



# Energy Industry in Norway



## General State of the Economy

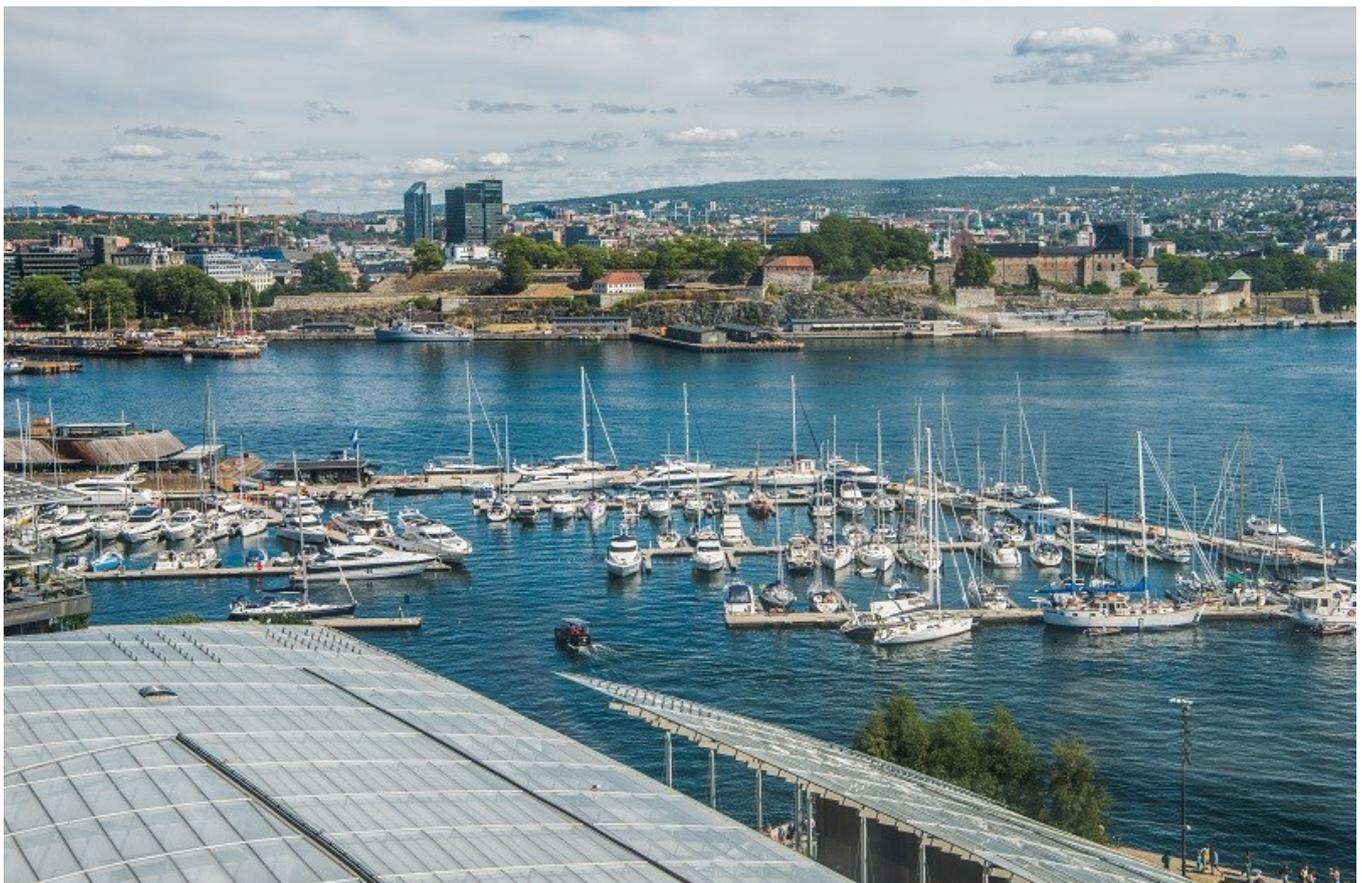
Norway, officially the kingdom of Norway, is a country in Northern Europe. Its capital city is Oslo. [1]. The country

has a land border with Russia, Sweden and Finland, and has access to the Norwegian, Barents and North Seas. Norway is the 63<sup>rd</sup> largest country in the world, and is home to nearly 5.5 million people, as of 2025.

### the Netherlands

Capital: Oslo	Density: 15/km <sup>2</sup>	Currency: Euro (€) (EUR)
Official languages: Norwegian, Sámi	Life expectancy at birth: 82.56 years	GDP (PPP): \$555.644 billion (2023)
National Day: 17 May	Land area: 364,270 km <sup>2</sup>	GDP - per capita (PPP): \$100,668 (2023)
Population: 5,576,660 (2025)	Coastline: 2,650 km	Internet country code: .no

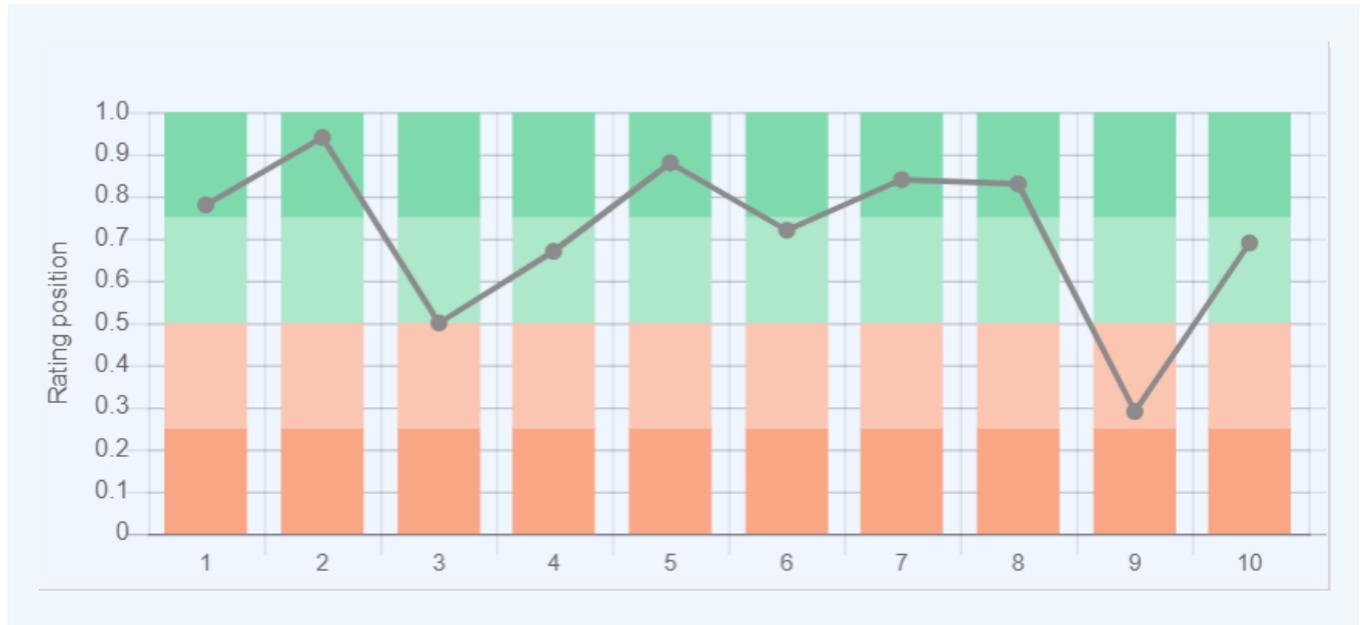
Source: [1,2,3,4,5]



OSLO, NORWAY - 28 JULY, 2018: beautiful city view and boats in harbour at Aker Brygge district, Oslo. Envato Elements. 6HUDJ3RNQY

In terms of population density the country is 219<sup>th</sup> in the world, from 242 countries considered [2,3]. Norway is a parliamentary constitutional monarchy and the official language is Norwegian. The administrative map of the country is divided into 18 provinces [3]. Norway has one of the most advanced market economies in Europe,

which is reflected in Figure 1. By many indicators in the presented diagram, Finland places in the top 25% of the leading countries in the world included in the rating. However, according to the indicator for the average GDP growth in percentage, the country is below the world average.



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 Economics / 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 Norway

Since the beginning of the 1990s the country has experienced sustained GDP growth in purchasing power parity, both in general and per capita [4,5]. GDP at purchasing power parity increased from \$482 billion in 2021 to \$499 billion (49<sup>th</sup> place in the world) in 2023 [3]. The country's GDP at purchasing power parity per capita is higher (8<sup>th</sup> place in the world in 2023), and has also been demonstrating a slight increase: from \$89,200 in 2021 to \$90,500 in 2023 [3].

The level of inflation in Norway changed from 3.48% in 2021 to 5.52% in 2023; putting the country 113<sup>th</sup> in the world by this indicator (ranked by levels of inflation, low to high) [3].

The Global Competitiveness Report 3.48% in 2021 to 5.52% in 2023 reflects the effectiveness of the use of the country's own resources for sustainable development. In addition to a number of economic indicators this index

also takes into account such variables as education, health, level of innovation, etc. High-technology exports in 2023 was 21% of manufactured exports.

According to the Index of Economic Freedom 2024, which is based on freedom of business, freedom from government action, property protection, and freedom from corruption, the country was considered "mostly free": 28<sup>th</sup> out of 178 countries.

## Energy resources

Norway has significant reserves of fossil resources (Table 1). According to proven reserves of oil and natural gas,

the country is ranked 20th in the world [3]. According to data for 2024, in terms of tons of oil equivalent, conventional proved reserves by fuels broke down as follows: oil - 44.3%, natural gas - 55.6%, and coal - 0.1% (Figure 5).

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

Resource/ explanations	Crude oil*	Natural gas*	Coal*	Shale Gas	Tight Oil
<b>Value</b>	8.122(0.48%)	54.542(0.79%)	2.2(0.0002%)	-	-
<b>Unit</b>	billion barrels	Tcf	million short tonnes	-	-
<b>Year</b>	2021	2021	2023	-	-
<b>Source</b>	[6]	[6]	[6]	-	-

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

According to [6], at the end of 2023 proven oil reserves in Norway were estimated at 7 billion barrels, and according to [3] there were 8.122 billion barrels as of the beginning of 2021.

Proven natural gas reserves in Norway in the beginning of 2023 were estimated at 48.2 Tcf according to [6], and at 1.544 Tcm in 2021, according to [3]. Despite the presence of significant proven reserves of traditional oil

and gas there are practically no unconventional fossil resources, including extra heavy oil, kerogen oil and oil found in low permeability wells. However, it should be noted that parts of the developed oil fields contain significant amounts of heavy oil. Norway has various reserves of renewable energy sources. A selection of basic indicators of this type of resource is presented in Table 2. The level of global horizontal radiation does not exceed 2.7

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

Resource/ explanations	Solar Potential (GHI)*	Wind Potential (50 m)*	Hydro energy Potential	Bio Potential Agricultural area	Bio Potential Forest Area	Geothermal Potential	Municipal Solid Waste
<b>Value</b>	<2.7	7.0-9.0	214 000	2.7	33.5	58	724
<b>Unit</b>	kWh/m <sup>2</sup> /day	m/s	GWh/year	% of land area	% of land area	MW/m <sup>2</sup>	Kg per capita
<b>Year</b>	2022	2022	2013	2022	2022	2015	2023
<b>Source</b>	[11]	[12]	[8]	[13]	[14]	[10]	[15]

\*for most of the territory of the country

kWh/m<sup>2</sup>/day; in the south-east of the country, it can reach its maximum of 2.7-3.0 kWh/m<sup>2</sup>/day [11]. This is a limited resource, although in the south of the country these figures are commensurate with those in neighbouring Denmark, where solar energy has received more extensive development. The distribution of wind resources is as follows: for the majority of the country the wind speed is 7.0-9.0 m/s, and in the west of the country between Bergen and Alesund may exceed 9.0 m/s at a height of 50 m [12]. By this indicator, Norway has some of the highest wind potential in the world. The most valuable and widely used natural renewable resource Norway is water resources. A large number of mountain rivers in different parts of the country provide a significant hydropotential for the production of electricity. The global theoretical potential of hydropower in Norway is 214 000 GWh/year, according to [8], which exceeds, for example, the hydro potential of Austria, and is comparable to that of Iceland. Norway has consistently ranked among the top ten countries in the world in terms of in-

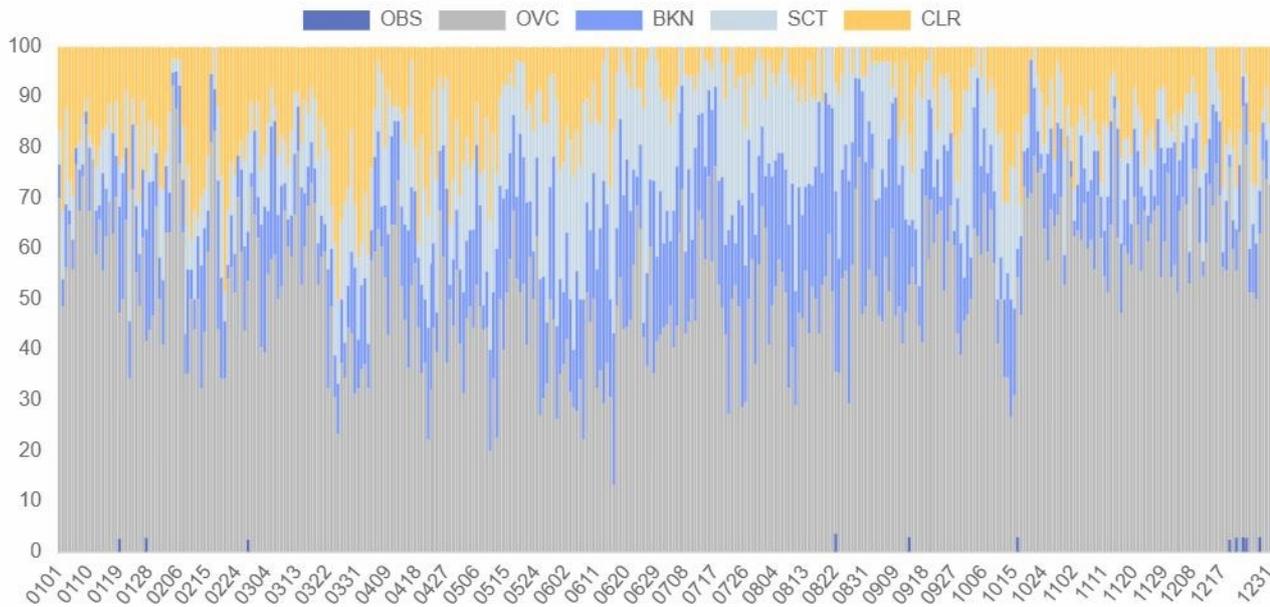
stalled capacity and power generation using hydropower. Electricity generation per capita in Norway is one of the highest in the world (according to this indicator, the country is second only to Iceland). In addition, the share of hydroelectric power in the total volume of electricity production exceeds 90.1% (Fig. 3). In addition, it should be noted that the tidal energy potential on the west coast of the country can reach 40-60 kW/m [9]. This is another valuable renewable energy resource of the country which is inaccessible to most other countries. According to sources, the potential of Norway's geothermal energy in 2015 was about 58 MW/m<sup>2</sup> [10] is a promising local resource for the development of geothermal heat pump technologies.

According to data from 2022, 2.7% of the territory of the country is occupied by agricultural land, the area of which has been slightly decreasing during the last half-century [13]. 33.5% of the territory of the country was forested [14].

### NORWAY, SAUDA

Latitude: 59.65, Longitude: 6.37

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

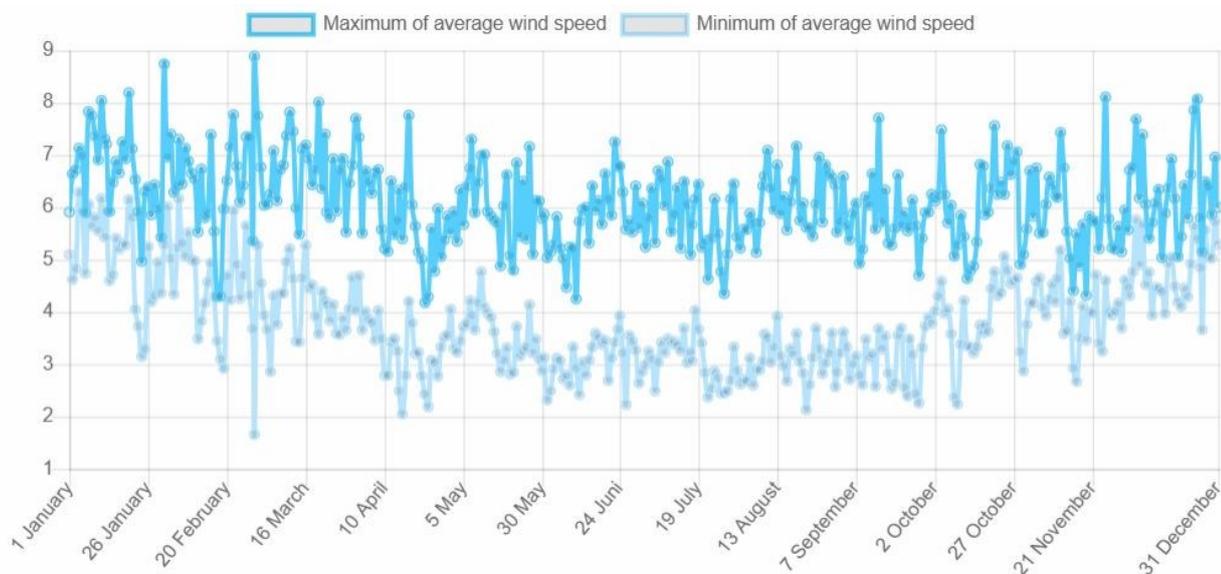
Detailed information: [Interactive map of solar resources](#)

### NORWAY, VANGSNES

Latitude: 52.31, Longitude: 4.76

Average speed: 4.91 m/s, Operational share: 79%

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

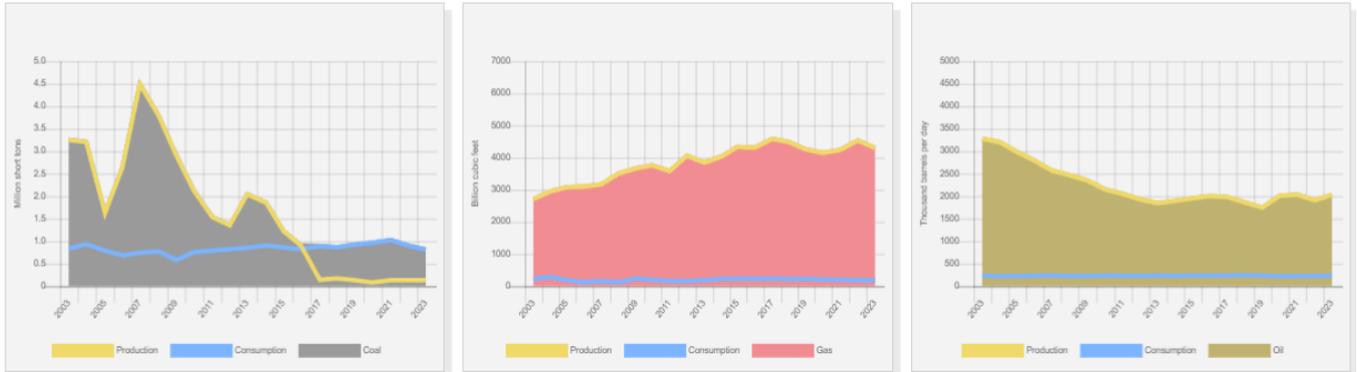
Detailed information: [Interactive map of wind resources](#)

The country's agriculture cannot be a competitive supplier of energy resources in the form of bio-waste. According to Eurostat, in 2023 Norway generated 724 kg municipal waste per capita, ahead of, for example, Finland – (468 kg per capita), but behind Denmark – (802 kg per capita) [15]. This resource is a valuable raw material for recycling or energy production, the technologies of which have reached a high level of development in Norway.

## Energy balance

According to [6], in 2023 in Norway, the total production of primary energy was 9.09 quadrillion Btu, while consumption was at the level of 1.144 quadrillion Btu. Thus, the share of domestic consumption in primary energy production was 12,6%. This makes Norway a country in-

dependent of energy imports (without taking into account the structure of energy consumption). According to the BP Statistical Review of World Energy 2024, total primary energy consumption in Norway in 2023 was 1.99 Exajoules, 70% of which was from hydroenergy, 19.2% from oil, 8.2% from renewables, 7% from natural gas, and 1.6% from coal [7].



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

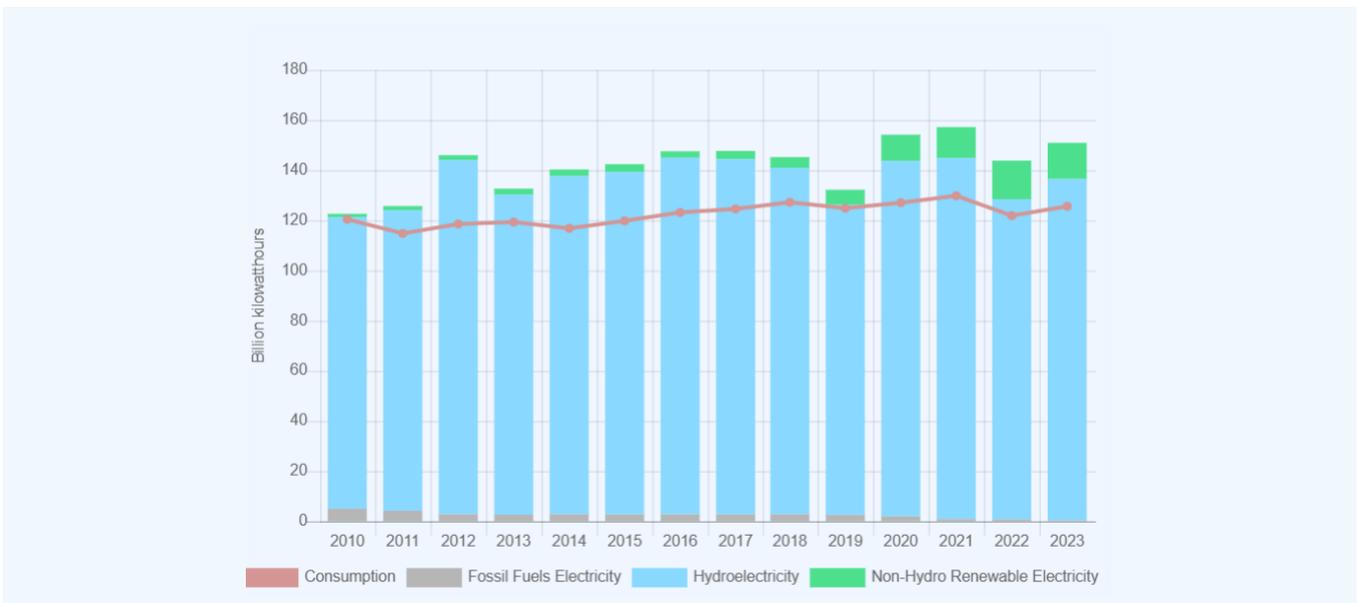
Figure 2. The production and consumption of fossil fuels in Norway (coal – left, gas – in the center, oil – right)

Norway is the largest producer and exporter of oil in Western Europe [6]. Oil production between 2001 and 2013 had been declining, then the output became stable and in 2023 amounted to 2 026 thousand barrels/day [16]. Oil consumption between 2002 and 2023 remained almost unchanged (Fig. 2), at about 229 thousand barrels/day [16].

According to the Energy Institute Statistical Review of World Energy 2024, the level of oil production in Norway in 2023 was 2 022 thousand barrels/day, and oil consumption was 226 thousand barrels/day [7]. In 2023, total final crude oil production in the country was 4 115

401 TJ [17]. 86.1% total crude oil production in 2023 was exported, and the main importers were EU countries [17]. The production of natural gas in the country grew rapidly between 2002 and 2020, reaching its peak of 4 375 Bcf in 2017 and decreasing to 4 296 in 2023. The consumption of natural gas between 2002 and 2023 did not exceed the level of 282 Bcf, and by 2023 totalled 179 Bcf [16].

According to the BP Statistical Review of World Energy 2024 [7], gas production in the country in 2023 was 116.6 Bcm, while consumption was 3.8 Bcm. According to the International Energy Agency, total final natural gas



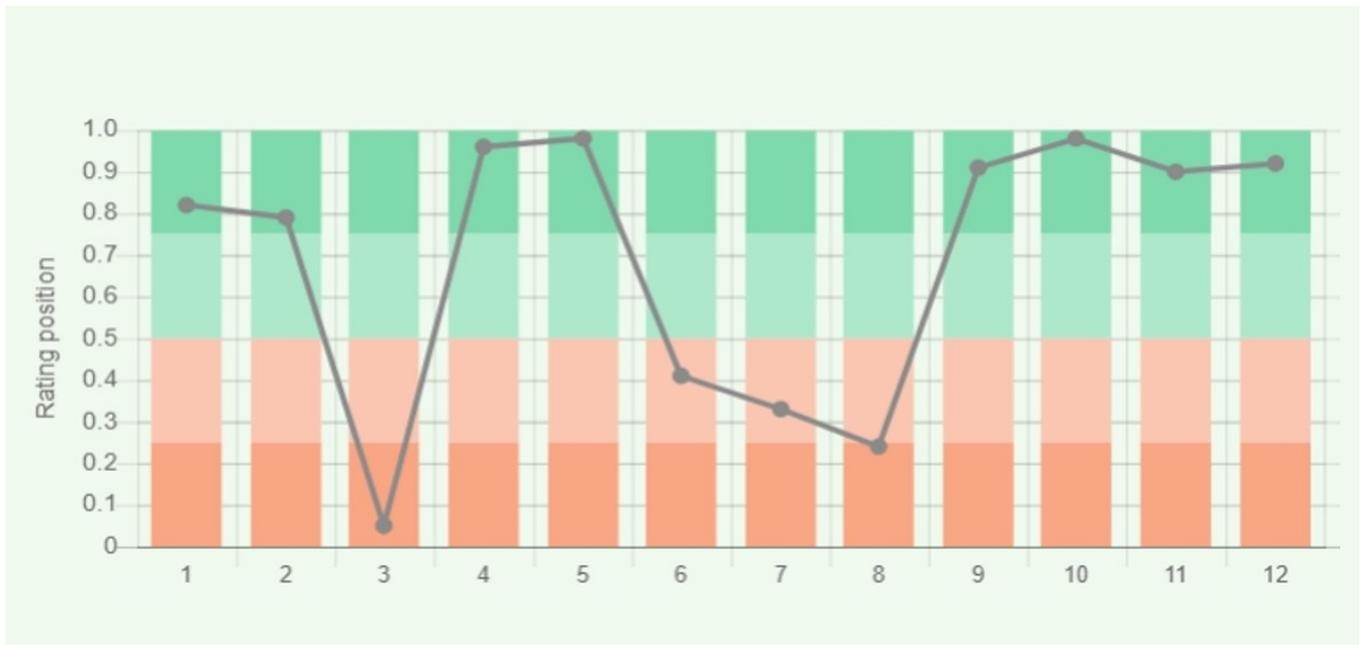
Source: U.S. Energy Information Administration (Sep 2024) / <https://www.eia.gov/>

Figure 3. Electricity generation in Norway

production in 2023 was 4 344 012 TJ-gross, 95.7% of total gas production was exported [17].

Almost 95% of the gas produced was supplied through an extensive network of pipelines, mainly to EU countries [6]. Since 2001 coal production in the country demonstrated multi-directional dynamics, and in 2023 reached the level of 0.13 million short tons. Coal consumption during the same time period did not exceed 0.97 million short tons, and in 2023 was 0.81 million short tons [16].

According to the Energy Institute, coal consumption amounted to 0.03 Exajoules in 2023 [7]. Norway mainly uses hydropower for the production of electricity (Fig. 3). In 2023, according to the U.S. Energy Information Administration, the country produced 150.39 TWh of electricity, where hydropower power accounted for 90.1%, renewables for 9.7%, and fossil fuels for 0.2% (Fig. 6). Norway's position in the comparative diagram of energy index is shown in Fig. 4.



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
  - Primary energy consumption - BP Statistical Review of World Energy 2021/BP;GDP (purchasing power parity) - The World Factbook/Library/Central Intelligence Agency
  9. Energy use (primary energy use of oil equivalent per capita) 2020 \*127
  - 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
  10. The Global Energy Architecture Performance Index (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 the Norway

Norway is the highest ranked country in terms of production/consumption of oil and gas, ranging from high to low values. Norway was 50<sup>th</sup> out of 66 countries ranked by the ratio of GDP per unit of energy use; energy consumption per capita is much higher placing the country 6<sup>th</sup> in the world. In terms of electricity consumption per capita, the country is second in the world, behind only Iceland. For the indicator of combination of electricity production-

consumption, Norway is 18<sup>th</sup> in the ranked list of 216 countries.

## Energy Infrastructure

A territorial map showing the distribution of the largest infrastructure projects of the fossil fuel sector and elec-

tricity in Norway is shown in Figure 5. In the total potential of fossil energy resources, natural gas plays the predominant role – 55.6%; oil amounts to 44.3%; and coal to 0.1% (Figure 5). The main gas field in Norway is the off-



*Oil and gas sea platform in Norway. Energy industry. Petroleum exploration. Envato Elements. DAG2RBZYST*

shore Troll Natural Gas Field, whose production in 2023, according to [18], were around 1.3 Tcf. LNG is delivered to a number of regions of the country via two terminals. Gas exports, in addition to pipelines, are carried out via three terminals, the largest of which is Snohvit, Statoil

LNG Export Terminal (4.2 Mtpa) [19]. Gas is transported via a network of pipelines with a length of 8520 km (Fig.5). Norway is actively involved in the search and re-search of gas hydrates; gas hydrate occurrences have been found near the Svalbard area (Fig. 5).



*Hammerfest Island Muolkkut Northern Norway, gas processing plant. Envato Elements. JDGVQUSECZ*

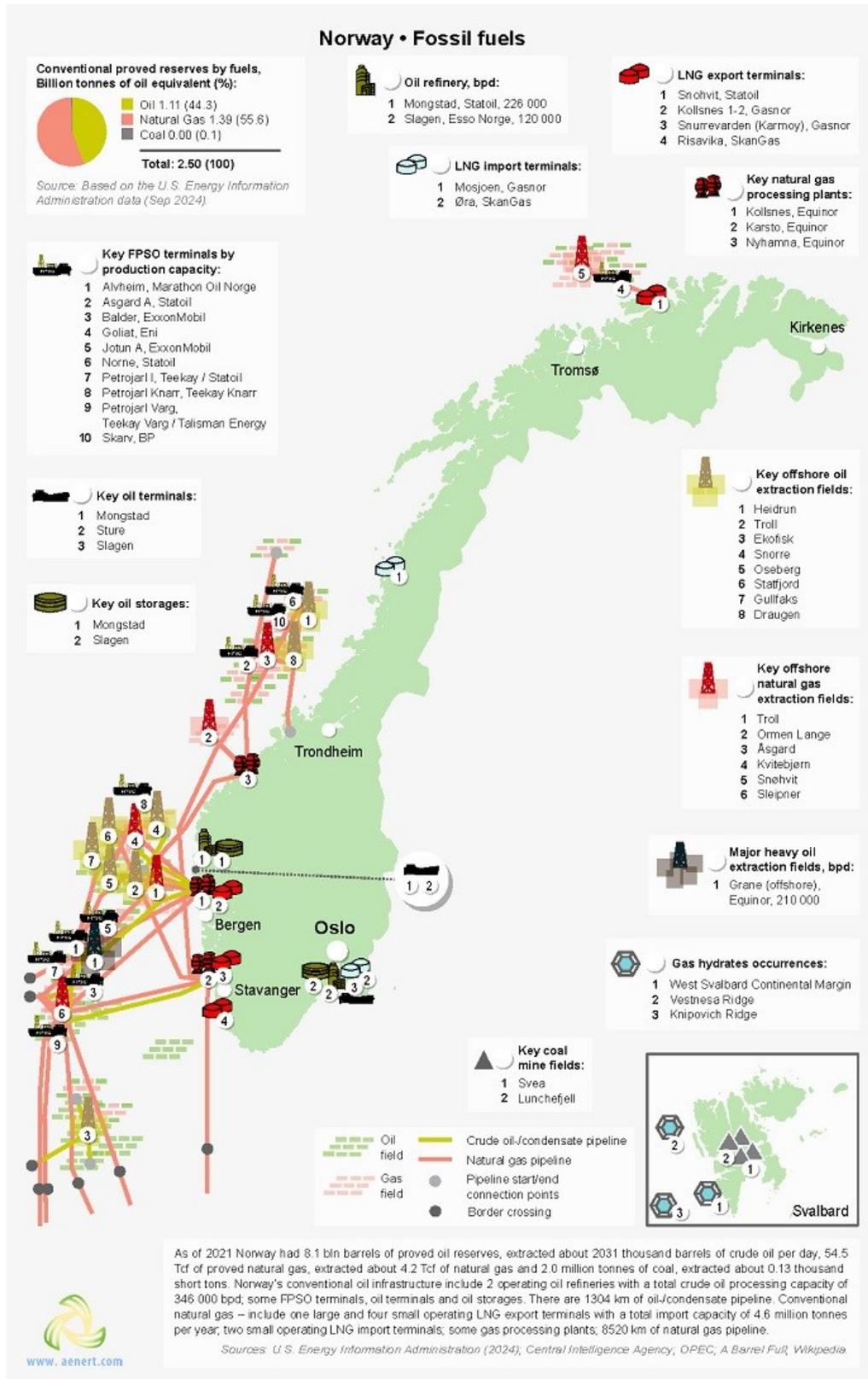


Figure 5. Basic Infrastructure facilities of the Fossil fuel sector and Electricity in Norway

One of the most developed oil fields is the offshore installed capacity of 226,000 bbl/day; there is a neighboring oil storage facility [6] (Fig.5). Gas condensate is transported via pipelines with a total length of 1,304 km (Figure 5).

The largest heavy oil field is the Grane, developed by Equinor Heavy Oil, which can produce 150,000 bbl/day [21]. Coal mines are concentrated in Svalbard, the leading being Svea; however during the period from 2020 to 2023 coal production in Norway decreased by 81% [22].

Norway actively uses FPSOs (floating production storage offloading) for oil production. The map showing the territorial distribution of Norway's largest infrastructure facilities for electricity generation is presented in Figure 6.

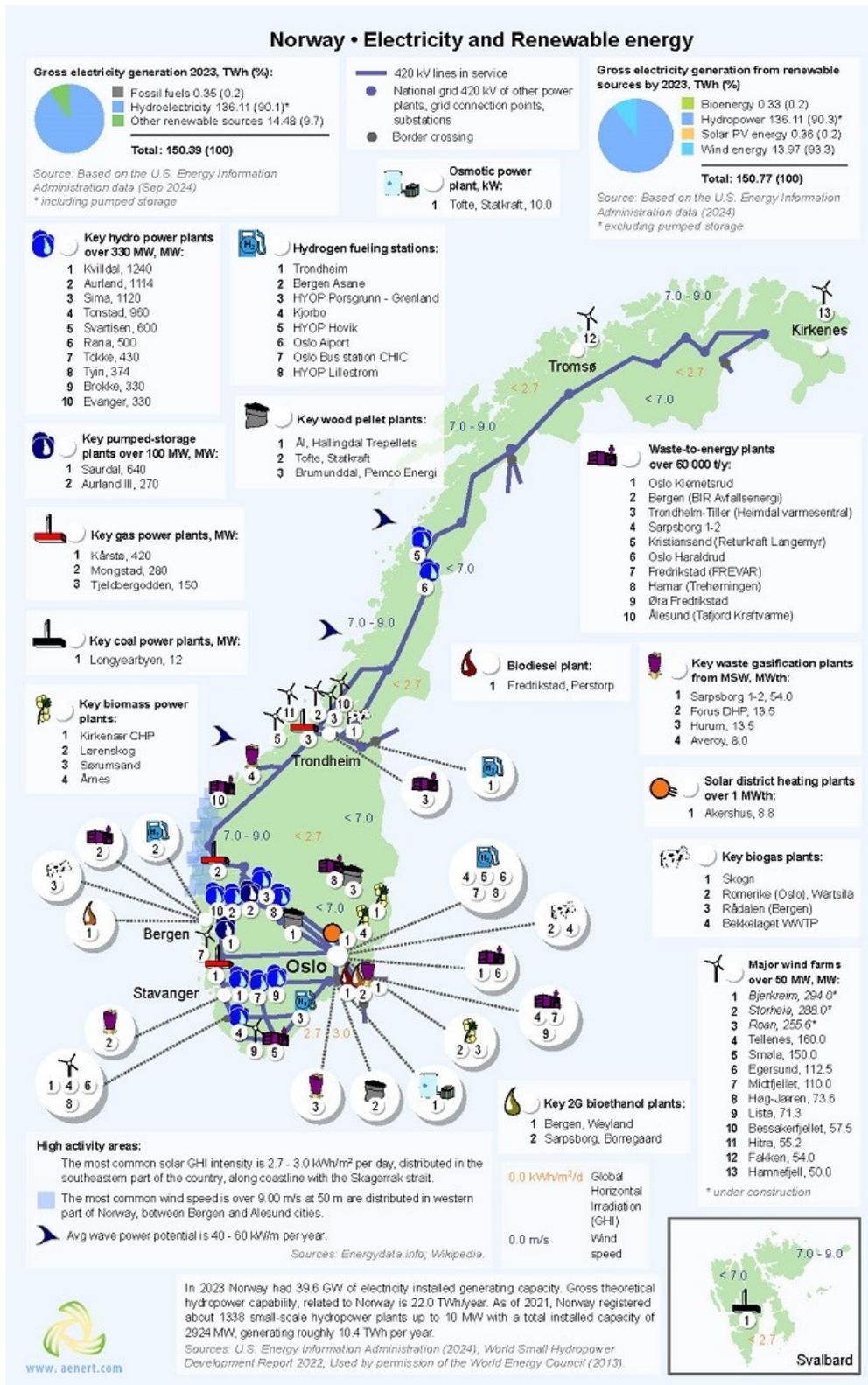


Figure 6. Electricity production and Renewable energy in Norway

According to the U.S. Energy Information Administration the share of fossil fuels in energy production in Norway in 2023 was only 0.2%, which is generated at three large gas and coal power plants (Fig.6). The largest coal-fired power station is Longyearbyen, with an installed capacity of only 12 MW, however the government plans to close the plant completely in the coming years [23].

The share of hydro-power in energy production was 90.1%, this sector is represented by both pumped-storage power plants, and large and small hydropower plants (Fig.6). The largest pumped storage power plant is Saurdal, with an installed capacity of 640 MW, and the largest hydro-power station is Kviteseid with a capacity of 1 240 MW [25,26]. As of 2021, Norway registered about 1338 small-scale hydropower plants up to 10 MW with a total installed capacity of 2924 MW, generating roughly 10.4 TWh per year [27].

As noted above, renewable energy (excluding hydroenergy) in Norway accounted for 9.7% of its total electricity generation. The level of direct solar radiation in some areas of the country can reach 3kWh/m<sup>2</sup> [11]. Near the capital, there is a solar district heating plant, Akershus, with a capacity of 8 MWh [28]. The wind speed in the west of the country can exceed 9 m/s which offers a potential renewable energy source that is inaccessible to most other countries. As 2023, there were 65 wind farms in Norway, with an installed capacity of 5073 MW [29]. Bioenergy does not play a major role in the production of electricity – its share in the production of renewable sources is insignificant – 0.2% (Fig.6).

There are biogas enterprises in the country as well as enterprises for processing municipal garbage, production of biodiesel, bioethanol, pellets, etc. (Fig.6). Norway has large enterprises for the production of second-generation biogas and bioethanol: Seal Sands with a capacity of 25 mln Nm<sup>3</sup>/year; and Bergen, Weyland with a capacity of 3.9 mln Nm<sup>3</sup>/year [30,31]. Fredrikstad is the largest biodiesel producer in the country, capable of producing about 100,000 tons per year [32].

Other notable facilities include: Tofte, Statkraft Osmotic Power Plant with a capacity of 10 Kw [33]; Sarpsborg 1-2 MSW Gasification Plant waste gasification plant, with an installed capacity of 54 MWh [34,35]; and Ål, HallingdalTrepellets Pellet Plant, which can produce 30,000 tons of pellets annually [36].

The largest facility for the generation of electricity from municipal waste is Oslo Klemetsrud, which can recycle 375,000 tons of waste annually, and can also generate electricity from landfill gas flowing through pipelines from the Grønmo landfills.

Oslo Klemetsrud produces 160 GWh of electricity and 590 GWh of energy for district heating [37]. Norway is at the forefront of the development of hydrogen energy, including as an energy source for vehicles. According to the data for 2024, nine hydrogen filling stations were in operation in the country (Fig. 9).

The energy policy of the country is aimed, primarily at the improvement of energy efficiency, reduction of harmful emissions, and the development of renewable energy technologies. For these purposes, various pilot projects are being built in the country, such as an advanced biofuel demonstration plant in Toft, through the joint efforts of Steeper Energy and Silva Green Fuel, worth €50.7 million, potentially leading to a future commercial scale operation by 2025 [39]. One of the world's largest "green hydrogen" plants will be built in Norway, which will have a capacity of 10 MW; the hydrogen produced by the electrolysis method will be used both for vehicles and for power generation [40].

Norway has ambitious plans to use electric vehicles and limit the use of traditional vehicles. The study of gas hydrates mentioned above, as well as the development of ocean technologies - in particular stations of the osmotic type- are some of the many innovative aspects of Norway's energy agenda.

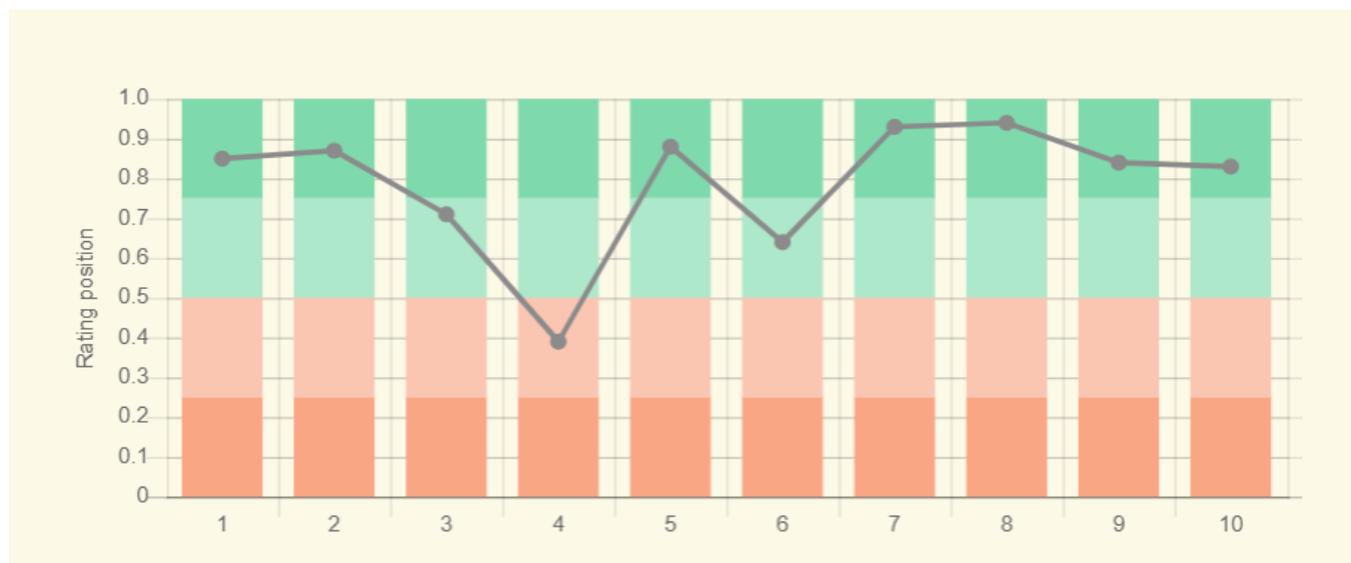
## Education and Innovation

The set of indices reflecting the position of Norway among other countries in the field of education and innovation can be seen in Figure 7. Norway placed 21<sup>st</sup> out of 133 countries considered in the ranking of countries of the Global Innovation Index 2024 (see diagram), ahead of Iceland.

According to the number of patents granted to Norwegian nationals, both domestically and abroad, the country

ranks 24<sup>th</sup> in the world, behind a number of European countries, but nevertheless higher than the world average. Similarly, by the number of valid patents, the country is 47<sup>th</sup> out of 109 countries, indicating the country's favorable conditions for innovation.

In terms of government expenditure on education as a percentage of the country's GDP, the country ranks highly – 19<sup>th</sup> out of 119 countries selected for consideration; contributing to 4 Norwegian universities entering the QS University Rating. Norway is very well positioned when



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: CC BY-4.0 / Data as of September 2021 \*177
  9. Research and development expenditure (% of GDP), 2018 / UNESCO Institute for Statistics. License: CC BY-4.0 / Data \*119
  10. Scientific and technical journal articles, 2018 / National Science Foundation, Science and Engineering Indicators. License: CC BY-4.0 / Data \*197
- \* Total number of countries participating in ranking

Figure 9. The indices of education and innovation in Norway

considering the number of publications of specialists in scientific and technological journals and patent activities. The country is 29<sup>th</sup> out of 240 participating countries in the Scimago ranking, and in Scientific and Technical Journal Activities it is ranked 34<sup>th</sup> out of 197 countries. The country is also among the leaders in the region in terms of the number of Internet users. It should be noted that many of the ratings mentioned use absolute values, which taking into account the country's very low population, in some cases demonstrates outstanding results. Norwegian universities, such as the Norwegian University of Science and Technology, the University of Stavanger, and The Arctic University of Norway train specialists in various fields of energy, including Electrical Engineering, Petroleum Engineering, Renewable Energy, Environmental Engi-

neering, etc. In the field of synthetic fuel production, leaders in patenting are Statoil ASA, Det Norske Oljeselskap ASA. Research and development in this field is carried out by the Norwegian University of Science and Technology (NTNU), SINTEF.

In the field of unconventional oil, Statoil ASA, Statoil Petroleum, Statoilhydro ASA rank prominently. The Norwegian University of Science and Technology (NTNU), Statoil ASA are actively engaged in research in this field.

Advanced Hydrocarbon Mapping AS, Norsk Hydro ASA, are leading patent holders, and the University of Bergen, the University of Tromsø, the Arctic University of Norway, actively publish their research in the field of gas hydrates. Another important patenting area is coalbed methane. Here the leaders in patenting are Sinvent AS, Norsk Hydro

ASA, and by number of publications - GeoKnowledge AS and the International Research Institute of Stavanger. Noteworthy enterprises in the field of associated petroleum gas include SWT AS, Cubility AS, Kongsberg Offshore AS. Research and development in this field is carried out by the Norwegian University of Science and Technology (NTNU), Carbon Limits AS, Statoil ASA. In the field of hydrocarbon production from reservoirs with low permeability, the leading patent holders are Statoil Petroleum, Impact Technology Systems AS, Statoil ASA, and the University of Oslo, the University of Stavanger, and Statoil ASA conduct research in the field.

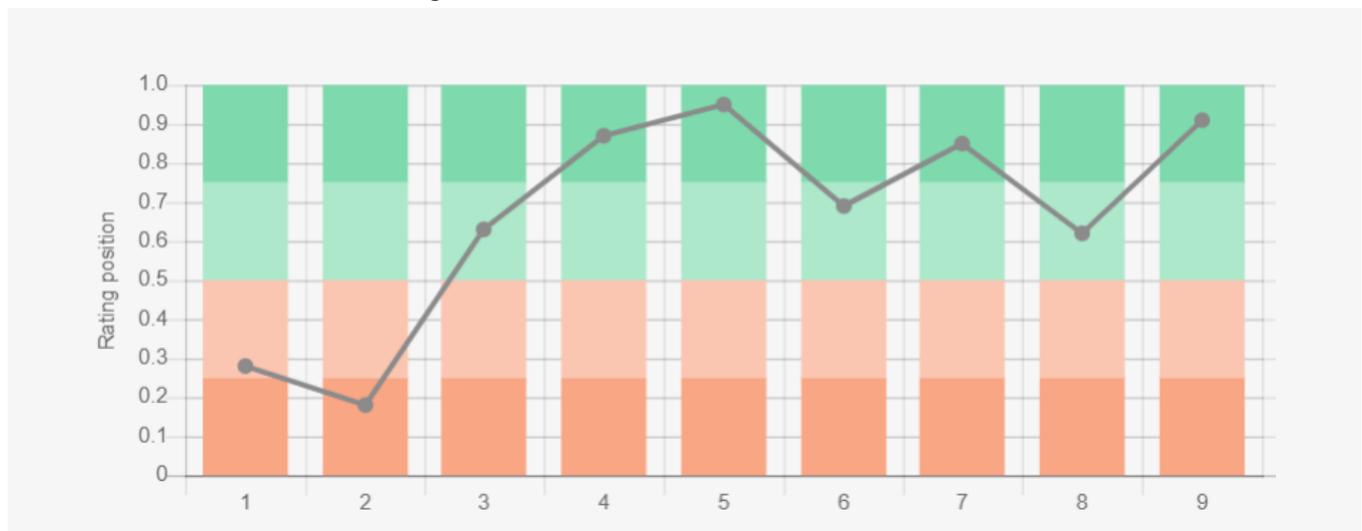
The leading patent holders in the field of bioenergy are Norsk Biogass AS, SEAWEED ENERGY SOLUTIONS AS, MICROA AS. The following research agencies are actively

engaged in research: the Norwegian University of Science and Technology (NTNU), the Norwegian University of Life Sciences, and SINTEF. A large number of companies patent technical solutions in the field of energy production from renewable sources. In the field of solar energy prominent enterprises include NEST AS, Yara International ASA, and ENERGYNEST AS. Leading research organizations in this field are the Norwegian University of Science and Technology (NTNU) and NEST AS. Sway Turbine AS, Hywind AS, Statoilhydro ASA, and GE Wind Energy Norway AS have received the largest number of patents in the field of wind power. The Norwegian University of Science and Technology (NTNU) and SINTEF conduct research in the field.

## Ecology and Environment Protection

The diagram of environmental indices presented in Figure 8 to some extent reflects the ecological situation in the

country. As with many oil-producing countries, Norway demonstrates a relatively high level of CO<sub>2</sub> emissions, both in general and per capita. It is also necessary to note the high level of methane emissions in the country.



Sources:

1. CO<sub>2</sub> total emission by countries 2020 / European Commission / Joint Research Centre (JRC) / Emission Database for Global Atmospheric Research (EDGAR)\*208
  2. CO<sub>2</sub> 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 (m<sup>3</sup> per capita), 2017 \*179
  - Annual freshwater withdrawals, total (billion m<sup>3</sup>), 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
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- \* Total number of countries participating in ranking

Figure 10. Environmental Indices of Norway

Norway is in 9<sup>th</sup> place in the Climate Change Performance Index (CCPI) 2025, which consists of 64 positions and includes 61 countries responsible for more than 90% of global energy-related CO<sub>2</sub> emissions. Despite the rather

favourable environmental situation in the country, the compilers of the rating emphasize that Norway actively exports fossil resources, thereby increasing the percentage of negative emissions in other countries. In terms of

forest area as a percentage of the country, Norway was 86<sup>th</sup> out of 234 countries. The country is very well positioned in the Environmental Performance Index (EPI) 2024, which focuses primarily on the environmental activities of national governments, aimed at reducing the

negative impact of the environment, and rational use of natural resources. In this ranking, the country is 7<sup>th</sup> out of 180 participating countries, behind a number of European countries, including Sweden and Finland.



*Beautiful Nature Norway. Envato Elements. 5DAHPXZQW4*

Finally, it is worth mentioning that according to the Ecological Footprint Atlas rating, Norway is among a number of ecological creditors.

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

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

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