

# Energy Industry in Serbia



## General State of the Economy

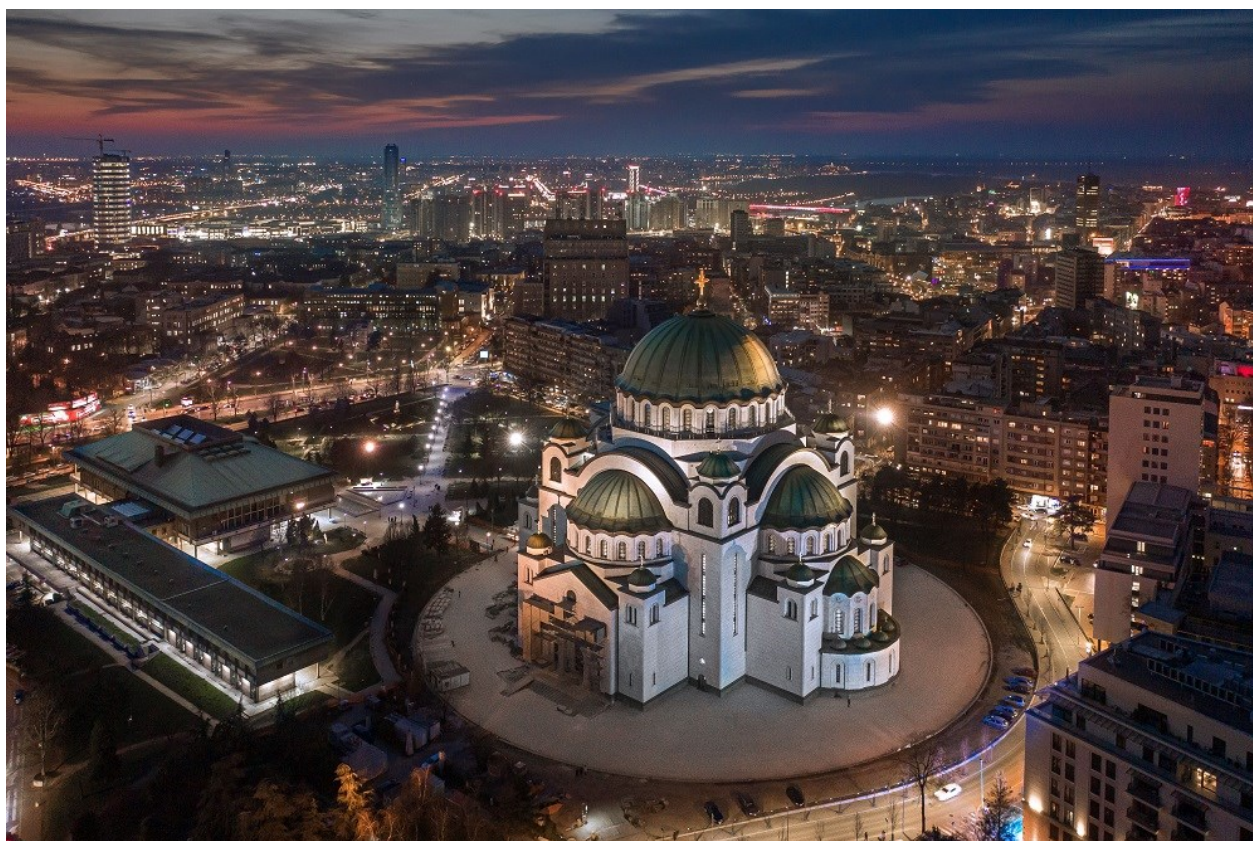
Serbia, officially the Republic of Serbia, is a landlocked country in the west-central Balkans and the Pannonian

Plain. For most of the 20<sup>th</sup> century, Serbia was part of Yugoslavia. It borders Hungary to the north, Romania to the northeast, Bulgaria to the southeast, North Macedonia to the south, Croatia and Bosnia and Herzegovina to

### Serbia / the Republic of Serbia

Capital: Belgrade	Density: 85.8/km <sup>2</sup>	Currency: Serbian dinar (RSD)
Official languages: Serbian	Life expectancy at birth: 74.23 years	GDP (PPP): \$164.8 billion (2023 est.)
National Day: 15 February	Area (land): 77,474 km <sup>2</sup> (excl. Kosovo)	GDP - per capita (PPP): \$23,534 (2023 est.)
Population: 6,693,375 (2023 est.)	Coastline: 0 km	Internet country code: .rs

Source: [1,2,3,4,5]



Beograd - Hram Svetog Save, Envato Elements, 473PTB5GHN

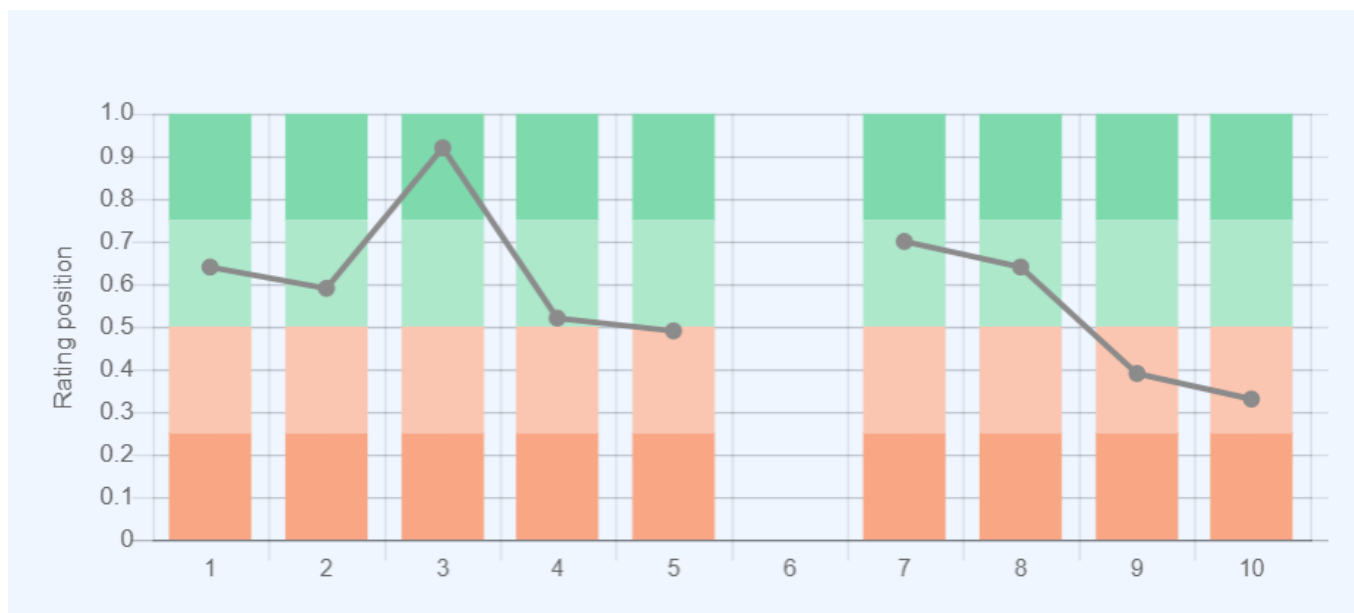
the west, and Montenegro to the southwest. In addition, to the southwest, the country also borders Kosovo, which declared independence from Serbia in February 2008, but the latter has not recognized it and the republic's status remains disputed.

According to 2023 statistics, Serbia, which ranks 117<sup>th</sup> in the world in terms of the size of its territory, is home to around 6,5 million people. In terms of population density, the country occupies the 94<sup>th</sup> place in the world. Serbia is a parliamentary republic and a European Union membership candidate country since 2012. The country is divided into 117 municipalities and 28 cities. The capital and the largest city is Belgrade, the official language is Serbian [1,2,3]. Serbia's ranking positions relative to other countries have been determined for an extensive list of economic, energy, innovative and educational indices, as well as for metrics reflecting the state of the environment. The economic indices include, for example, GDP per capita, annual average GDP growth, high-technology exports, and others. The list of energy indices

includes proven reserves of oil, gas and coal, production-consumption ratio combined, and energy use, etc. Each of the indices has a ranked list of included member countries. Since the number of countries in each rating is different for each index, the positioning of the country of interest is displayed on a special chart, where the vertical axis is a uniform relative scale from 0 to 1, whereas the horizontal axis denominates the various indices and respective numbers relating to the descriptions given underneath.

Thus, in such a relative "0-1" diagram, the country's position is marked with a dot in proportion to its location in the original rating list. If the country is among the leaders regarding the selected indicator, it will be marked close to 1 in the upper green zone on the relevant chart "0-1", if the country is an outsider in the rating list, then it will be marked in the lower red zone of the chart "0-1", etc.

Ranking position of Serbia for list of economic indices:



Sources:

1. GDP (purchasing power parity), 2020 est. / The World Factbook/Library/Central Intelligence Agency \*228
  2. GDP - per capita (PPP), 2020 / The World Factbook/Library/Central Intelligence Agency \*229
  3. Inflation rate (consumer prices), 2019 est. / The World Factbook/Library/Central Intelligence Agency \*228
  4. Charges for the use of intellectual property, receipts (BoP, current US\$), 2020 / International Monetary Fund, Balance of Payments Statistics Yearbook, and data files. / License: CC BY-4.0 \*88
  5. The Global Competitiveness Index 2019 / Rankings / Reports / World Economic Forum \*141
  6. High-technology exports (current US\$) 2019-2020 / United Nations, Comtrade database through the WITS platform / License: CCBY-4.0 / Data \*134
  7. 2021 Index of Economic Freedom / International Economies / The Heritage Foundation \*178
  8. Reserves of foreign exchange and gold, 2017 est. / The World Factbook / Library / Central Intelligence Agency \*195
  9. Annual average GDP growth in %, for the last 10 years (2011-2020) / World Bank national accounts data, and OECD National Accounts data files / License: CC BY-4.0 \*206
  10. Public debt (% of GDP), 2017 est. / The World Factbook / Library / Central Intelligence Agency (from smallest to largest) \*210
- \* Total number of countries participating in ranking

Figure 1. Economic Indices of Serbia

Of the indices presented, Serbia has the highest values for the Inflation Rate (0.92) and for the Index of Economic Freedom (0.70). The weakest parts of Serbia's economic indicators are annual average GDP growth in % (0.39) and public debt (0.33), where the country is lower than the

world average. Data concerning High-technology exports is unavailable leaving this chart indicator blank.

## Energy resources

Serbia has minor reserves of crude oil and gas, which represent 0.005% and 0.023% of world total reserves, respectively. Coal reserves are more significant and amount to 0.71% of the world reserves. According to es-

timates, Serbia has fairly large reserves of oil shale, but this energy resource is underdeveloped.

In terms of tons of oil equivalent, according to 2024 data, conventional proved reserves by fuel type were dominated by coal – 99%, natural gas – 0.8%, and oil – 0.2% (Fig.5).

**Table 1. Fossil energy resources of Serbia**

Resource/ explanations	Crude oil*	Natural gas*	Coal *	Shale Gas**	Tight Oil**	Coalmine methane
<b>Value</b>	0.08 (0.005%)	1.7 (0.023%)	8 282 (0.71%)	no date	no date	no date
<b>Unit</b>	billion barrels	Tcf	million short tons	-	-	-
<b>Year</b>	2021	2020	2021	-	-	-
<b>Source</b>	[6]	[6]	[6]	[-]	[-]	[-]

\*the share of the country's reserves in world total is provided in brackets

The renewable resource matrix of Serbia shows no exceptional or extreme values. The fact that the country has several big rivers, including the Danube, Sava and Tisa, and an abundance of mountain rivers makes it an ideal

environment for hydropower development. Although there is still a lot of unused hydropower potential in Serbia, hydropower already provides about 30% of the country's electricity demand.

**Table 2. Renewable energy resources of Serbia**

Resource/ explanations	Solar Potential (GHI)*	Wind Potential (50 m)*	Hydro energy Potential**	Bio Potential (agricultural area)	Bio Potential (forest area)	Municipal Solid Waste
<b>Value</b>	3.5-4.1	5.0-6.0	19 447	40.1	31.1	472
<b>Unit</b>	kWh/m <sup>2</sup> /day	m/s	GWh/year	% of land area	% of land area	kg per capita
<b>Year</b>	2020	2020	2013	2020	2020	2022
<b>Source</b>	[7]	[8]	[9]	[10]	[11]	[12]

\*for the majority of the territory of the country

\*\*gross theoretical capability

Serbia has significant potential for renewable energy production, both solar PV and wind power. The highest solar GHI intensity reaches 4.1 kWh/m<sup>2</sup> per day and distributed

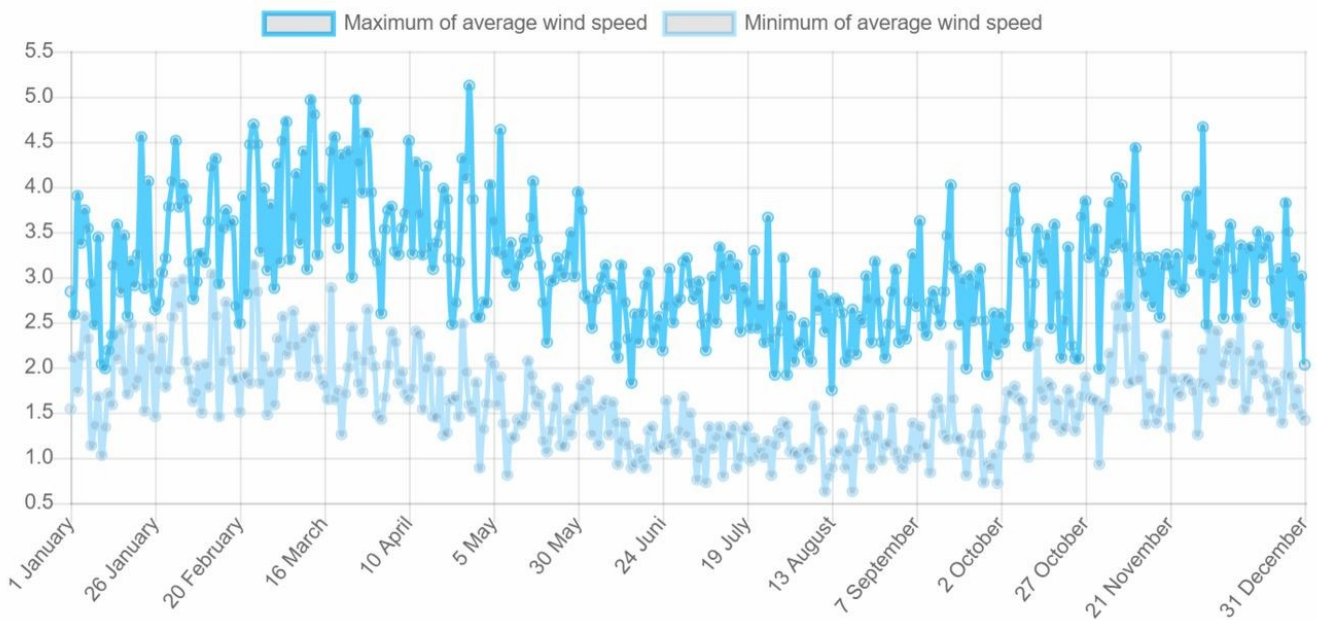
in the southern part of the country. In the eastern part of country, mainly in the mountain areas, the wind speed is over 6.0 m/s at 50 m.

### NOVI SAD RIMSKI SANCEVI, SERBIA

Latitude: 45.33, Longitude: 19.85

Average speed: 2.33 m/s, Operational share: 35%

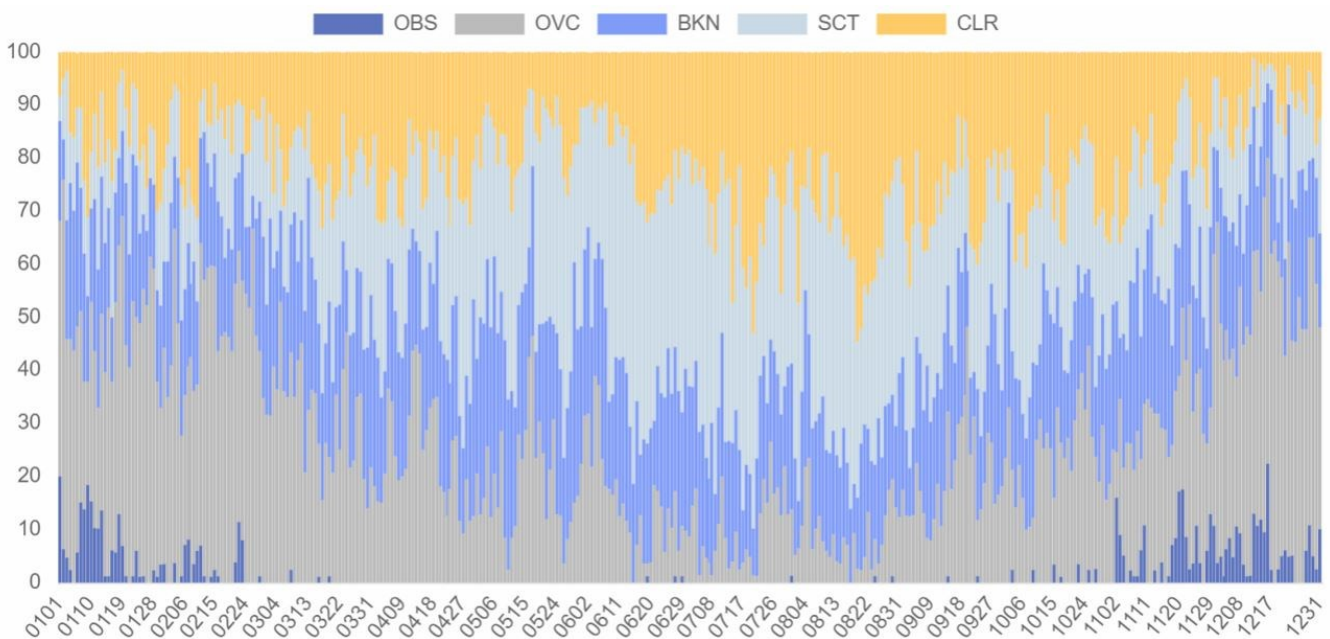
**Average daily wind speed for 10 years of observations, m/s, 10 m above the ground**



Source: based on NOAA U.S. Department of Commerce  
 Detailed information: [Interactive map of wind resources](#)

**NOVI SAD RIMSKI SANCEVI, SERBIA**  
 Latitude: 45.33, Longitude: 19.85

**Average daily sky coverage over 10 years of observations, %**



CLR - clear, SCT - scattered from 1/8 TO 4/8, BKN - broken from 5/8 TO 7/8, OVC - overcast, OBS - obscured, POB - partial obscuration

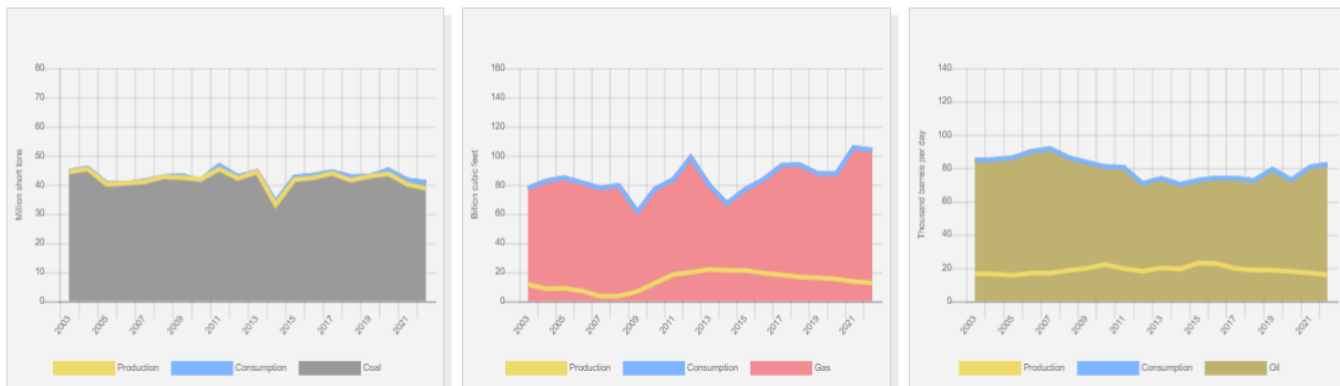
Source: based on NOAA U.S. Department of Commerce  
 Detailed information: [Interactive map of solar resources](#)

The total area of agricultural land and forests is relatively large, which means that there is enough feedstock for the development of bioenergy.

## Energy balance

According to [6], in 2022 in Serbia, the total production of primary energy was 0.32 quadrillion Btu, while consumption was at the level of 0.593 quadrillion Btu. Thus, the share of domestic production in primary energy consumption was about 54%. This makes Serbia a country dependent on energy imports. This makes Serbia a coun-

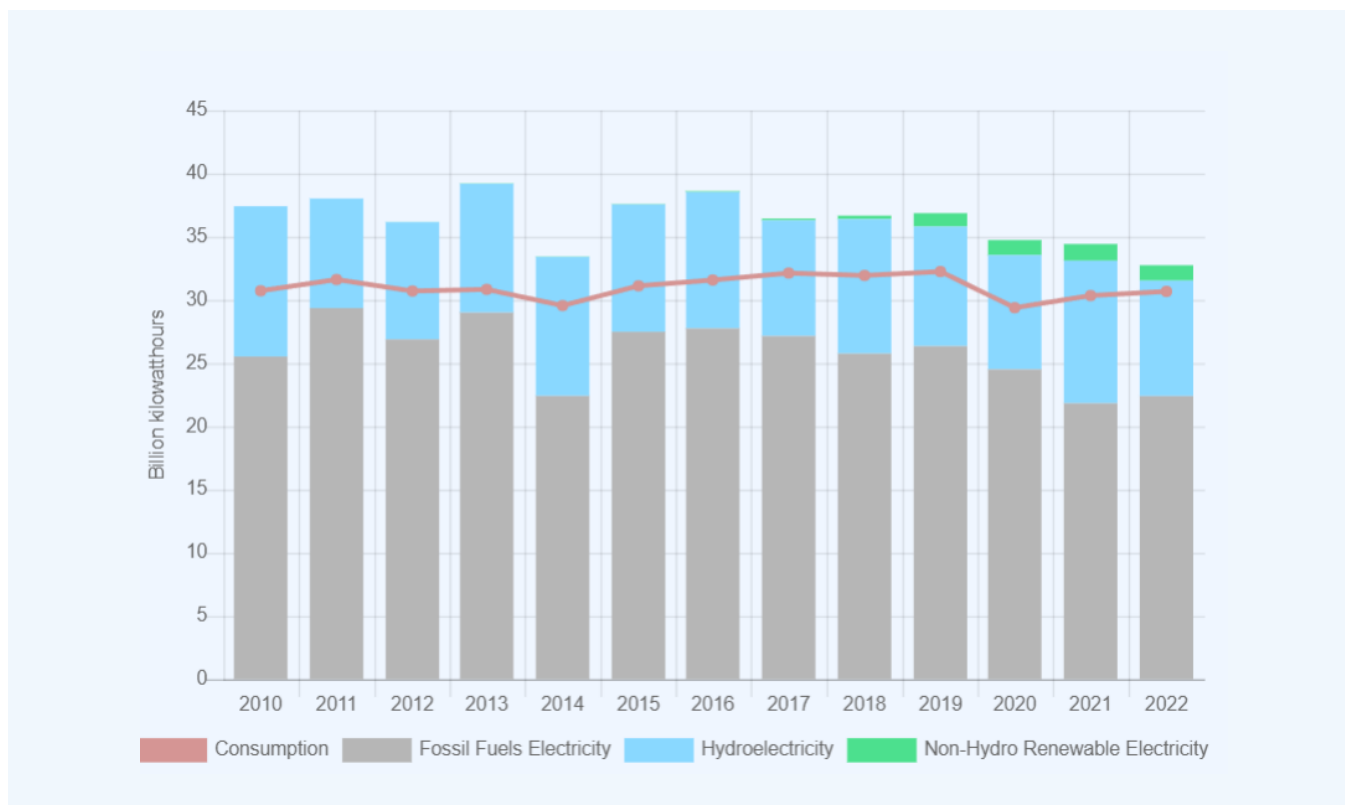
try dependent on energy imports. According to the National energy statistics [13], in 2020 energy available for final consumption is dominated by oil derivatives (32.8%), followed by electricity (25.2%), wood fuels (16.4%), natural gas (11.6%), heat (7.88%), coal and coal products (5.85%), biogas (0.18%), and geothermal energy (0.05%).



Source: U.S. Energy Information Administration (Mar 2024) / <https://www.eia.gov/>

Figure 2. Production and consumption of fossil fuels in Serbia (left—coal, in the center— gas, right—oil)

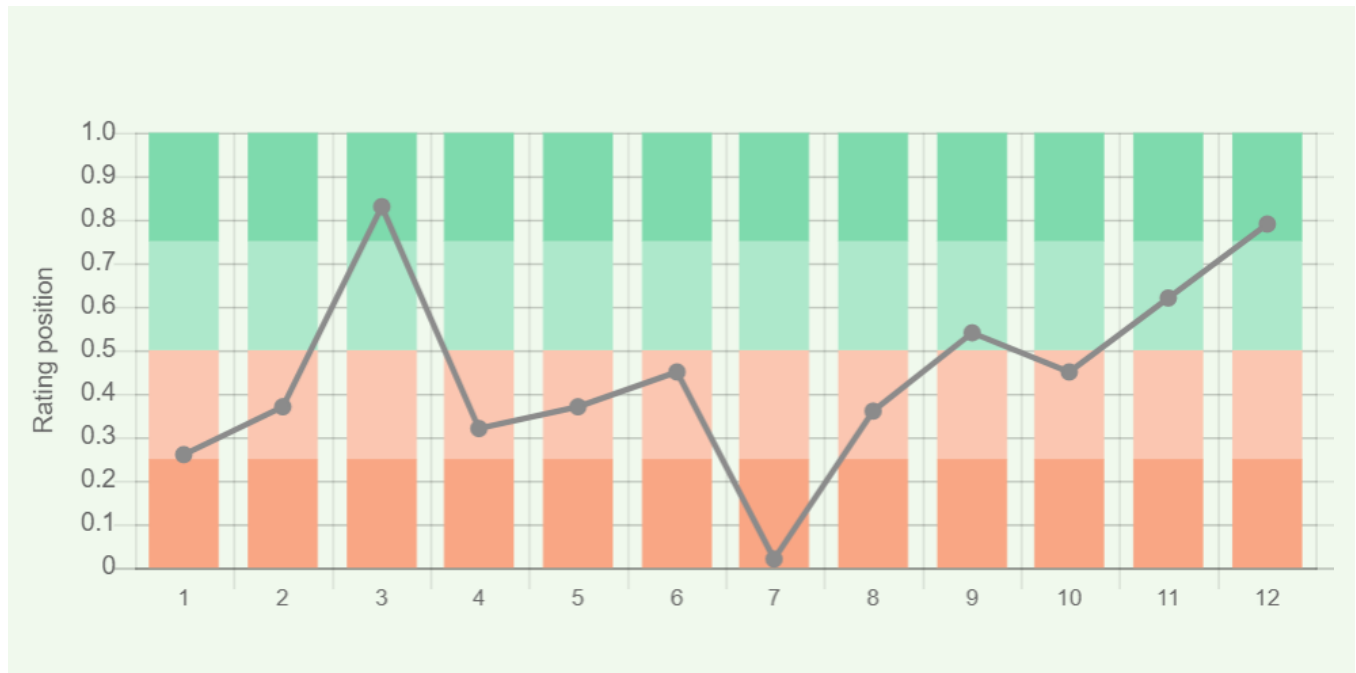
As can be seen from the graph above, Serbia's consumption of natural gas and crude oil far exceeds its low production. Thus, in 2022, oil consumption is 4,5 times higher than domestic production, and the demand for natural gas is about 8 times higher than the country's internal capacity. If we look at coal data, coal consumption is slightly higher than production.



Source: U.S. Energy Information Administration (Mar 2024) / <https://www.eia.gov/>

Figure 3. Electricity production in Serbia

In 2022 Serbia's national electricity generation came nearly 68% from fossil fuels, mainly coal, about 28% from hydropower, and a small percentage – from wind and solar. Serbia is fully self-sufficient in electricity and exports some of the domestically produced electricity. Over the 10 years presented in the chart above, the amount of electricity produced and consumed in the country has remained approximately at the same level.



Sources:

1. Crude oil proved reserves, 2021 / International Energy Statistic/Geography / U.S. Energy Information Administration (Nov 2021)\*98
  2. Natural gas proved reserves 2021 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) \*99
  3. Total recoverable coal reserves 2019 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) \*81
  4. Combination production-consumption for Crude oil 2018 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) \*219
  5. Combination production-consumption for Natural gas 2019 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) \*123
  6. Combination production-consumption for Coal 2019 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) \*128
  7. Electricity – from other renewable sources (% of total installed capacity), 2017 est. / The World Factbook / Library / Central Intelligence Agency \*170
  8. GDP per unit of energy use (PPP per unit of oil equivalent), 2020 \*66
  9. Primary energy consumption - BP Statistical Review of World Energy 2021/BP/GDP (purchasing power parity) - The World Factbook/Library/Central Intelligence Agency
  10. Energy use (primary energy use of oil equivalent per capita) 2020 \*127
  11. Electric power consumption (kWh per capita), 2016 \*217
  12. Electricity Consumption - The World Factbook / Library / Central Intelligence Agency; Population - United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, custom data acquired via website. Retrieved 15 November 2021
  13. The Global Energy Architecture Performance Index Report (EAPI) 2017 / Rankings / Reports / World Economic Forum
  14. Electric power consumption (kWh per capita), 2016 \*217
  15. Electricity Consumption - The World Factbook / Library / Central Intelligence Agency; Population - United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, custom data acquired via website. Retrieved 15 November 2021
  16. Combination of electricity production-consumption (kWh)/The World Factbook/Library/Central Intelligence Agency \*216
- \* Total number of countries participating in ranking

Figure 4. Energy indices of Serbia

The energy indices shown in the chart above show that Serbia is a country that is struggling with certain challenges in the energy sector. Since the country produces only a small amount of electricity from wind and solar, the Electricity - from other renewable sources indicator (0.02) is the worst for Serbia of all the indices presented. In addition, as Serbia does not have significant fossil fuel reserves, its positions in terms of gas and oil reserves and their production-consumption ratios are among the

lowest spots. This does not apply to coal, whose reserves indicator (0.83) is the best of those presented.

## Energy Infrastructure

The main infrastructural objects of the fossil fuel sector in Serbia are shown in the map below. The extraction of crude and oil gas is concentrated in the south north-east

of the country. The Velebit field in the south of the country is the most important oil deposit in Serbia. Coal is mined in Serbia mainly in the center of the country, where Kolubara and Kostolac are the two main lignite deposits. The Kolubara mine produces about 75%

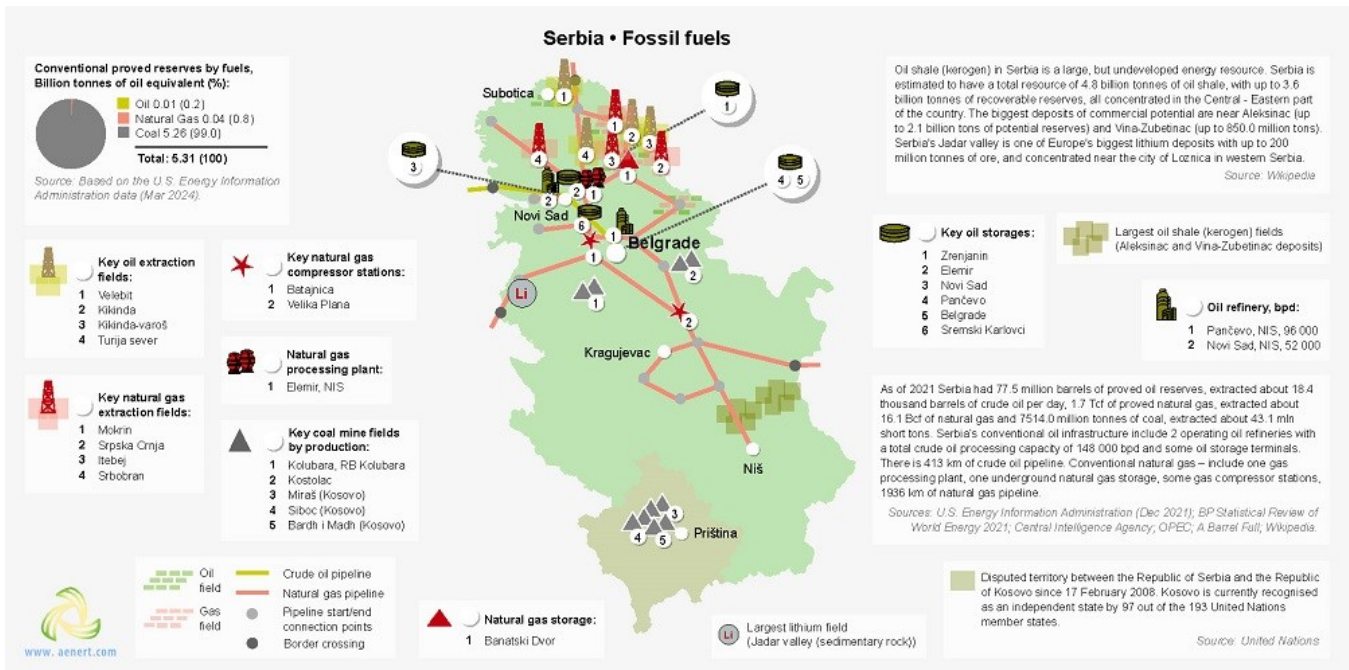


Figure 5. Basic infrastructural facilities of the fossil fuel sector in Serbia

of Serbia's lignite, another 25% is supplied by Kostolac coal basin. The fossil fuel industry includes not only the exploration and production of coal, oil and natural gas, but also their processing into refined products.

The infrastructure includes 2 oil refineries in Pancevo and Novi Sad, as well as a natural gas processing plant in Elemir.

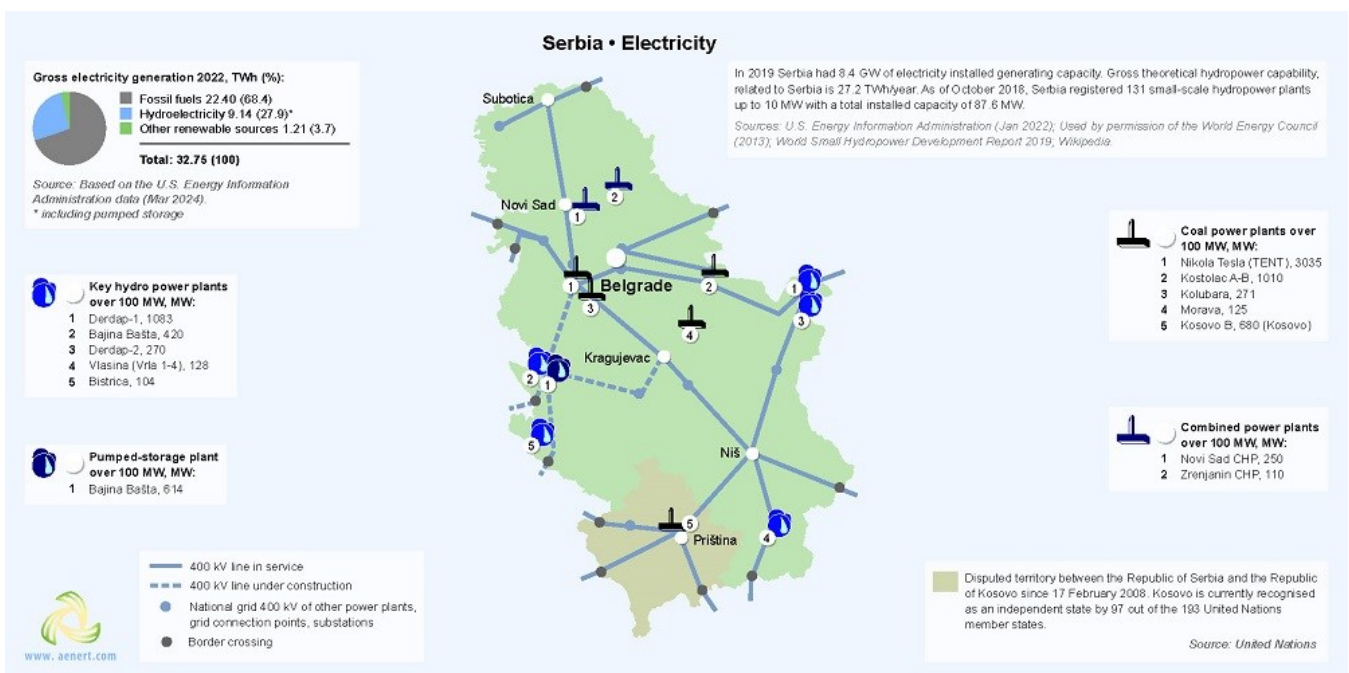


Figure 6. Electricity production in Serbia

Coal is the largest source of electricity in the country. More than 68% of electricity is generated from coal used in thermal power plants, the main of which are Kolubara, TPP Nikola Tesla and TPP Morava, which are supplied by Kolubara mines. Another important TPP in the country is Kostolac, the coal for the supply of which is mined

in the Kostolac basin. According to Elektroprivreda Srbije [14], Serbia has 16 hydropower plants with a total installed capacity of 3,015 MW. Electricity is generated by the Djerdap HPP branch, the Kladovska and Drinsko-Limsko HPP branch, and Baina Bašta. The total capacity of 28 units of the Jerdap HPPs branch is 1,605 MW.

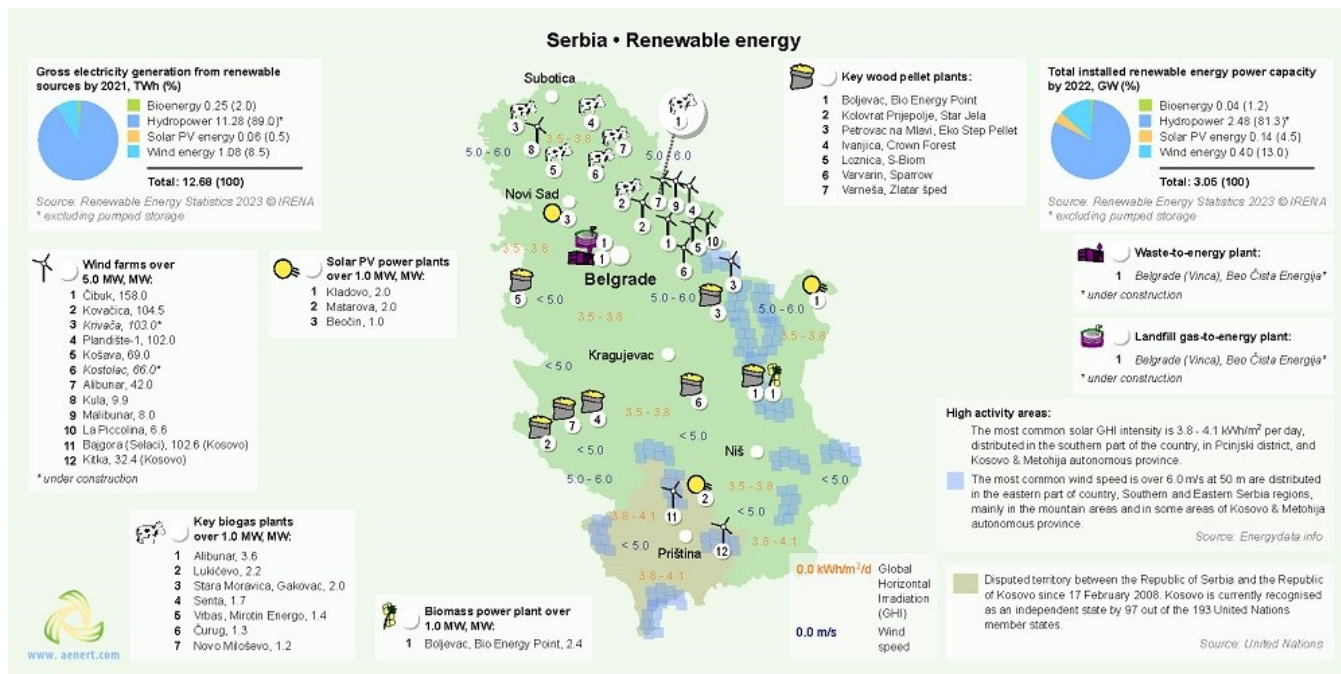


Figure 7. Renewable energy in Serbia

Nine hydropower plants within the Drinsko-Lim HPP branch on the Drina and Lim rivers have a total installed capacity of 1,390 MW.

According to the 2022 ANNUAL REPORT by Serbian Energy Agency, share of wind power plants connected to the transmission system amounts to 4.4% with the installed capacity of 373 MW. The majority of wind farms are located in the north-eastern part of Serbia. The solar energy sector in Serbia is still at a relatively early stage, and the total installed capacity of solar power plants for 2022 was 13 MW. The country also operates a number of biomass and biogas power plants [15].

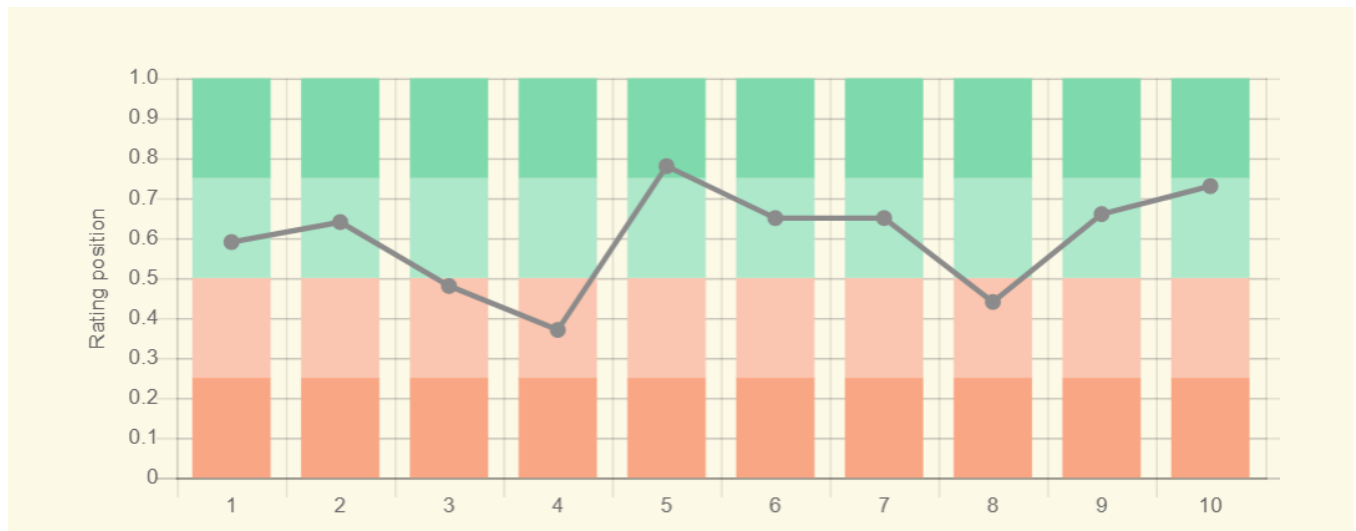
Serbia plans to drastically reduce the use of fossil fuels, primarily coal, and switch to efficient and renewable energy sources. The Comprehensive National Energy and Climate Plan of the Republic of Serbia [16] envisages that in 2030 the share of renewables in gross final energy consumption should be at least 33%. Additionally,

the share of renewable energy sources in the gross final consumption of electricity should be at least 45.2% and in the transportation sector – 7%.



## Education and Innovation

The following chart shows Bulgaria's positions in terms of education and innovation:



Sources:

1. The Global Innovation Index 2021, Rankings / Knowledge / World Intellectual Property Organization / Cornell University, INSEAD, and WIPO (2021); Energizing the World with Innovation. Ithaca, Fontainebleau, and Geneva \*132
  2. Patent Grants 2011-2020, resident & abroad / Statistical country profiles / World Intellectual Property Organization \*185
  3. Patents in Force 2020 / Statistical country profiles / World Intellectual Property Organization \*109
  4. QS World University Rankings 2022 \*97
  5. SCImago Country Rankings (1996-2020) / Country rankings / SCImago, (n.d.). SIR-SCImago Journal & Country Rank [Portal]. Retrieved 17 Nov 2021 \*240
  6. Internet users in 2018 / The World Factbook / Central Intelligence Agency \*229
  7. Internet users in 2018 (% Population) / The World Factbook / Central Intelligence Agency \*229
  8. Government expenditure on education, total (% of GDP), 2019 / United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics. License: CCBY-4.0 / Data as of September 2021 \*177
  9. Research and development expenditure (% of GDP), 2018 / UNESCO Institute for Statistics. License: CCBY-4.0 / Data \*119
  10. Scientific and technical journal articles, 2018 / National Science Foundation, Science and Engineering Indicators. License: CCBY-4.0 / Data \*197
- \* Total number of countries participating in ranking

Figure 8. The indices of education and innovation in Serbia

Seven out of ten indexes describing Serbia's positioning in various international ranking lists related to education and innovation are above the world average. Serbia ranks

below the global average in the Patents in Force (0.48) and in the QS World University Rankings (0.37).



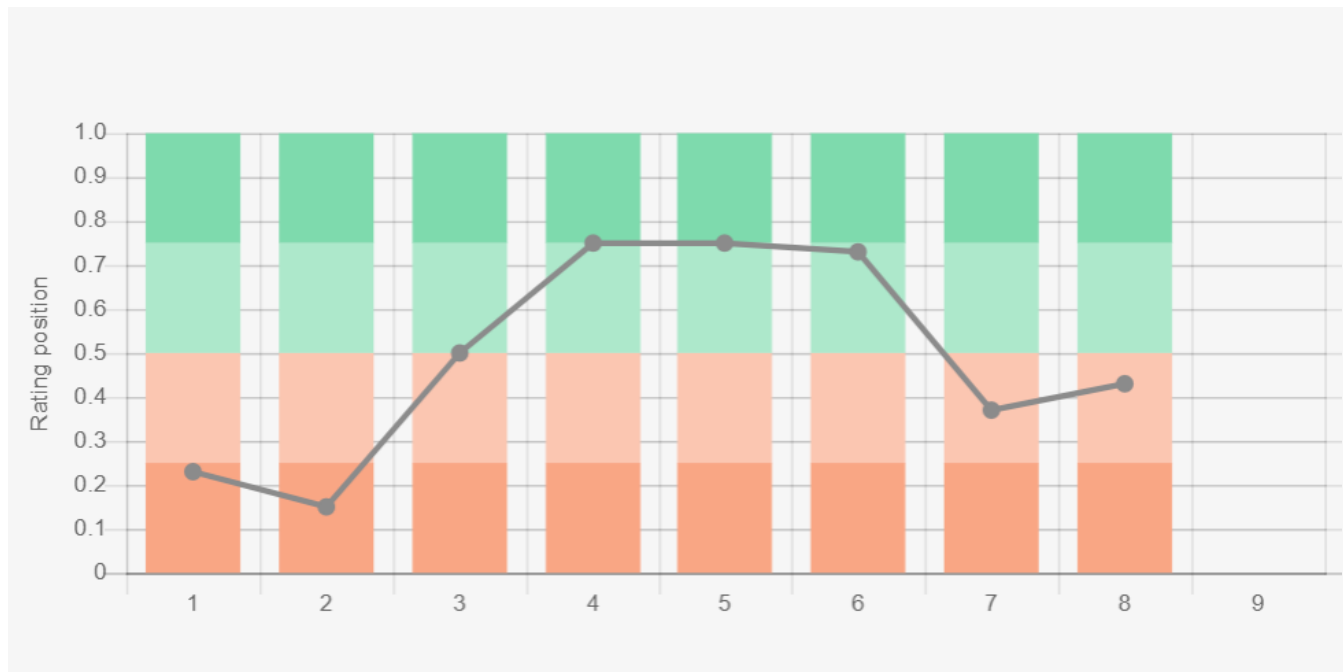
The Belogradchik rocks in Bulgaria. Envato. M976YKQ8C4

These positions are partly due to insufficient government expenditure in education (0.44). To the strongest positions of Serbia in terms of education and innovation be-

long SCImago Country Rankings (0.78) and Scientific and technical journal articles (0.73).

## Ecology and Environment Protection

Indicators related to environmental issues are presented in the following diagram:



Sources:

1. CO2 total emission by countries 2020 / European Commission / Joint Research Centre (JRC) / Emission Database for Global Atmospheric Research (EDGAR)\*208
2. CO2 per capita emission 2020/European Commission/Joint Research Centre (JRC) / Emission Database for Global Atmospheric Research (EDGAR) \*208
3. Forest area 2020 (% of land area) / The Global Forest Resources Assessment 2020 / Food and Agriculture Organization of the United Nations \*234
4. Forest area change 2010-2020 (1000 ha/year) / The Global Forest Resources Assessment 2020 / Food and Agriculture Organization of the United Nations \*234
5. The Environmental Performance Index (EPI) 2020 / Rankings / Yale Center for Environmental Law & Policy / Yale University \*180
6. Annual freshwater withdrawals (m3 per capita), 2017 \*179
- Annual freshwater withdrawals, total (billion m3), 2017 – Food and Agriculture Organization, AQUASTAT data. /License: CC BY-4.0; Population – United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, custom data acquired via website. Retrieved 15 November 2021
7. The National Footprint Accounts 2017 (Biocapacity Credit / Deficit) / Global Footprint Network \*188
8. Methane emissions (kt of CO2 equivalent), 2018 / Data for up to 1990 are sourced from Carbon Dioxide Information Analysis Center, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States. Data from 1990 are CAIT data: Climate Watch. 2020. GHG Emissions. Washington, DC: World Resources Institute. Available at: License : Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) \*191
9. The Climate Change Performance Index (CCPI) 2022 / Overall Results / Jan Burck, Thea Uhlich, Christoph Bals, Niklas Höhne, Leonardo Nascimento / Germanwatch, NewClimate Institute & Climate Action Network \*60

Figure 9. Environmental Indices of Serbia

Due to the fact that Serbia produces fossil fuels, the emission indicators are relatively high – carbon dioxide emissions in total (0.23) and per capita (0.15), as well as methane emissions (0.43). In Serbia, as can be seen from the diagram, the area of forests is at the world average level (0.50), and their number has shown a steady upward trend in recent years (0.75). The country's annual freshwater withdrawal (0.73) and Environmental Performance Index (EPI) (0.75) are also positive environmental

characteristics. In general, the environmental situation in the country requires significant improvement.

## References

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- [2] List of countries and dependencies by population density / Wikipedia / [en.wikipedia.org/wiki/List\\_of\\_countries\\_and\\_dependencies\\_by\\_population\\_density](https://en.wikipedia.org/wiki/List_of_countries_and_dependencies_by_population_density)
- [3] Serbia / The world factbook / Library / Central Intelligence Agency / [www.cia.gov](https://www.cia.gov)
- [4] GDP, PPP (constant 2011 international \$) / World Bank, International Comparison Program database. License: CC BY-4.0 / Data / The World Bank / [www.worldbank.org](https://www.worldbank.org)
- [5] GDP per capita, PPP (current international \$) / World Bank, International Comparison Program database. License: CC BY-4.0 / Data / The World Bank / [www.worldbank.org](https://www.worldbank.org)
- [6] International Energy Statistic / Geography / U.S. Energy Information Administration / [www.eia.gov/beta/international/](https://www.eia.gov/beta/international/)
- [7] Solar resource data obtained from the Global Solar Atlas, owned by the World Bank Group and provided by SolarGIS / Global Solar Atlas / [globalsolaratlas.info](https://globalsolaratlas.info)
- [8] Wind Map / Global Wind Atlas 2.0, a free, web-based application developed, owned and operated by the Technical University of Denmark (DTU) in partnership with the World Bank Group, utilizing data provided by Vortex, with funding provided by the Energy Sector Management Assistance Program (ESMAP). For additional information: [globalwindatlas.info](https://globalwindatlas.info)
- [9] World Energy Resources: Hydro World Energy Council / 2013 / Publications / World Energy Council / <https://www.worldenergy.org/>
- [10] Agricultural land (% of land area) / Food and Agriculture Organization, electronic files and web site. License: CC BY-4.0 / Data / The World Bank / [www.worldbank.org](https://www.worldbank.org)
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- [14] Hydro power plants / Elektroprivreda Srbije / <https://www.eps.rs/eng/Poslovanje-EE/Pages/Hidroelektrane.aspx>
- [15] 2022 Energy Agency Annual Report (PDF) / [www.aers.rs/Files/Izvestaji/Godisnji/Eng/AERS%20Annual%20Report%202022.pdf](https://www.aers.rs/Files/Izvestaji/Godisnji/Eng/AERS%20Annual%20Report%202022.pdf)
- [16] [Integrated National Energy and Climate Plan of the Republic of Serbia for the period 2030 with the projections up to 2050 \(PDF\)](#)

The sources of charts and curves are specified under the images.

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[For more information about the energy industry in Serbia see here](#)

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