

# Energy Industry in Slovenia



## General State of the Economy

Slovenia, officially the Republic of Slovenia, is a country in Central Europe bordering Italy to the west, Hungary to

the northeast, Austria to the north and Croatia to the south and east. It is washed by the Adriatic Sea to the south-west and has a coastline of 47 kilometers.

### Slovenia / Republic of Slovenia

Capital: Ljubljana	Density: 103/km <sup>2</sup>	Currency: Georgian (€) (EUR)
Official languages: Slovene	Life expectancy at birth: 80.53 years	GDP (PPP): \$111 billion (2023 est.)
National Day: 25 June	Area (land): 20,271 km <sup>2</sup>	GDP - per capita (PPP): \$52,640 (2023 est.)
Population: 2,099,790 (2023 est.)	Coastline: 47 km	Internet country code: .si

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



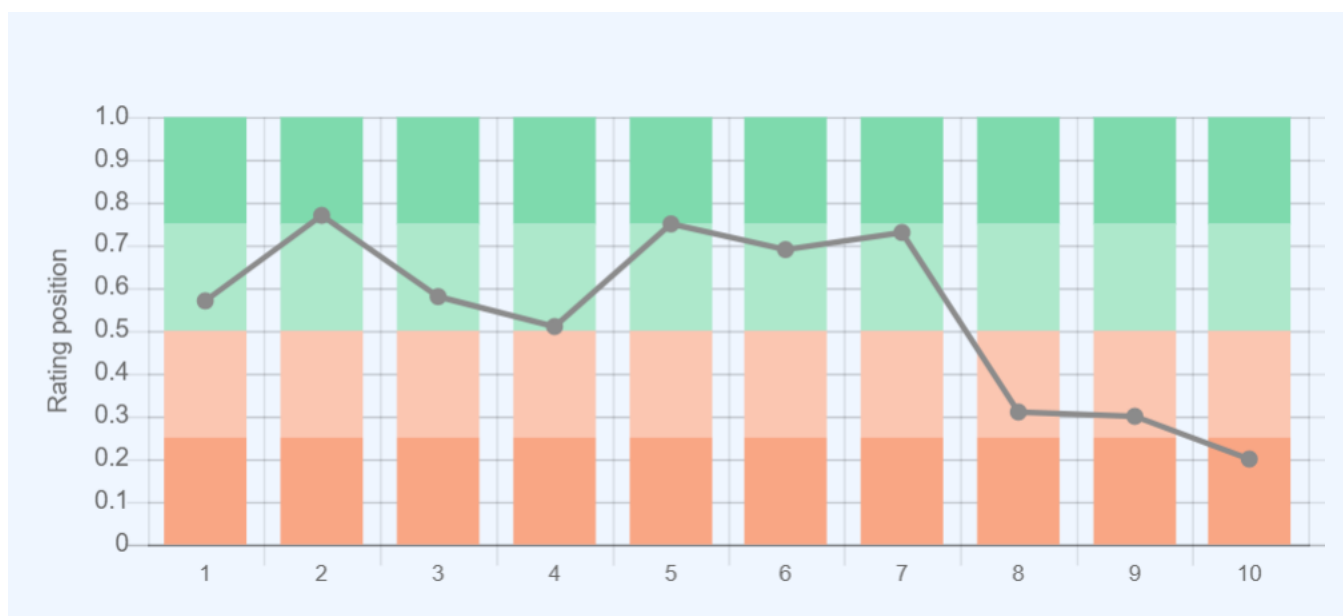
Aerial drone view of Ljubljana, Slovenia. KA2CYTVFBM. Envato Elements

According to 2023 statistics, Slovenia, which ranks 154<sup>th</sup> in the world in terms of the size of its territory, is home to around 2,1 million people. In terms of population density, the country occupies the 113<sup>th</sup> place in the world. Slovenia is a parliamentary republic divided into 200 municipalities and 12 urban municipalities. The capital and the largest city is Ljubljana, the official language is Slovenian [1,2,3]. Slovenia'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 Slovenia 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: CC BY-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 Slovenia

Slovenia is an export-oriented country with high macroeconomic stability and a large share of industry. The majority of the economic indices presented are above the world average. The highest of these are the inflation rate (0.77), the Global Competitiveness Index (0.75) and the Economic Freedom Index 2021 (0.73), indicating Slovenia as a country with a good investment climate. The lowest

indicators are the Annual average GDP growth in % (0.30) and Reserves of foreign exchange and gold (0.31).

## Energy resources

Slovenia has no reserves of crude oil and natural gas, its coal reserves are insignificant amounting to 0.04% of the world's total. In addition, the Government of the Repub-

lic of Slovenia has adopted the National Strategy for Coal Divestment and Restructuring of Coal Regions, which stipulates that Slovenia will stop using coal for electricity generation no later than 2033 [6].

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

Resource/explanations	Crude oil	Natural gas	Coal *	Tight Oil	Shale Gas	Coalmine methane
<b>Value</b>	-	-	409 (0.04%)	-	-	-
<b>Unit</b>	-	-	million short tons	-	-	-
<b>Year</b>	-	-	2021	-	-	-
<b>Source</b>	[1]	[1]	[7]	[1]	[1]	[1]

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

In Slovenia, the technical potential of renewable energy sources is much higher than the currently installed capacity. This primarily concerns wind energy, with speeds of up to 6 m/s at a height of 50 m in the western part of the country, mainly in mountainous areas. The highest inten-

sity of GHI solar radiation, with a maximum of 4 kWh/m<sup>2</sup> per day, is distributed in the southwestern part of the country, in the Coastal Karst and Gorizia regions, but if fully utilized, it could significantly increase the installed renewable energy capacity in the country.

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

Resource/explanations	Solar Potential (GHI)*	Wind Potential (50 m)*	Bio Potential (agricultural area)	Bio Potential (forest area)	Municipal Solid Waste
<b>Value</b>	3.0 – 3.6	<5.0	30.3	61.5	511
<b>Unit</b>	kWh/m <sup>2</sup> /day	m/s	% of land area	% of land area	kg per capita
<b>Year</b>	2020	2020	2020	2020	2021
<b>Source</b>	[8]	[9]	[10]	[11]	[12]

\*for the majority of the territory of the country

Slovenia is one of the most forested countries in Europe, with about 60% of its territory covered by forests. Agricultural land occupies about 30% of the country. These indicators create very favorable conditions for the development of different types of bioenergy, which already occu-

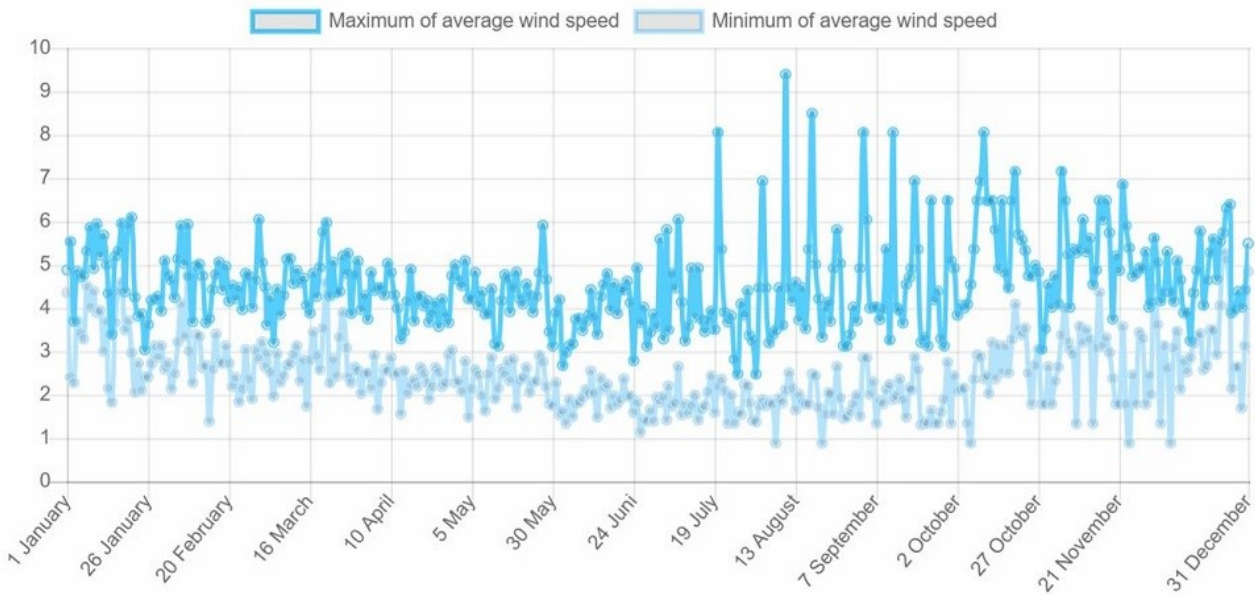
pies an important place in the energy balance of the country.

**LISCA, SLOVENIA**

Latitude: 46.07, Longitude: 15.28

Average speed: 3.39 m/s, Operational share: 59%

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

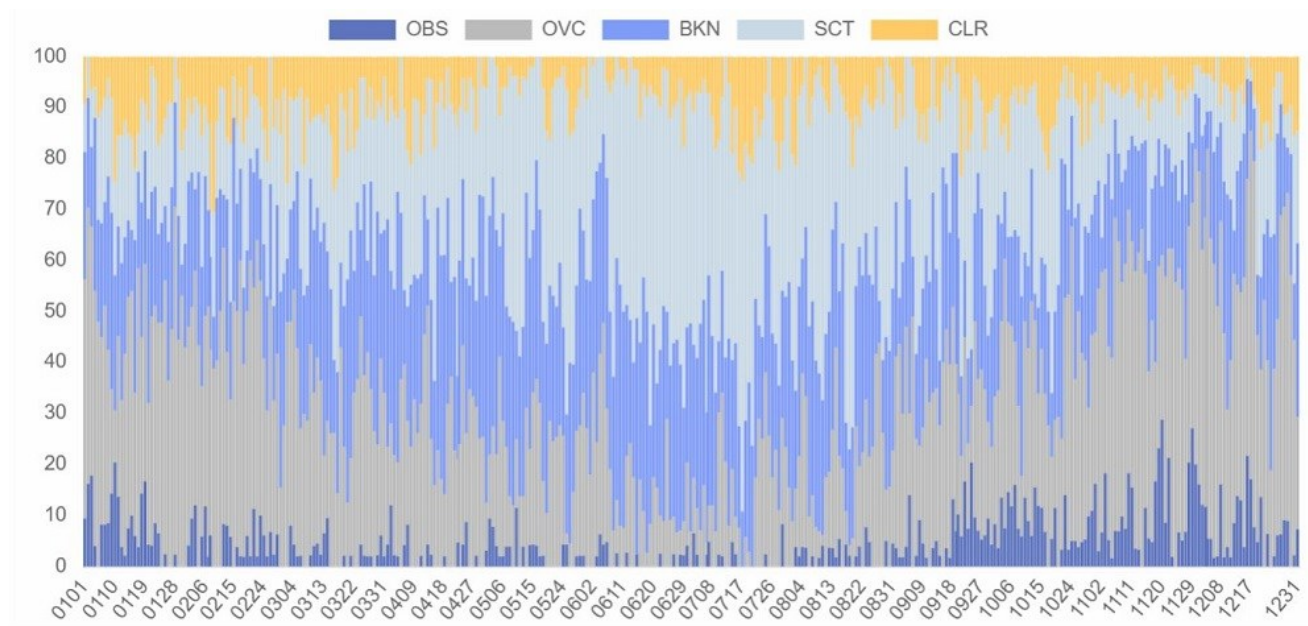


Source: based on NOAA U.S. Department of Commerce  
 Detailed information: [Interactive map of wind resources](#)

**NOVO MESTO, SLOVENIA**

Latitude: 45.8, Longitude: 15.18

**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

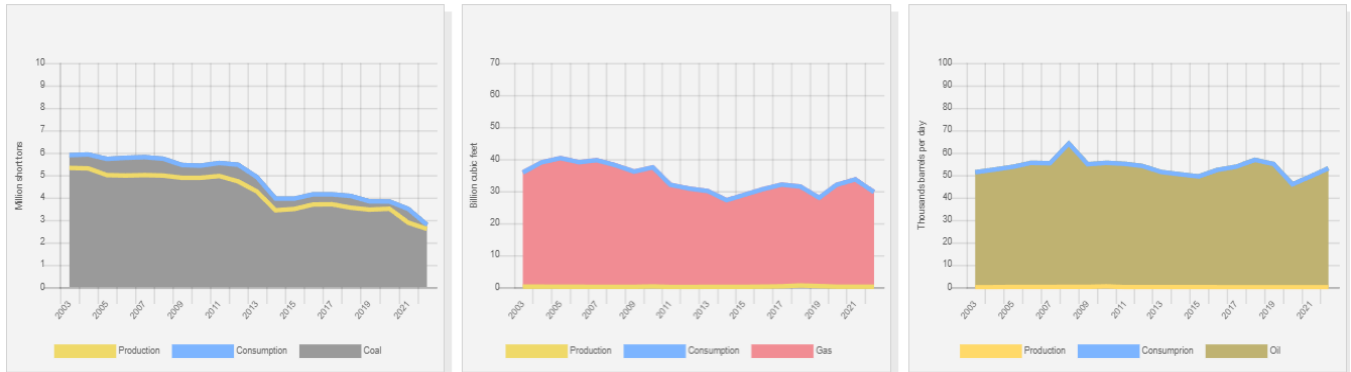
Source: based on NOAA U.S. Department of Commerce  
 Detailed information: [Interactive map of solar resources](#)

## Energy balance

According to [7], in 2022 in Slovenia, the total production of primary energy was 0.094 quadrillion Btu, while consumption was at the level of 0.243 quadrillion Btu. Thus, the share of domestic production in primary energy

consumption was about 37.2%. This makes Slovenia a country dependent on energy imports.

According to the BP Statistical Review of World Energy 2022, total primary energy consumption in Slovenia in 2021 was 0.27 exajoules [13].

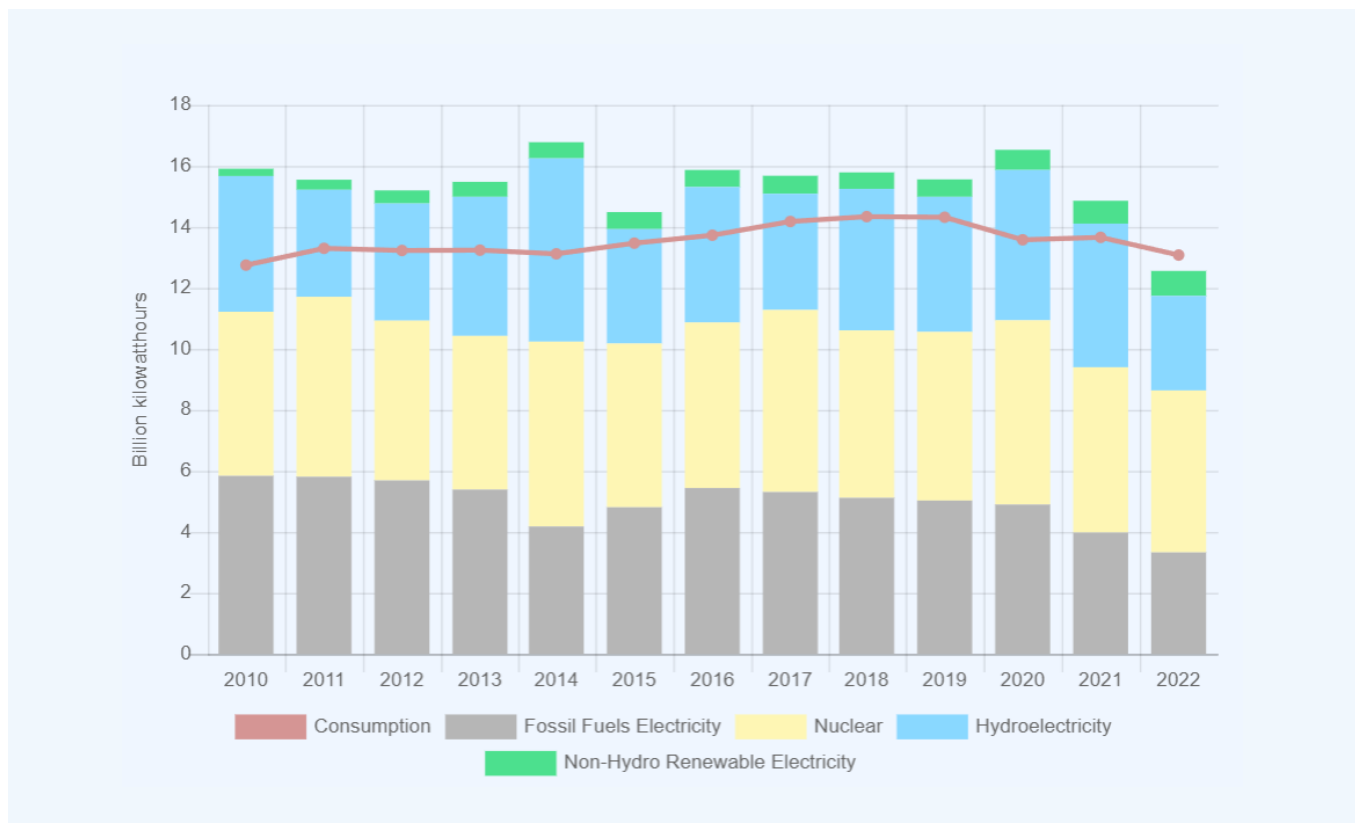


Source: U.S. Energy Information Administration (Mar 2024) / <https://www.eia.gov/>

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

As can be seen from the graph above, Slovenia's consumption of natural gas and crude oil is almost completely satisfied by imports. However, the dynamics of their consumption has not undergone any dramatic changes

over the ten years shown in the graph. If we look at the data for coal, its consumption slightly exceeds production, and there is a clear downward trend in coal use over the ten years.

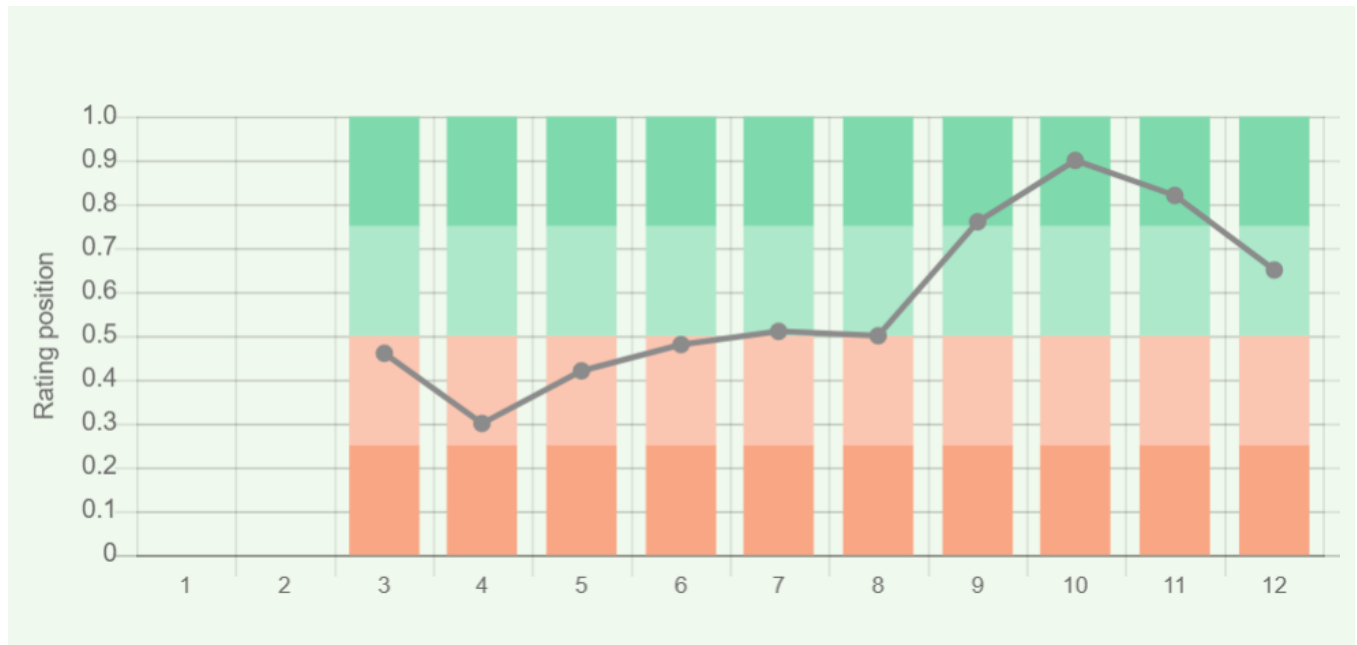


Source: U.S. Energy Information Administration (Mar 2024) / <https://www.eia.gov/>

Figure 3. Electricity production in Slovenia

Slovenia's electricity sector has shown fairly stable performance over the time period shown in the graph above. This applies to both the almost constant amount of electricity generated and consumed, as well as the slowly changing share of primary energy sources for electricity generation. According to the official Report on the energy

situation in Slovenia [14], in 2022, 43.6% of all electricity produced and supplied came from nuclear energy, 30.9% from renewable sources, including hydropower, and 25.5% from fossil fuels. Of the renewable energy sources, 88% comes from hydro, 7.6% from solar resources, 4.2% from biomass and 0.2% from wind.



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. Primary energy consumption - BP Statistical Review of World Energy 2021; 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\*66
  12. The Global Energy Architecture Performance Index Report (EAPI) 2017 / Rankings / Reports / World Economic Forum
  11. Electric power consumption (kWh per capita), 2016 \*217
  - 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
  12. 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 Slovenia

Since Slovenia does not have significant reserves of crude oil and natural gas, the first two positions remain unoccupied. Overall, the fossil fuel indicators are the weakest on the graph, with the lowest being the crude oil production-consumption combination (0.30). The strongest indicator on the graph is The Global Energy Architecture Performance Index Report (0.90). Apart from that, the country ranks relatively well in terms of elec-

tricity consumption per capita (0.82) and oil equivalent primary energy use per capita (0.76).

## Energy Infrastructure

Slovenia's fossil fuel infrastructure and electricity sector are shown on the map below. The country is almost entirely dependent on imports of crude oil and natural gas, with marginal domestic production from the Pe-

tišovci gas and oil fields located in the northeastern part on the border with Hungary. Slovenia's largest container port Koper, situated in the northern part of the Adriatic Sea, includes an oil terminal and an oil storage facility. Coal production is taking place at Slovenia's only coal mine, Velenje, and most of its lignite is used in the near-

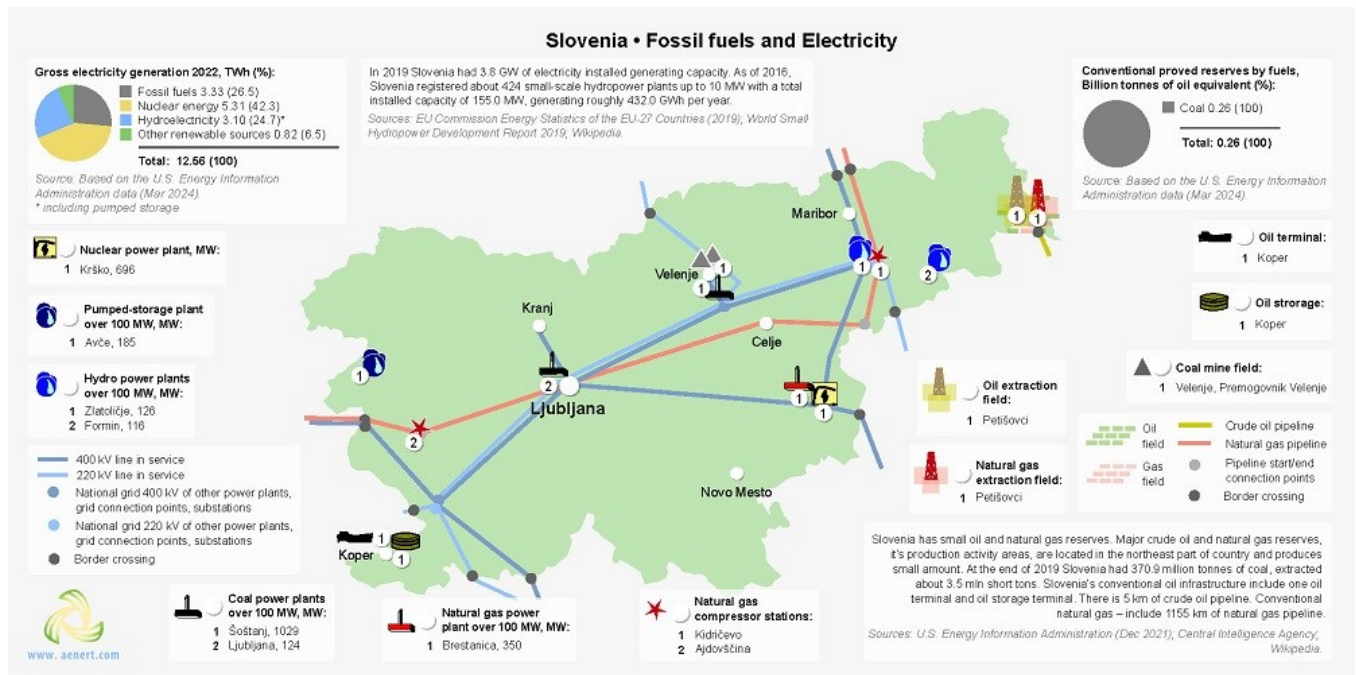


Figure 5. Basic infrastructural facilities of the fossil fuel sector and Electricity production in Slovenia

by Termoelektrarna Šoštanj power plant. The latter is considered unprofitable and will be closed by 2033 under Slovenia's coal phase-out strategy. According to the Energy Information Administration, the share of nuclear

energy in electricity generation in 2022 was 42.3%, followed by fossil fuels (26.5%), hydroelectricity (24.7%) and other renewables (6.5%). The Krško nuclear power plant, located in the town of Vrbina in the municipality

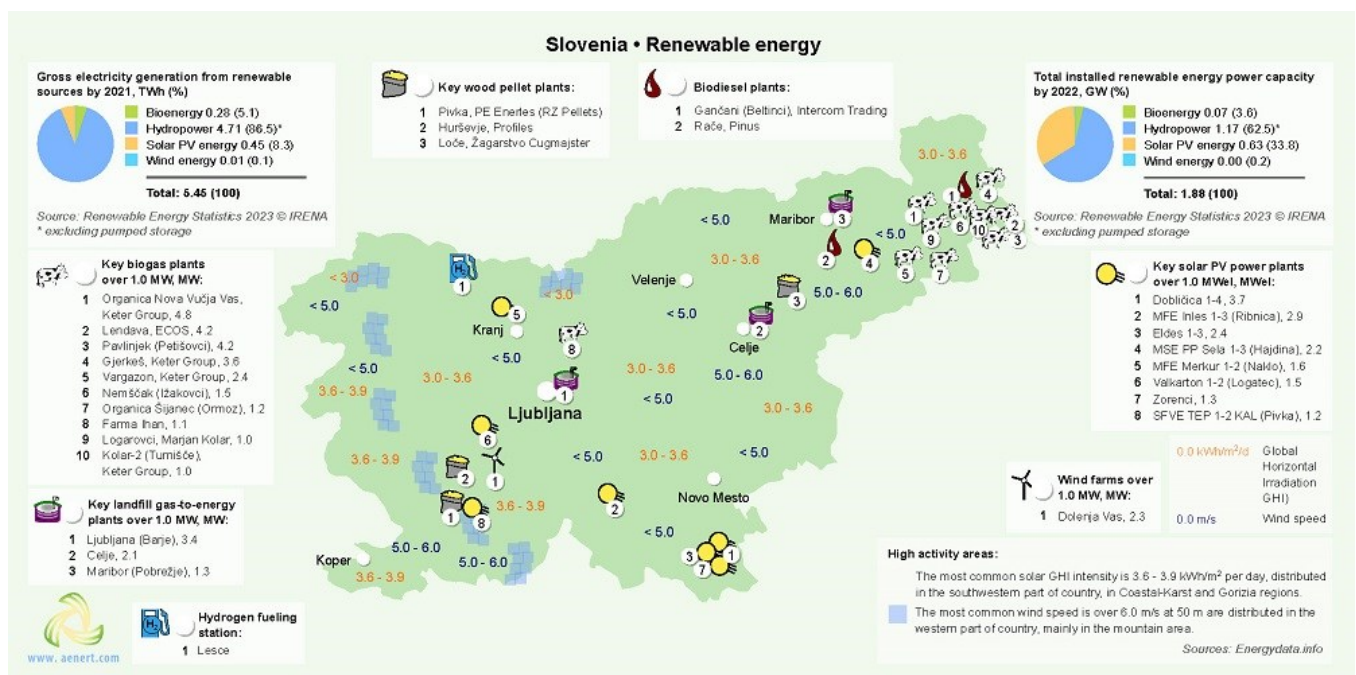


Figure 6. Renewable energy in Slovenia

of Krško, is the only nuclear power facility in the country and provides not only a significant part of Slovenia's electricity consumption, but also part of Croatia's electricity needs.

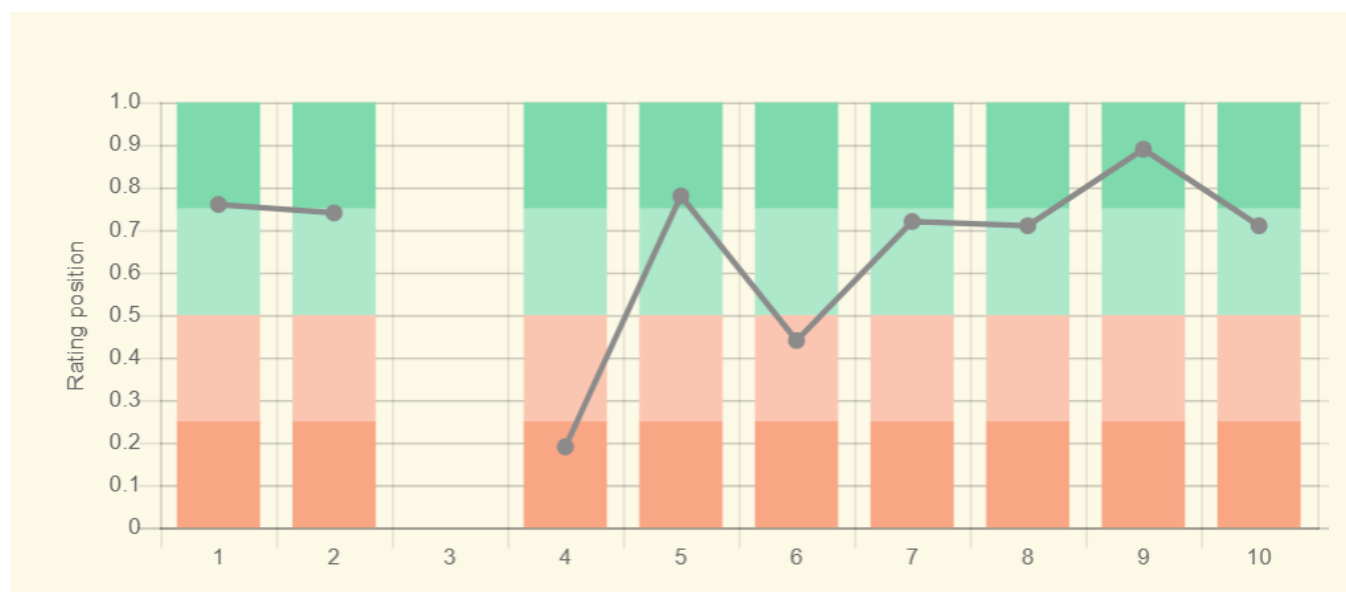
The hydroelectricity infrastructure of Slovenia consist of small and large hydropower plants. The biggest one is 136 MW Zlatoličje hydropower plant located the Drava river in the eastern part of the country between the cities of Maribor and Ptuj. The left bank of the Drava canal is used for a photovoltaic project that extends to the next largest hydropower plant in the country, Formin [15]. If we look at gross electricity production from renewable sources in 2021, hydropower leads with 86.5%, followed by solar energy with 8.3%, bioenergy with 5.1% and wind energy with only 0.1%.

Biogas production is quite well developed in Slovenia. The largest potential for biogas production in Slovenia is the Pomurska area in the north-eastern part of the country, where most of the biogas plants utilizing agricultural waste are concentrated.

Overall, Slovenia is lagging behind in the utilization of solar energy and especially wind energy. In 2023, only two wind turbines were operating in the country. One of them is located in the municipality of Divača in Griško Polje in southwestern Slovenia. The country's government is taking steps to encourage investment in renewable energy to accelerate the construction of wind and solar power plants. Many projects in the renewable sector are planned for construction in the coming years.

## Education and Innovation

The following chart shows Slovenia'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 7. The indices of education and innovation in Slovenia

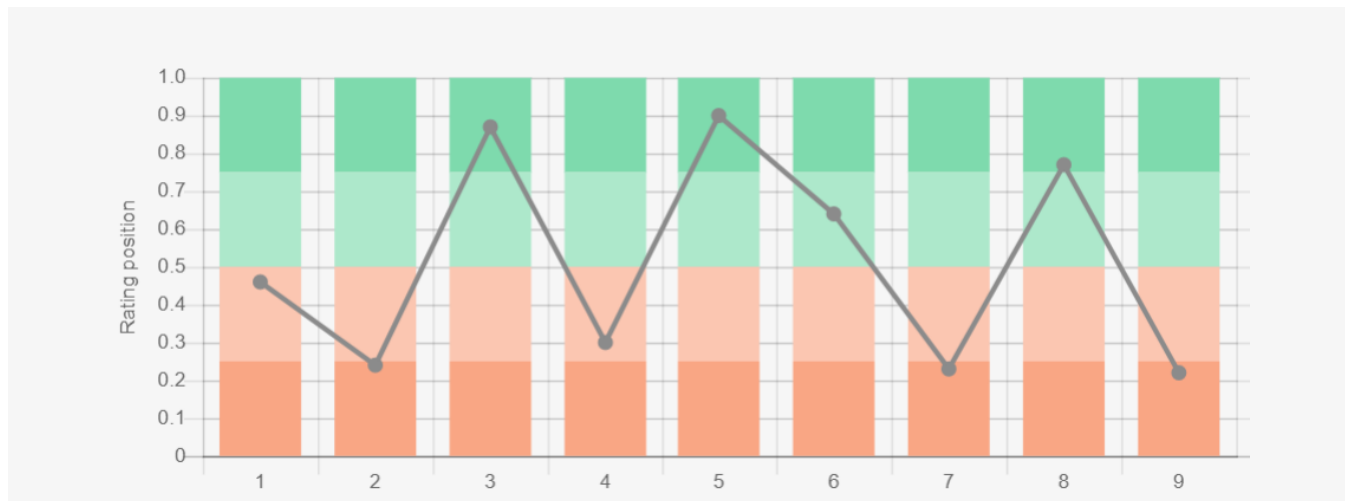
The majority of indices describing the country's positioning in the various international rankings related to education and innovation are above average. Slovenia has the highest rankings for Research and development expenditure (0.89) and SCImago Country Rankings (0.78). The lowest spot in the country is the QS World University

Rankings 2022 (0.19) and the total number of Internet users (0.44), which is, however, due to the low population of the country. Slovenia is not included in the Patents in Force rating, so this position in the chart remains unfilled.



## Ecology and Environment Protection

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



Sources:

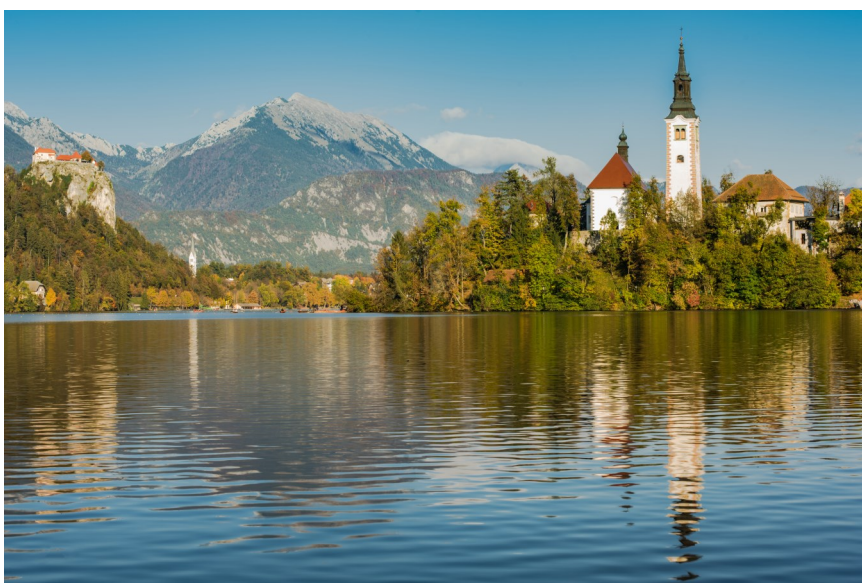
1. CO2 total emission by countries 2020 / European Commission / Joint Research Centre (JRC) / Emission Database for Global Atmospheric Research (EDGAR)\*208
2. CO2 per capita emission 2020/European Commission/Joint Research Centre (JRC) / Emission Database for Global Atmospheric Research (EDGAR) \*208
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

\* Total number of countries participating in ranking

Figure 9. Environmental Indices of Slovenia

Indicators related to environmental issues show a rather heterogeneous picture in the country in this area. On the one hand, Slovenia, as a highly forested country, has a

very good indicator of total forest area (0.87), but on the other hand, the indicator of change in forest area (0.30) shows a trend towards deforestation.



Colorful autumn at Lake Bled, Slovenia. 8JMVK6E3GS. Envato Elements

The highest indicator of those presented is The Environmental Performance Index (0.90). At the same time, the Climate Change Performance Index (0.22) as well as

the National Footprint Account (0.23) gives Slovenia a rather low score. This is primarily due to relatively high CO2 emissions – both total (0.46) and per capita (0.24).

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## References

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- [1] List of sovereign states and dependencies by area / Wikipedia / [https://en.wikipedia.org/wiki/List\\_of\\_sovereign\\_states\\_and\\_dependencies\\_by\\_area](https://en.wikipedia.org/wiki/List_of_sovereign_states_and_dependencies_by_area)
- [2] List of countries and dependencies by population density / Wikipedia / [https://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] Georgia / The-world-factbook / Library / Central Intelligence Agency / <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 / <http://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 / <http://www.worldbank.org/>
- [6] Coal phase-out by 2033 / hse / [6] Coal phase-out by 2033 / hse / <https://www.hse.si/app/uploads/2022/02/Coal-Phase-out.pdf>
- [7] International Energy Statistic / Geography / U.S. Energy Information Administration / [www.eia.gov/](http://www.eia.gov/)
- [8] Solar resource data obtained from the Global Solar Atlas, owned by the World Bank Group and provided by Solargis / Global Solar Atlas / [globalsolaratlas.info](http://globalsolaratlas.info)
- [9] 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: <https://globalwindatlas.info>
- [10] Agricultural land (% of land area) / Food and Agriculture Organization, electronic files and web site. License: CC BY-4.0 / Data / The World Bank / <http://www.worldbank.org/>
- [11] Forest area (% of land area) / Food and Agriculture Organization, electronic files and web site. License: CC BY-4.0 / Data / The World Bank / <http://www.worldbank.org/>
- [12] Municipal waste statistics Updated / Full list / Statistics Explained / Eurostat / [ec.europa.eu](http://ec.europa.eu)
- [13] BP Statistical Review of World Energy 2020-2022 (PDF) / BP / [www.bp.com](http://www.bp.com)
- [14] Report on the Energy Situation in Slovenia-2022 / Agencija za energijo / <https://www.agen-rs.si/documents/54870/68629/Report-on-the-energy-situation-in-Slovenia-2022/d72a2865-931f-441d-b8a3-0346eac0e59a>
- [15] DEM bolstering Slovenia's largest hydropower plant with solar power / January 30, 2023 / <https://balkangreenenergynews.com/dem-bolstering-zlatolicje-slovenias-largest-hydropower-plant-with-solar-power/>

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

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

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