a capacity of 40MW. ERG Power Generation has equity stakes in the project. It is located in Dobrich.
- Kaliakra Wind Power AD - The 35MW onshore wind project is located in Dobrich. The project has been developed by Kaliakra Wind Power.

Further to the largest active wind farms, we may mention one more big wind power project in development - *Dobrotich Wind Park*. This is a 592MW onshore wind power project, planned in Varna. It will be developed in multiple phases. The project construction is likely to commence in 2026 and is expected to enter into commercial operation in 2027. The project is being developed and is currently owned by CWP Global. The company has a stake of 100%. The project cost is expected to be around \$614.317 mln. The wind power project will consist of 74 turbines each with 8 MW nameplate capacity.

In addition, a market stakeholder to consider represent the *Bulgarian Wind Energy Association* (BGWEA). BGWEA brings together the majority of wind energy producers of over 1 MW and companies actively engaged in the sector. BGWEA's members represent a major share of the total installed wind power capacity in Bulgaria. BGWEA is a non-profit organization that supports the sustainable development of wind energy on behalf of all stakeholders.

When it comes to the offshore energy, Bulgaria has a way to go despite numerous advantages stakeholders are pointing out.

The offshore energy industry could have a significant contribution to local communities in terms of highly skilled job creation as well as the formation of new technological clusters. The transformation of the two largest Bulgarian ports (Varna and Burgas) to decarbonization hubs would support the offshore wind industry formation. However, stakeholders on the market note that the current national strategic document roadmaps fail to recognize the potential of Bulgarian maritime territories for the decarbonization of the energy sector. Though the financial mechanisms of the European Green Deal offer timely opportunities for financing the pre-conditions of the formation of a regional offshore wind energy industry in Bulgaria, Bulgaria is the only EU country with access to the sea that has not tried to take advantage of this low-carbon and competitive form of energy. This being also a conclusion drawn by a study on Bulgaria's offshore wind potential conducted by the Bulgarian Center for the Study of Democracy (CSD)⁷.

The study assesses the technical and economic potential of the Bulgarian Exclusive Economic Zone in the Black sea identifying favorable deployment areas for offshore wind power generation. The data demonstrates that 26 GW out of a total of 116 GW technically feasible capacity could be utilized in shallow waters by mature bottom-fix technology concept with capacity factors in the range of 40 – 48 percent. Even if a fraction of this threshold could be harnessed, offshore wind could play a transformational role in meeting and exceeding the 2030 national renewable energy targets. It would contribute to the establishment of a regional value chain as part of a completely new industrial profile for the country in line with the goals for a low-carbon Europe in the European Green Deal.

The development of the country's significant wind potential is considered a key medium-term pathway for the better integration of renewable energy sources in the electricity generation sector in Bulgaria and fully in line with policy priorities in Europe. Offshore wind has the potential to reduce carbon emissions from coal and natural gas-fired power plants and to also ease the burden of balancing the electricity system, especially during off-peak hours.

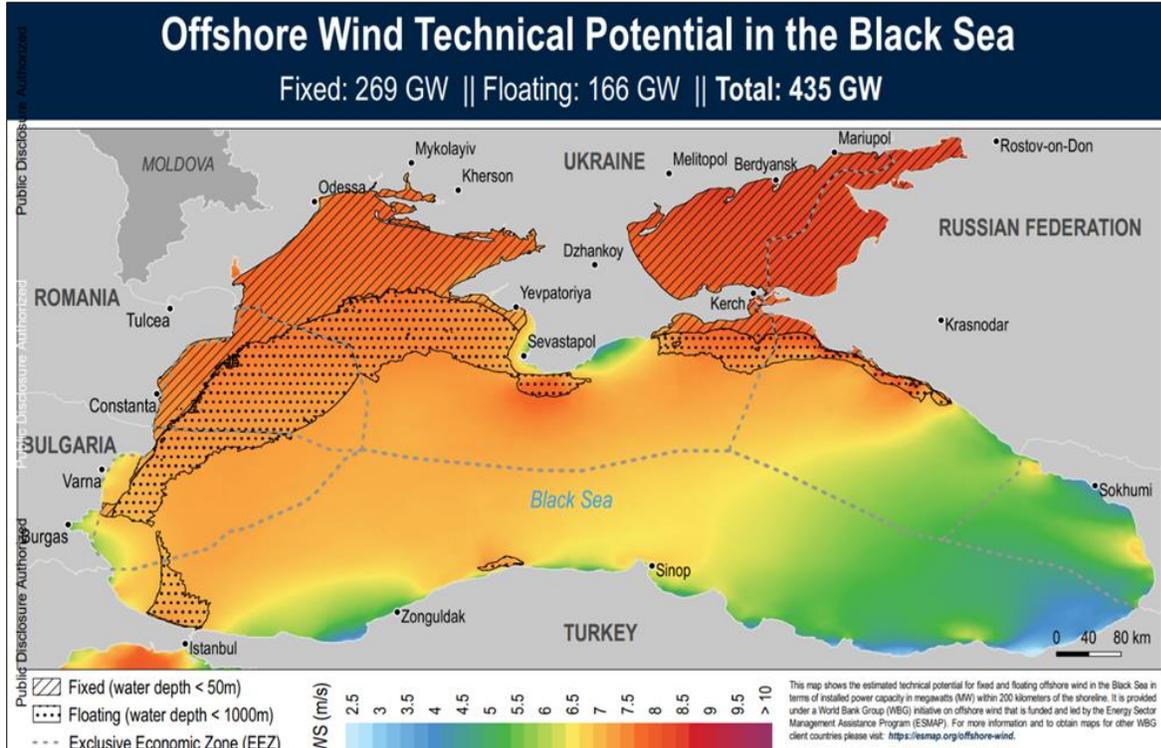
Assessment of the Black Sea Offshore Potential

Power generation from offshore wind resources brings forward a significant potential for energy system decarbonization, opening up a wide range of economic and infrastructure advancement opportunities for coastal communities. Moreover, marine energy technologies complement the variable character of other renewables such as solar photovoltaics, onshore wind, and hydropower making them suitable for providing steady baseload power.

Evaluations point out that Bulgaria holds an unutilized technical offshore wind potential of 116 GW.

⁷ Link to the CSD's study: <https://csd.bg/publications/publication/wind-power-generation-in-bulgaria/>

Figure 6



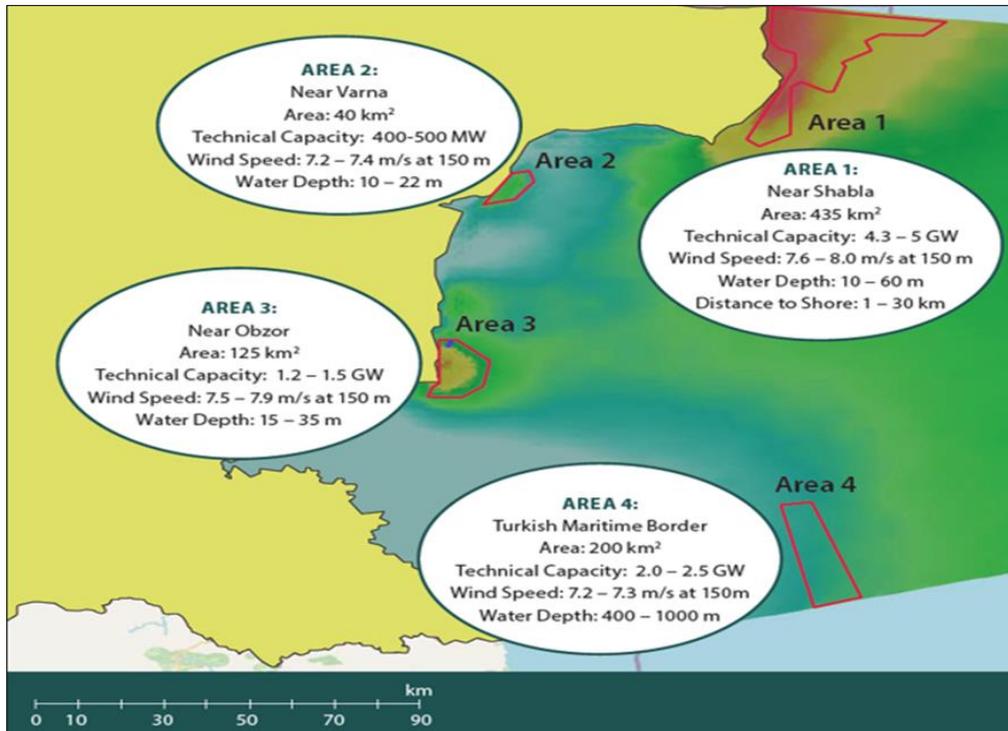
Source: CSD's study

The study of the CSD “Wind Power Generation, Assessment of the Black Sea Offshore Potential” identifies four areas as suitable for potential project development of offshore wind energy in the Bulgarian Black Sea exclusive economic zone (EEZ):

- **Area 1:** Shabla/Romanian maritime border – close to the shoreline with a distance of up to 30 km to the coast of Shabla, a town and seaside resort in Northeastern Bulgaria. This Black Sea section is distinguished by the best wind resource and largest plot size (435 km²) out of all four areas. Wind speeds hover between 7.6 and 8 m/s at a 150 m height.
- **Area 2:** Varna – the smallest area, only 40 km², but in the immediate proximity of the town of Varna, an important economic center with two industrial zones, an airport, and a seaport. Because of the industrial power demand available near the area, offshore wind projects could be developed as part of a larger low-carbon industrial restructuring process. Although the initial technical potential has been calculated at 400-500 MW with wind speeds between 7.2 and 7.4 m/s, only a small fraction could be utilized due to the intense marine traffic in the area.
- **Area 3:** Obzor – located near the town of Obzor, which is about 30 km by sea to Burgas, the second largest town on the Black Sea coast in Bulgaria. The area is large, 125 km², suitable for fixed installations at a water depth of 15-35 m. Based on wind speeds in the range of 7.5 and 7.9 m/s at 150 m, its technical capacity is assessed between 1.2 and 1.5 GW. Conflicts with current navigation routes reduce the technical potential of full deployment.

- **Area 4:** Turkish maritime border – it is far away from the shore located on the maritime border with Turkey. The main reason to pre-select this plot is its proximity to a planned high-voltage DC (HVDC) submarine cable connecting Romania and Turkey. The area itself occupies 200 km² up to 400-1000 m sea depth. The wind conditions are moderate with 7.2-7.3 m/s at 150 m height. It provides a potential opportunity for the development of floating-platform-based wind parks in the time horizon after 2030.

Figure 7



Source: CSD (Center for the Study of Democracy)

It shall be noted, however, that the deployment of offshore wind depends to a very high extent on the availability of corresponding infrastructure. Any potential new project would require a connection to a high-voltage transmission grid. According to preliminary analysis, the national transmission grid has the available capacity to accommodate up to 4 GW in new energy projects in the region. Transmission injection points are available in the northeastern part of Bulgaria at the substations Dobrudzha (approx. 50 km to the shore) and Varna (approx. 70 km). Another 440 kV substation is currently under development near Shabla (15 km to the shore). In the Southern part of the country, the connection is possible at the substation Burgas. In the latest version of the National Recovery and Resilience Plan, the Bulgarian government foresees the complete digitalization of the national high and medium voltage network, which will expand the interconnection capacity with neighboring countries by an additional 200 MW, allowing the investors to sell electricity from renewable energy sources outside the country on power exchanges after the finalization of the regional market coupling.

In addition, the study points out that financial mechanisms of the European Green Deal provide ample opportunities to finance new business strategies for the transformation of the two largest Bulgarian ports (Varna and Burgas) into decarbonization hubs based on offshore wind energy. Shipbuilding companies as well as industrial zones located near the harbors could benefit from a low-carbon energy supply and later attract new renewable energy investors.

However, one shall consider some issues raised by the authors of the study, namely:

- The Bulgarian government should urgently align the policy and regulatory framework to offshore wind development opportunities, by addressing the unclear procedures for spatial planning, licensing, grid connection, subsequent decommissioning at the end of the facility's operational lifetime as well as the underwhelming economic incentives for potential investors.
- The National Energy And Climate Plan does not consider any offshore wind additions. The offshore potential in the exclusive economic zone of the Bulgarian Black Sea coast remains understudied, leaving a critical gap in the country's long-term renewable energy strategy.

Conclusion

To sum up, from what we observe on the market, Bulgaria is on its way to developing its renewable energy sector. The renewable energy sector receives a lot of investment interest and developments in the recent years and this is expected to continue. The sector is market driven with a raising interest from businesses and households and supported by substantial EU funding. Given the high energy and carbon intensity of the Bulgarian economy, transition to environmentally friendly, efficient, and secure energy is critical to Bulgaria's productivity, competitiveness, and growth. In addition, amendments in the regulations and necessary reforms are ongoing reinforced by binding commitments to the EU through a number of funding mechanisms and compliance requirements.

The wind energy market, in particular, is still in its developing stage and holds a potential that has not been optimally utilised yet.

FIT Sofia at your service

FIT Sofia Office is always at your disposal to answer any of your further questions and to provide you with the necessary assistance, so please do not hesitate to get in touch with us.

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