Country Analysis Brief: Norway

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Overview

Table 1. Norway's energy overview, 2022

	Crude oil and other petroleum liquids	Natural gas	Coal	Nuclear	Hydro	Other renewables	Total
Primary energy production (quads)	3.81	4.60	0.00	0.00		0.49[a]	8.91
Primary energy production (percentage)	42.7%	51.7%	0.0%	0.0%		5.5%	100.0%
Primary energy consumption (quads)	0.45	0.17	0.02	0.00		0.46[a]	1.10
Primary energy consumption (percentage)	40.9%	15.4%	2.0%	0.0%		41.7%	100.0%
Electricity generation (TWh)	0.58	0.00	0.07	0.00	127.62	15.48	143.38
Electricity generation (percentage)	0.4%	0.0%	0.0%	0.0%	89.0%	10.8%	100.0%

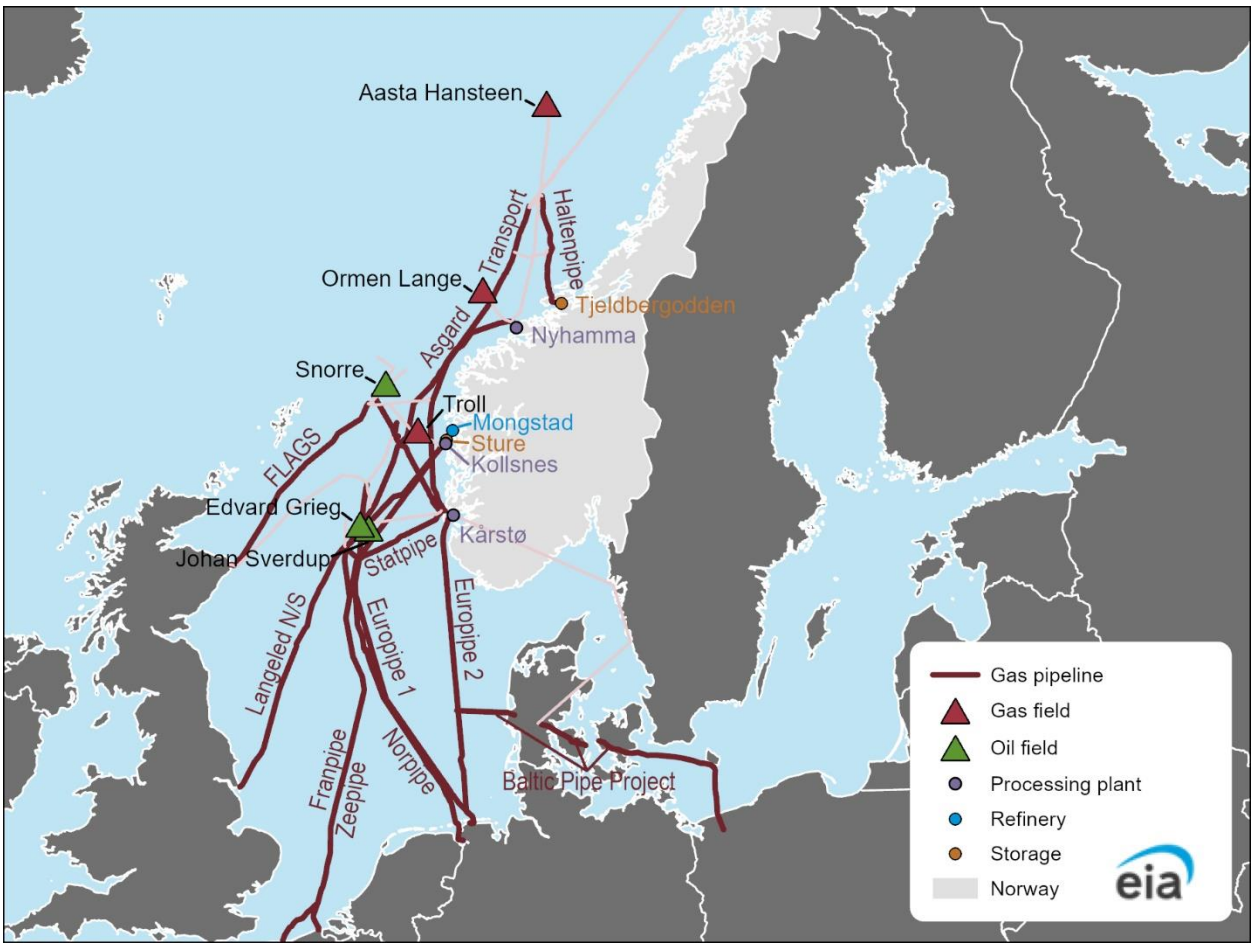
Data source: U.S. Energy Information Administration, International Energy Statistics
Note: We aggregate hydroelectricity and renewables as *other renewables* for primary energy production and consumption.
Quads=quadrillion British thermal units; TWh=terawatthours
[a]Includes hydroelectricity

- In 2022, Norway accounted for 29% of energy production and 2% of energy consumption in OECD Europe (Table 1).
- After Russia's full-scale invasion of Ukraine, Norway increased its natural gas production and exports to Europe in 2022 to help replace Europe's natural gas imports from Russia.
- Norway's last coal-fired power plant, located on a Norwegian island group called Svalbard in the Arctic Ocean, is switching from coal to diesel now that Norway's only coal mine in the islands was closed. However, Russia's state-owned coal mining plant on Svalbard continues to operate (Figure 1).[1]
- Norway's top producing oil field, Equinor-operated Johan Sverdrup, is nearing its peak production at 755,000 barrels per day (b/d), likely to be reached this year.[2] Johan Sverdrup produced 711,000 b/d in 2023 (Table 2 and Figure 2).[3]
- Europe's largest onshore wind farm project, the Fosen Vind project, includes several central Norwegian wind farms including its largest wind farm Stoheria (288 megawatts (MW) of installed capacity) with 801 MW of installed capacity now excluding Roan (255 MW of installed capacity). In 2021, however, Norway's supreme court determined that the Fosen Vind farms, including Roan, were violating Sami reindeer herding rights. Subsequently, Fosen Vind reached agreements with the herders in December 2023 and in March 2024 to allow operations (Figure 3).[4,5]
- Equinor's Hywind Tampen in the Norwegian North Sea added the world's largest floating wind farm, at 88 MW in capacity, in late 2022 to aid oil and natural gas production of some of Norway's top fields (Figure 3).[6]

Figure 1. Map of Norway (as of August 2024)

Source: U.S. Energy Information Administration

Figure 2. Map of Norway's major energy infrastructure (as of August 2024)



Source: U.S. Energy Information Administration
Note: Terminal sites include some natural gas processing, oil refining, and storage facilities among other capabilities.

Petroleum and Other Liquids

- Norway's proved oil reserves totaled 7 billion barrels as of the end of 2023.[7]
- Norway's oil production totaled 2.0 million b/d in 2023 and we expect that it will continue to increase into 2025, after two decades of downward-trending production since its 3.4 million b/d peak in 2001 (Figure 3).
- In 2023, most of Norway's oil and natural gas production was located offshore in the North Sea (88%), the Norwegian Sea (11%), or the Barents Sea (1%). Norway produces many grades of crude oil that have different characteristics, including the following blends, which are generally light and sweet to medium in density and sulfur content (low (0.0% to 0.2%) to medium (0.2% to 0.9%) sulfur by weight):[8,9]
    - Ekofisk (38.9° API and low sulfur)
    - Oseberg (39.6° API and low sulfur)

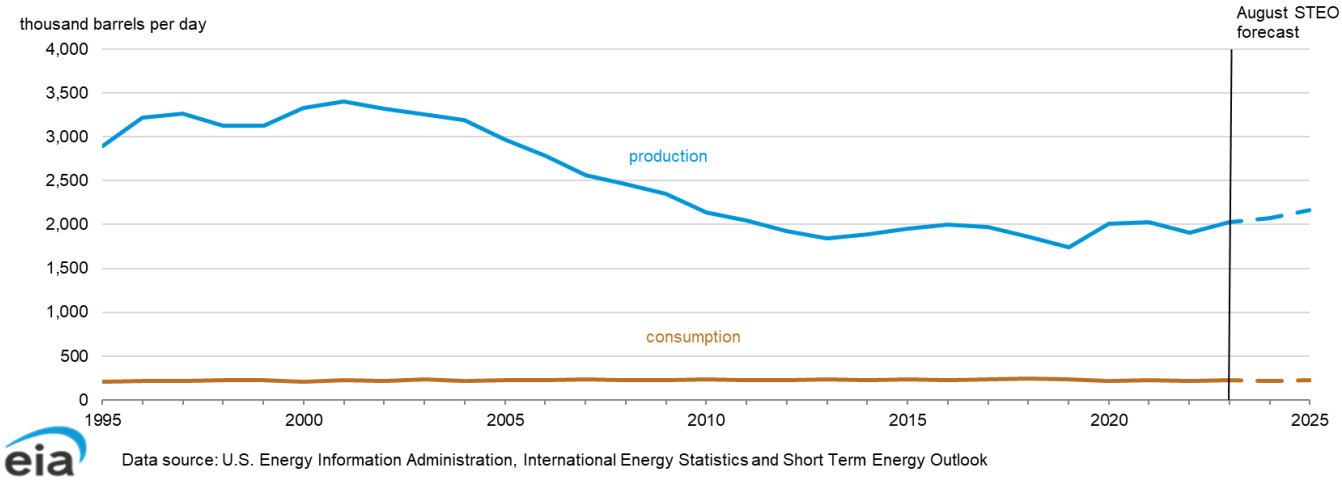
  - Johan Sverdrup (28.7° API and medium sulfur)
  - Gullfaks (39.3° API and low sulfur)
  - Statfjord (39.3° API and low sulfur)
  - Troll (36.64° API and low sulfur)
  - Granne (28.8° API and low sulfur)
- Equinor is a 67% state-owned energy company in Norway that also operates in approximately 30 countries worldwide. Equinor produces 70% of Norway's oil and natural gas, and its operations in Norway accounted for 67% of global Equinor operations in 2021. Equinor produces approximately 2 million barrels of oil a day globally, most of which is produced in Norway, as of 2024.[10]
- Equinor-operated Johan Sverdrup was, by a large margin, the top producing field in Norway in 2023. At 712,000 b/d of crude oil production, this field accounted for 40% of Norway's crude oil production that year.[11] Johan Sverdrup, with 2.7 billion barrels of reserves, was discovered in 2010 in the North Sea and had an expected production plateau of 660,000 b/d that has since been raised to 755,000 b/d. Johan Sverdrup went through two development phases, one starting in October 2019 and another in December 2022. Currently, Sverdrup is near its production plateau, but production is expected to decline by the end of 2024 or early 2025.[12,13]
- Norway has one oil refinery, Mongstad, which is also owned and operated by Equinor. Mongstad has a total crude oil distillation capacity of 203,000 b/d.[14] Refining primarily gasoline, diesel, and jet fuel, the refinery produces four times more liquid fuels than Norway's annual consumption. Mongstad refinery is co-located with crude oil terminal DA (MTDA), which facilitates exports via pipelines from Equinor-operated fields Johan Sverdrup, Troll B, and Troll C and houses an approximately 9-million-barrel underground storage facility.[15]
- As natural gas production has grown in Norway, the amount of recovered natural gas liquids (NGLs) has increased significantly, reaching a peak of 351,000 b/d in 2017. In 2023, NGL production was 204,000 barrels per day, with Troll (23,000 b/d) and Åsgard (21,000 b/d) as the top NGL-producing fields.
- Kårstø is the largest NGL processing hub in Europe. The site receives rich natural gas and natural gas plant liquids (NGPLs), which are separated into liquid products and dry gas, from about 30 fields, including major developments on the Norwegian continental shelf, by pipeline. The dry gas is primarily transported by pipeline to continental Europe and the United Kingdom.
- Ethane, propane, butanes, and natural gasoline extracted from the rich natural gas at Kårstø are either stored or shipped by tanker or barge. Propane, butanes, and natural gasoline are exported from Kårstø to destinations worldwide, and ethane is shipped to petrochemical users in the North Sea Basin. The two propane caverns at Kårstø, with a combined capacity of more than 1.6 million barrels, are the largest in Europe.
- Norway's petroleum and other liquid consumption has been relatively steady, at approximately 220,000 b/d, since 2020, and we expect it to remain unchanged into 2025 (Figure 3). In 2022, 75% of the country's oil consumption was used in transportation-related activities, and 16% was used in manufacturing, construction, and non-fuel mining industries.[16] Although the transportation sector is the top crude oil consumer, 82% of new vehicles sold in Norway were electric vehicles in 2023.[17]

Table 2. Norway top 10 oil fields by production, 2023

Fields	First year of production	Operator	Location	Production (thousand barrels per day)
Johan Sverdrup	2019	Equinor	North Sea	711
Snorre	1992	Equinor	North Sea	95
Edvard Grieg	2015	Aker BP	North Sea	71
Oseberg	1988	Equinor	North Sea	35
Ivaar Assen	2016	Equinor	North Sea	26
Goliat	2017	Vår Energi	Barents Sea	26
Gudrun	2014	Equinor	North Sea	22
Martin Linge	2021	Equinor	North Sea	21
Yme	2021	Repsol Norge	North Sea	19
Solveig	2021	Aker BP	North Sea	18
Total				**1,044**

Data source: Norwegian Offshore Directorate

Figure 3. Norway petroleum and other liquids production and consumption, 1995–2025



Natural Gas

- Norway's proved natural gas reserves were 48.2 trillion cubic feet (Tcf) at the end of 2023.[18]
- Norway has steadily increased its natural gas production during the last two decades; production grew from 2.4 Tcf in 2002 to 4.4 Tcf in 2022 (a 181% increase). Natural gas consumption dropped slightly in 2022 to 0.2 Tcf—85% of 2002 levels (Figure 4).
- In March 2022, following Russia's full-scale invasion of Ukraine, the Norwegian government authorized an increase of approximately 50 Bcf in natural gas production, primarily from the Oseberg and Heidrun fields. In addition, the newly reopened Hammerfest liquefied natural gas

(LNG) facility, which processes natural gas from the Snøhvit field in the Barents Sea, was authorized to increase natural gas production by up to 247 Bcf in 2022 (Table 3).

- Gasnor is Norway's primary domestic buyer, distributor, and seller of natural gas to end users. Gasnor has LNG production and receiving facilities, where it distributes natural gas via ship and tankers.[19] Lyse Neo is Norway's largest land-based natural gas network.
- Gassco is Norway's state-owned natural gas company, which transports and processes much of Norway and Greater Europe's natural gas. Gassco owns and operates various parts of the related infrastructure, including receiving terminals, riser and compressor platforms, processing plants, and pipelines. Gassco's pipelines deliver natural gas from Norway to Europe, traversing under or around the North Sea, to the United Kingdom, Germany, France, Belgium, the Netherlands, and Denmark (Table 4 and Figure 4 and 10).[20]
- Equinor is the primary owner and operator of Hammerfest, which is located on Melkøya Island and has been serving as Europe's largest LNG plant since operations began in 2007. The liquefaction facility delivers 0.65 Bcf per day of natural gas, accounting for 5% of Norway's natural gas exports, and connects with the large offshore natural gas field Snohvit, which is located in the Barents Sea, via a 90-mile pipeline.[21] A fire in the filter housing on natural gas turbine Generator 4 in September 2020 paused operations until March 2022.[22] By 2050, Equinor plans to electrify, to lower emissions, and to make the plant more sustainable.[23]
- Norway also has two smaller LNG plants, Risavika Liquefaction Plant (RLP) and Tjeldbergodden. RLP began operating in 2010 and can produce 14.6 Bcf of LNG a year for:
    - Vessels (two pumps, each with 35 Bcf-per-hour capacity)
    - Road tankers (two 50% LNG road tanker loading pumps with 2.2 Bcf-per-hour capacity)
    - Its 989 Bcf LNG storage tank
- RLP is connected via the Rogass pipeline to Kårstø Gas Processing Plant, which is the largest natural gas processing plant in Europe. The Tjeldbergodden LNG plant is relatively small with a yearly production capacity of 576,000 cubic feet a year. [24,25]

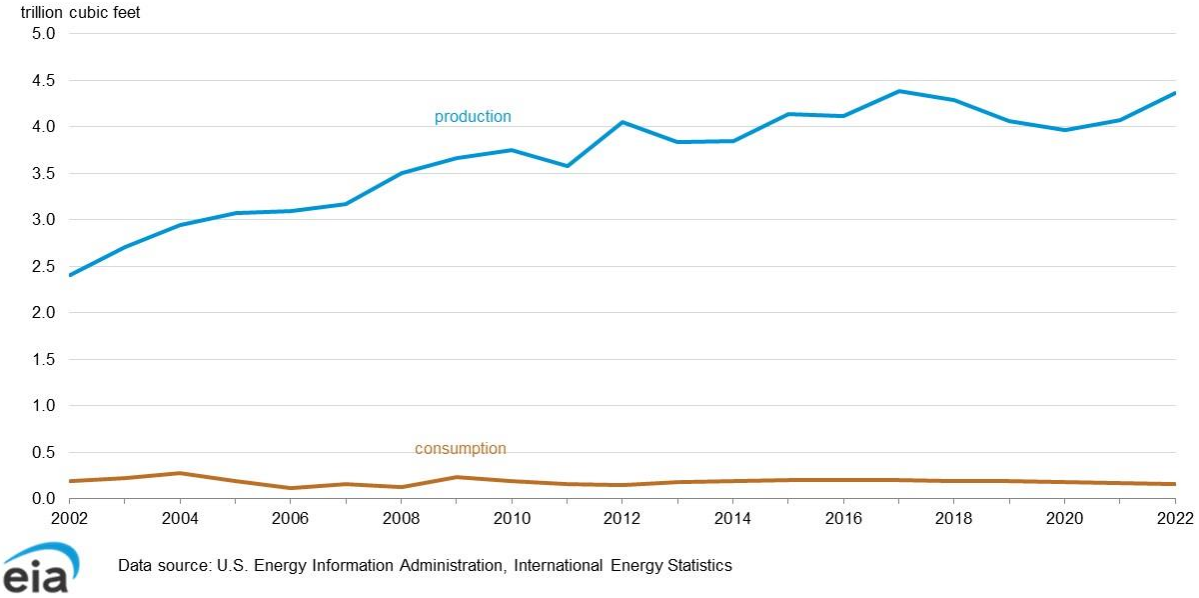
Table 3. Norway top 10 natural gas fields, 2023

Fields	First year of production	Location	Production (Tcf)
Troll	1990	Northern North Sea	1.32
Aasta Hansteen	2018	Norwegian Sea	0.25
Ormen Lange	2007	Norwegian Sea	0.24
Skarv	2013	Norwegian Sea	0.23
Oseberg	1986	Northern North Sea	0.21
Snøhvit	2007	Barents Sea	0.21
Visund	1999	Northern North Sea	0.20

Gullfaks Sør	2021	Northern North Sea	0.18
Åsgard	1999	Norwegian Sea	0.17
Tyrihans	2009	Norwegian Sea	0.11
Total			**3.11**

Data source: Norwegian Petroleum Directorate
Note: Tcf=trillion cubic feet

Figure 4. Norway dry natural gas production and consumption, 2002–2022

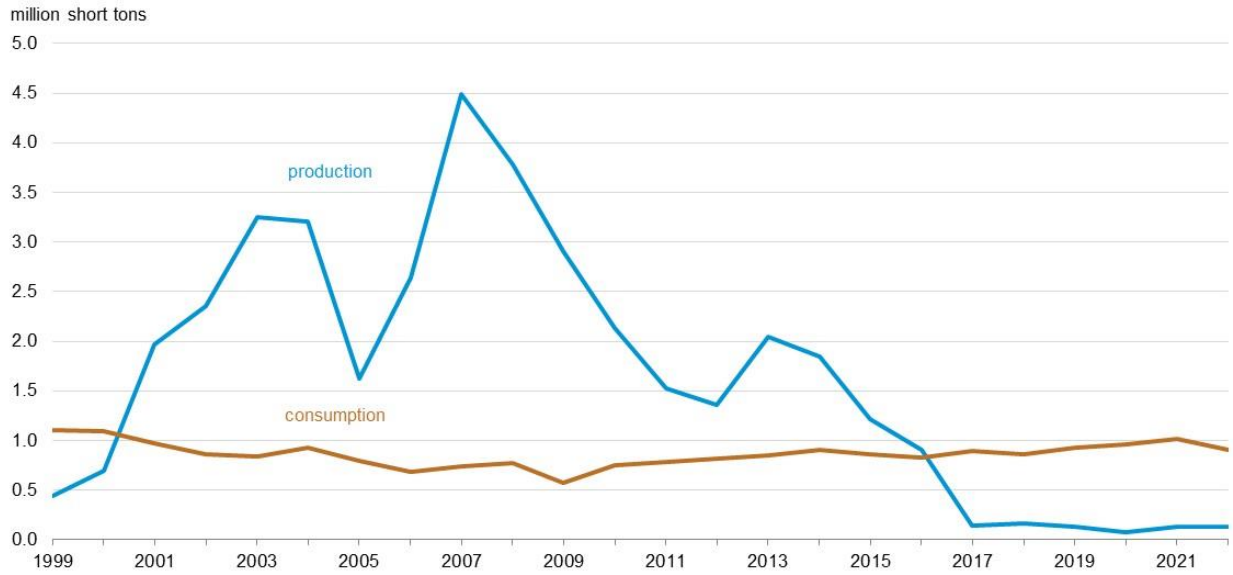


Data source: U.S. Energy Information Administration, International Energy Statistics

Coal

- Norway had 29 million short tons of coal reserves in 2022.
- Norway has largely ended most of its coal production from its peak of 4.5 million short tons in 2007. Yearly production has been approximately 100,000 short tons since 2019. Coal consumption has been relatively steady for decades and was 901,039 short tons in 2022 (Figure 5).
- Svalbard is an archipelago of Norway that is a midpoint between Norway and the North pole. Norway phased out the Svalbard Islands' coal production in 2023 when it closed Mine 7 on the main island of Spitsbergen, which was producing approximately 100,000 short tons a year in its last few years. At its peak, Norway's production in the Svalbard Islands reached several million short tons a year. Russia's production on Svalbard is scheduled to decrease from 120,000 metric ton (mt) to 40,000 mt by 2032.[26,27,28]

Figure 5. Norway coal production and consumption, 1999–2022



Data source: U.S. Energy Information Administration, International Energy Statistics

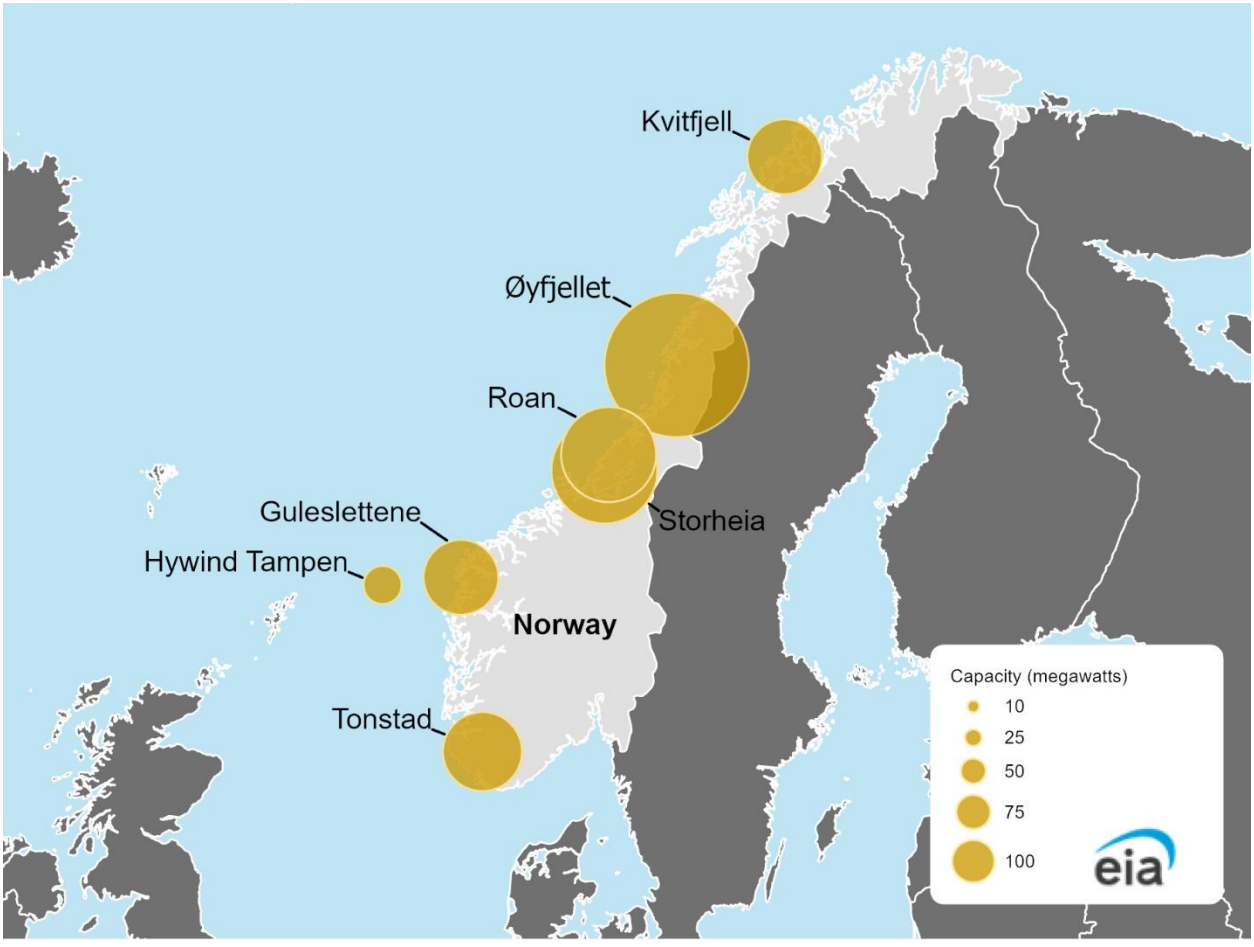
Electricity

- In 2022, Norway generated 143 terawatthours (TWh) of electric power and maintained an installed generation capacity of 41 gigawatts (GW) (Figure 7). Nearly 100% of Norway's generation is renewable; in 2022, hydroelectric generation accounted for 128 TWh of electric power, and wind was the second-largest source, generating 15 TWh (Table 1 and Figure 8). Historically, Norway, as Europe's largest hydropower producer, has predominantly used its ample supply of hydroelectric power for electricity.
- Statkraft AS is Norway's fully state-owned internationally operating hydropower company. It is Europe's largest producer of renewable energy and Norway's largest producer of hydropower and energy. Statkraft AS has major or partial ownership in most of Norway's energy generation. Hafslund, Oslo's fully owned power company, is Norway's second-largest hydropower and energy producer. Statnett is Norway's state-owned primary power grid owner, operator, and producer.
- In 2022, wind generation, at 15 TWh (10% of total generation), and wind capacity, at 5 kW (13% of total capacity), were the highest on record. Late 2022 capacity additions included Equinor's Hywind Tampen, which is the world's largest floating wind farm, at 88 MW. Hywind Tampen's 11 turbines generate a combined 8.6 MW of power to the Snorre and Gullfaks fields.[29]
- The Fosen Vind project, Europe's largest wind project (with annual production of 2.6 TWh and installed capacity of 801 MW across its five wind farms), halted operations in 2021 due to a dispute with Sami reindeer herders related to grazing rights. The dispute involved two of its farms— Roan wind farm (884 GW of annual production), and Stoheria (1.0 TWh of annual production), previously the largest individual farm in Norway and Europe now behind Øyfjellet (1.2 TWh of annual production).[30] Norway's supreme court ruled that the farms violated Sami

rights under international law and were segmented into Fosen South and Fosen North. Fosen South reached an agreement in December 2023, but Fosen North settled in March 2024. Fosen Vind sold Roan wind farm in 2021, which was part of Fosen North (Figure 6).[31,32,33,34]

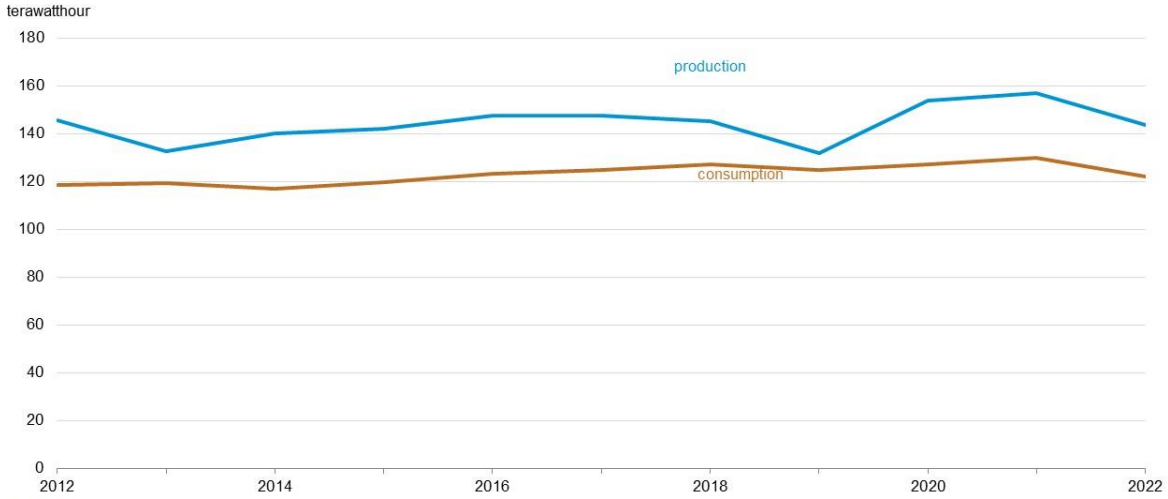
- Norway's only operating coal-fired electric power plant in Longyearbyen on Svalbard's only populated island, Spitsbergen, switched from coal to diesel for power once the coal mine in Svalbard shut down. However, Russia's coal-based power plant, also located on Svalbard, will continue operating in Barentsburg, Spitsbergen.[35]
- Norway is considering preliminary plans submitted by Norsk Kjernekraft AS for a nuclear power plant. The proposed plan would include a number of small modular reactors in the border area between Aure and Heim. The plant would produce approximately 12.5 TWh of electricity, approximately 9% of 2022 total electric power production.[36]

Figure 6. Map of Norway's major wind farms (as of August 2024)



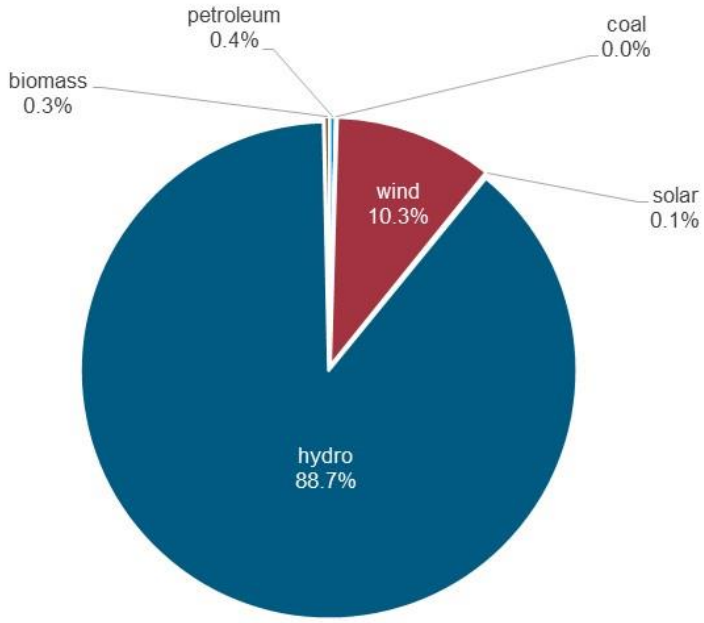
Source: U.S. Energy Information Administration

Figure 7. Norway electricity production and consumption, 2012–2022



Data source: U.S. Energy Information Administration, International Energy Statistics

Figure 8. Norway electricity generation by fuel, 2022



Data source: U.S. Energy Information Administration, International Energy Statistics
Note: Less than 0.1% of generation was from coal. Hydroelectric pumped storage decreases hydro total.

Energy Trade

- Norway is Europe's top producer and exporter of oil and natural gas. The country has large oil and natural gas reserves located primarily offshore in the North, Norwegian, and Barents Seas. Norway uses a network of undersea pipelines to ship much of its dry natural gas exports to the UK, France, Belgium, the Netherlands, and Germany, and it uses tankers to ship oil, natural gas liquids, and liquefied natural gas (LNG) primarily to Europe. Norway provides 30% of the European Union's piped and shipped natural gas.[37] Norway's piped natural gas has recently entered Denmark's pipeline grid via the commissioned Baltic Pipe project to Poland, deriving from the Europipe II. Denmark imported 7% of Norway's natural gas in 2023.[38] Natural gas has outpaced oil as the top energy export from Norway (Figure 11, Figure 13, and Table 4).
- Norway's petroleum and other liquids exports have increased correspondingly with increased production. Exports rose from 1.2 million b/d in 2013 to 1.6 million b/d in 2023 (Figure 9). The UK received the largest portion of those exports at 28%, followed by Poland and the Netherlands at 15% each in 2023 (Figure 12).
- Norway's natural gas exports slightly fell in 2023 to 4,353.9 Bcf from 4,391.0 Bcf in 2022 due to lower production. Although LNG exports increased from 107.8 Bcf to 206.9 Bcf (Figure 10) from 2022 to 2023, this increase was more than offset by the decline in pipeline exports, which fell from 4,283.1 Bcf to 4,147.0 Bcf over the same period.
- Norway is a net exporter of petroleum products, with 64,600 b/d of exports and 45,500 b/d of imports in 2023. However, net exports of 13,000 b/d in 2022 and 19,100 b/d in 2023 are the lowest since 1989.[39]
- Norway imports a relatively small amount of coal at 571,800 short tons in 2023, although it has been growing to compensate for lower domestic coal production. Norway exported only about 1,000 short tons in 2023 (Figure 15).
- In 2023, Norway exported 31.0 TWh of electricity and imported 13.2 TWh of electricity which was related to its low electricity prices and two new interconnector additions: NordLink with UK and North Sea Link with Germany in 2021.
- Norway has five international interconnectors: North Sea Link with UK (1,400 MW); NordLink with Germany (1,400 MW), which was the longest subsea electrical interconnector in the world; NorNed with the Netherlands (700 MW); Skagerrak with Denmark (1,632 MW); and Boris Gleb with Russia (50 MW).[40]
- Even with multiple interconnectors, Norway's electricity exports are limited by its interconnector capacity and have sometimes been limited by the effect of low water levels on their hydropower-dominated electricity supply. Also, Norway's grid and interconnectors use direct current (DC), which makes Norway's electricity supply unsuitable for immediate response to frequency deviations in greater Europe, which uses alternating currency (AC).[41]

Table 4. Norway gas pipelines, 2024

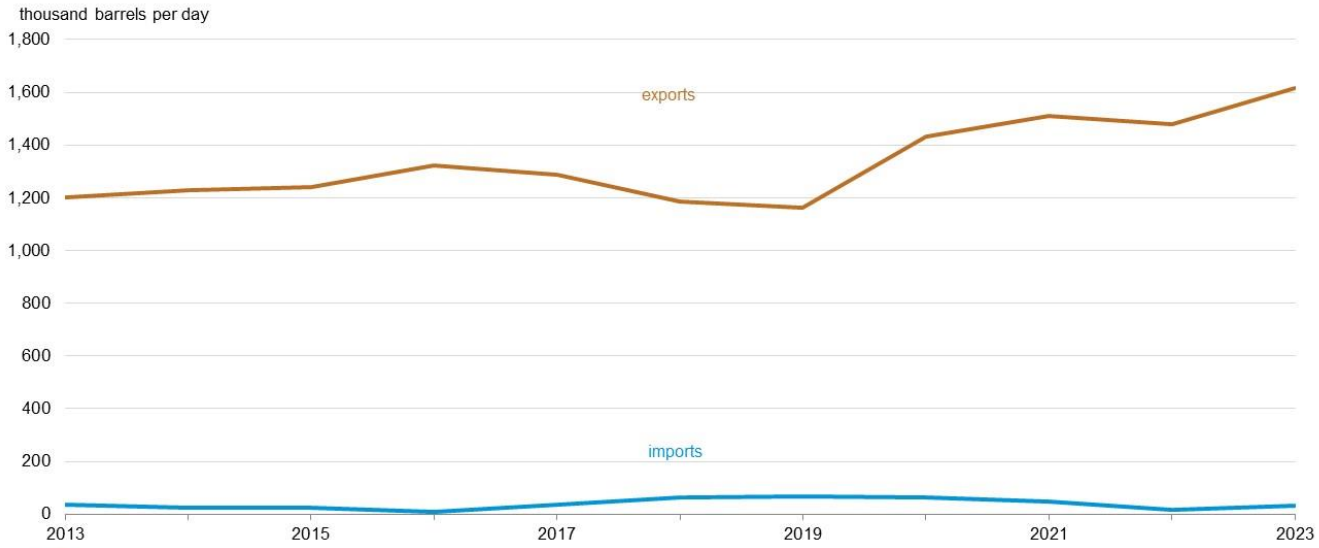
Pipeline	Start date	Operator	From	To	Length (miles)	Diameter (inches)	Capacity (billion cubic feet per day)	Details
Valemon Rich natural gas pipeline	2015	Gassco (Equinor)	Northern North Sea (Valemon field)	Central North Sea (Heimdal riser)	110	22	0.5	It is in the process of being decommissioned by 2028. Valemon gas will now be transported to Kvitebjørn and then to Kollsnes for further processing.[42]
Gjøa gas pipe	2010	Gassco	North Sea (Gjøa field)	UK (Flags pipeline system)	81	28	0.6	The gas from Gjøa field continues through the Flags system to St. Fergus terminal in Scotland.
Franpipe	1998	Gassco	North Sea (Draupner E platform)	France (Dunkirk)	522	42	1.9	Franpipe connects the Draupner E platform in the North Sea to Dunkirk in northern France
Flags pipeline system	1982	Shell	North Sea (Tampen Link)	UK (St. Fergus, Scotland)	280	36	1.2	Flags exports natural gas from the Tampen Link to the UK continental shelf and to St. Fergus in Scotland.
Europipe	1995	Gassco	Norwegian Sea (Draupner E platform)	Germany (Dornum Europipe Receiving Facilities (ERF))	385	40	2.5	The final section of the Europipe goes through a tunnel under the protected Wattenmeer wetlands.
Europipe II	1999	Gassco	Kårstø processing plant	Germany (Dornum Europipe Receiving Facilities (ERF))	409	42	1.6	
Baltic Pipe	2022	Gaz-System	Denmark (Europipe II)	Poland	76/43	39	1.0	The pipeline played a key role in mitigating the energy crisis in Europe. [43]
Zeepipe	1993	Gassco (Equinor)	Kollsnes processing plant	Belgian (Zeebrugge terminal)	19/506	40	2.6	The Zeepipe system transports natural gas from the Troll field to Europe.
Zeepipe II A	1996	Gassco (Equinor)			186	40	2.6	
Zeepipe II B	1997	Gassco			186	40	1.9/1.5	
Vesterled (Frigg	1976	Gassco	North Sea (Heimdal	UK (St. Fergus, Scotland)	224	32	1.3	Vesterled transports natural gas from fields

Norwegian Pipeline)			riser platform)					connected to the Heimdal riser platform to Scotland.
Kvitebjørn Pipeline	2004	Gassco (Equinor)	North Sea (Kvitebjørn field)	Kollsnes processing plant and some processed at the fractional plant in Mongstad Refinery	91	30	0.9	The condensate from the Kvitebjørn field is processed at the Mongstad refinery.
Tampen link	2010	Gassco (Equinor)	North Sea (Norway gas transport system)	UK (Flags pipeline system)	14	32	0.9	Tampen link is in proximity and name with the world's first floating wind farm Hywind Tampen.
Statpipe	1985	Gassco (Equinor)	Statfjord and Gullfaks fields, via the Kårstø processing plant north of Stavanger, the Draupner S platform and Norpipe	Germany (Emden)	142/126/96	28/36/36	0.8/1.6/1.1	The first pipeline to cross the Norwegian Trench has been approved to operate into 2050.[44]
Polarled	2018	Gassco	Norwegian Sea (Aasta Hansteen field)	Onshore Norway (Nyhamna processing plant)	300	36	0.9	Polarled carries natural gas for processing at Nyhamna processing plant.
Ormen Lange	2007	Shell	Norwegian Sea (Ormen Lange field)	Onshore Norway (Nyhamna processing plant)	75	30	NA	Ormen Lange carries natural gas for processing at Nyhamna processing plant.
Oseberg gas transport (OGT)		Gassco (Equinor)	North Sea (Oseberg field)	Heimdal riser platform to Vesterland and Statpipe/Norpipe	68	36	1.2	Increased flows were approved to supply natural gas to Europe.[45]
Norpipe	1977	Gassco	North Sea (Ekofisk field)	Germany	273	36	1.6	The Teeside oil terminal in the UK is also fed by Norpipe's oil and natural gas liquids.
Norne Gas Transport	2001	Gassco (Equinor)	Norwegian Sea (Norne field)	Kårstø terminal via Åsgard Transport pipeline	80	16	0.2	The connected Norne field is in its decline stage.[46]
Langeled South	2006	Gassco (Equinor)	Nyhamna processing plant	UK (Easington terminal)	325	44	2.5	The world's longest underwater natural gas pipeline exports gas from the Ormen Lange field to the UK.
Langeled North	2007	Gassco (Equinor)			390	42	2.6	

Haltenpipe	1996	Gassco (Equinor)	Norwegian Sea (Heidrun field)	Onshore Norway (Tjeldbergodden processing plant)	155	16	0.2	Haltenpipe connects to Europe's largest methanol plant Tjeldergodden.

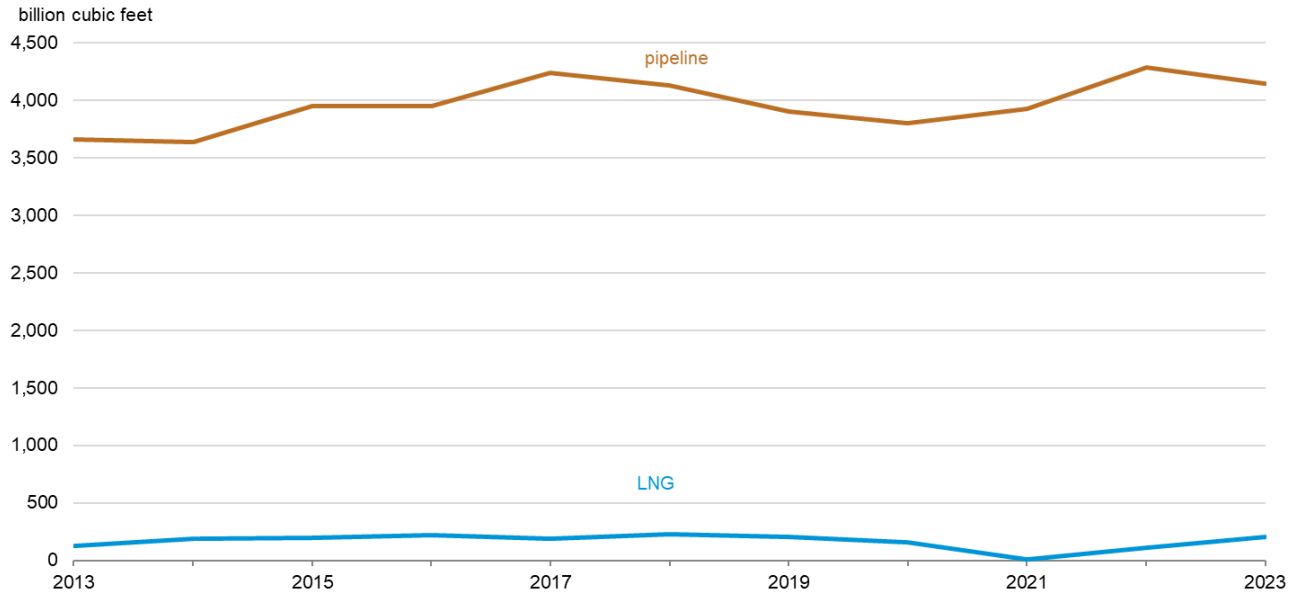
Data source: Gassco

Figure 9. Norway petroleum and other liquids imports and exports, 2013–2023



Data source: Statistics Norway and U.S. Energy Information Administration, International Energy Statistics

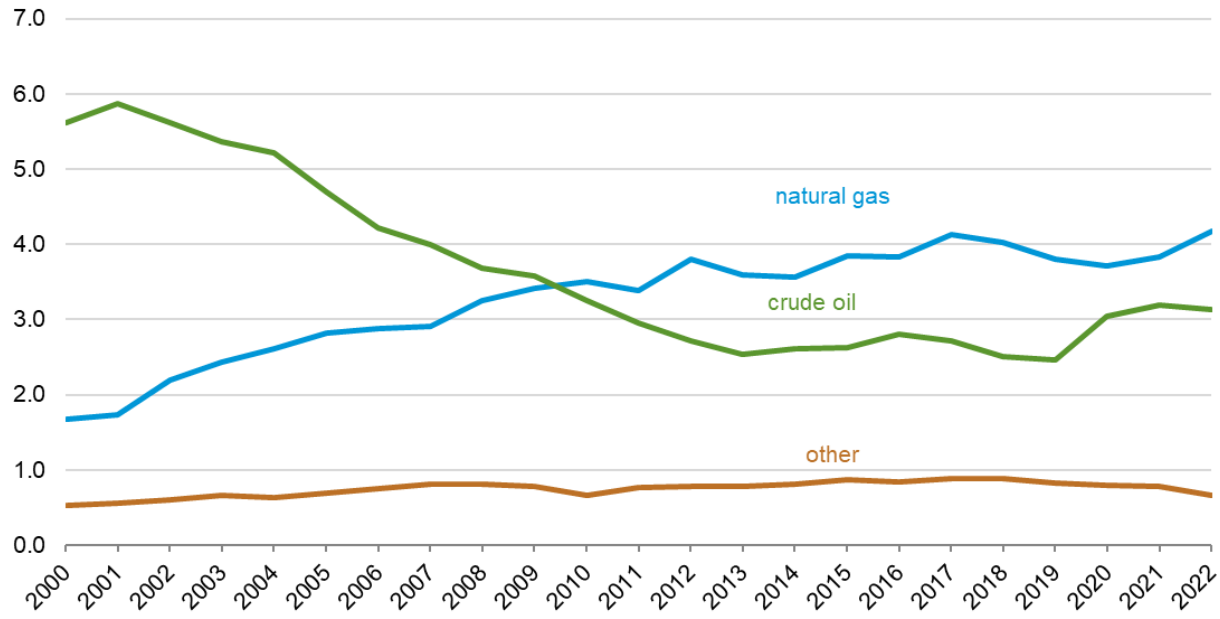
Figure 10. Norway liquified natural gas (LNG) and pipeline natural gas exports, 2013–2023



Data source: Statistics Norway and U.S. Energy Information Administration, International Energy Statistics
Note: The 2023 values are preliminary estimates.

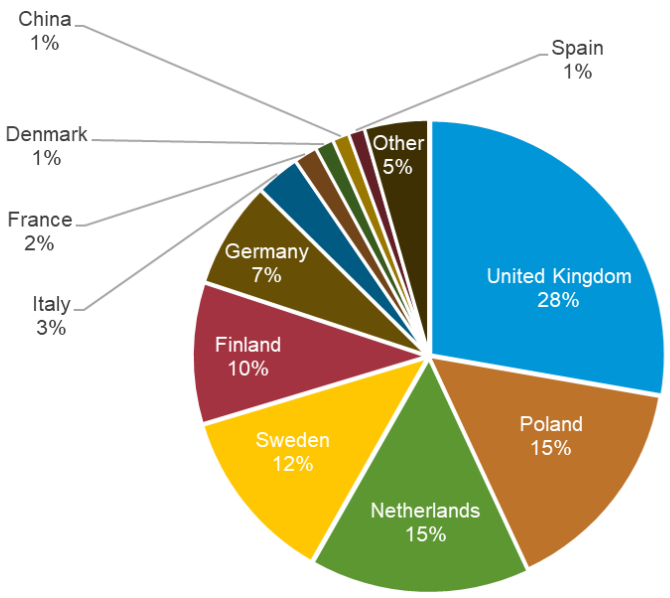
Figure 11. Norway exports by energy source, 2000–2022

quadrillion British thermal units



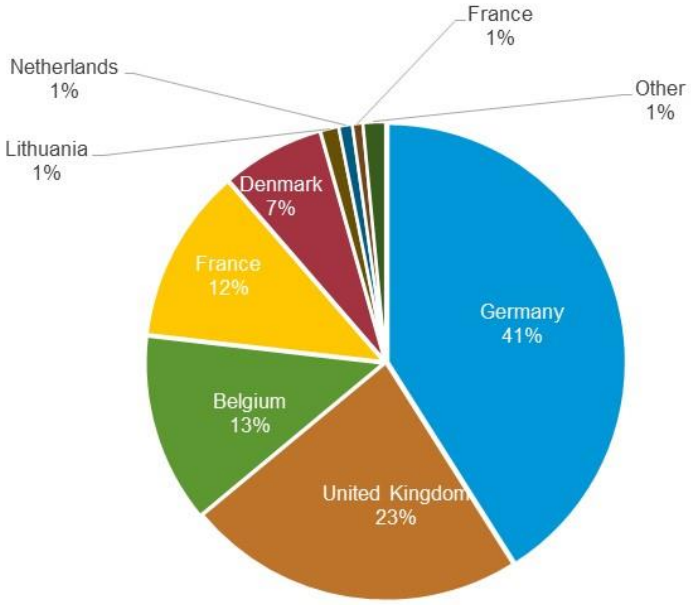
Data source: Statistics Norway

Figure 12. Norway oil exports by destination, 2023



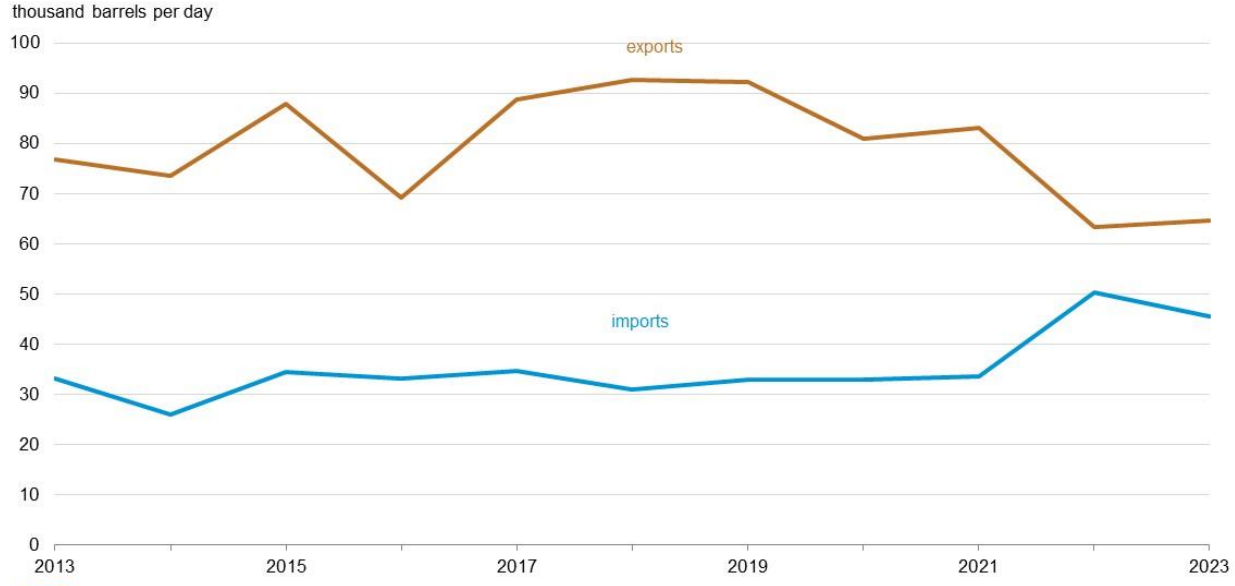
Data source: Statistics Norway

Figure 13. Norway natural gas exports by destination, 2023



Data source: Statistics Norway

Figure 14. Norway petroleum products imports and exports, 2013–2023



Data source: Statistics Norway

Figure 15. Norway coal imports, 2013–2023

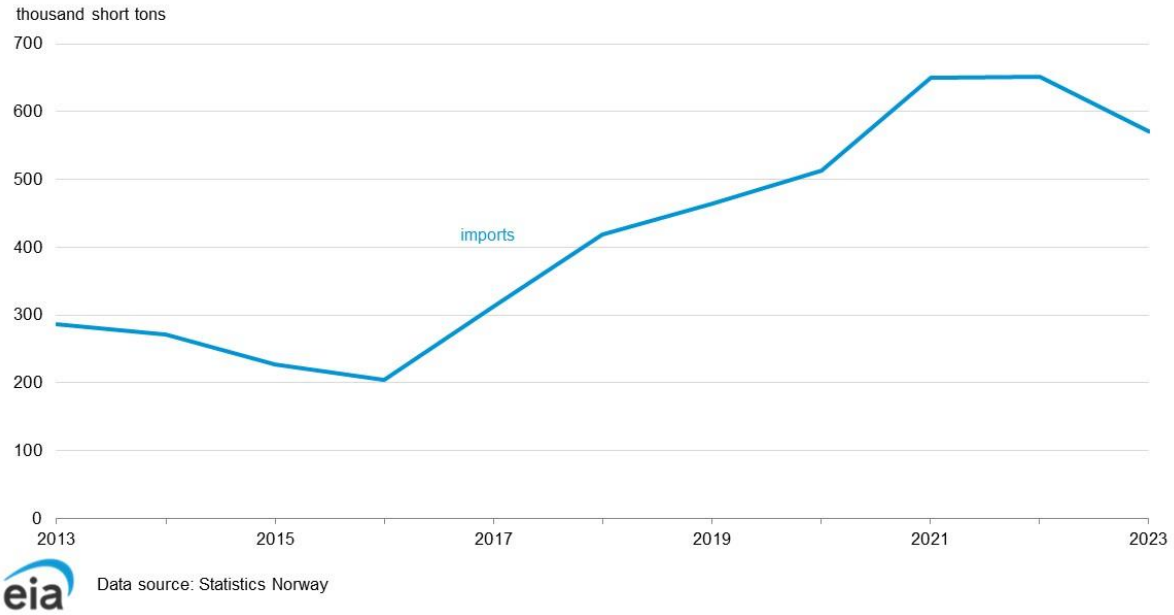
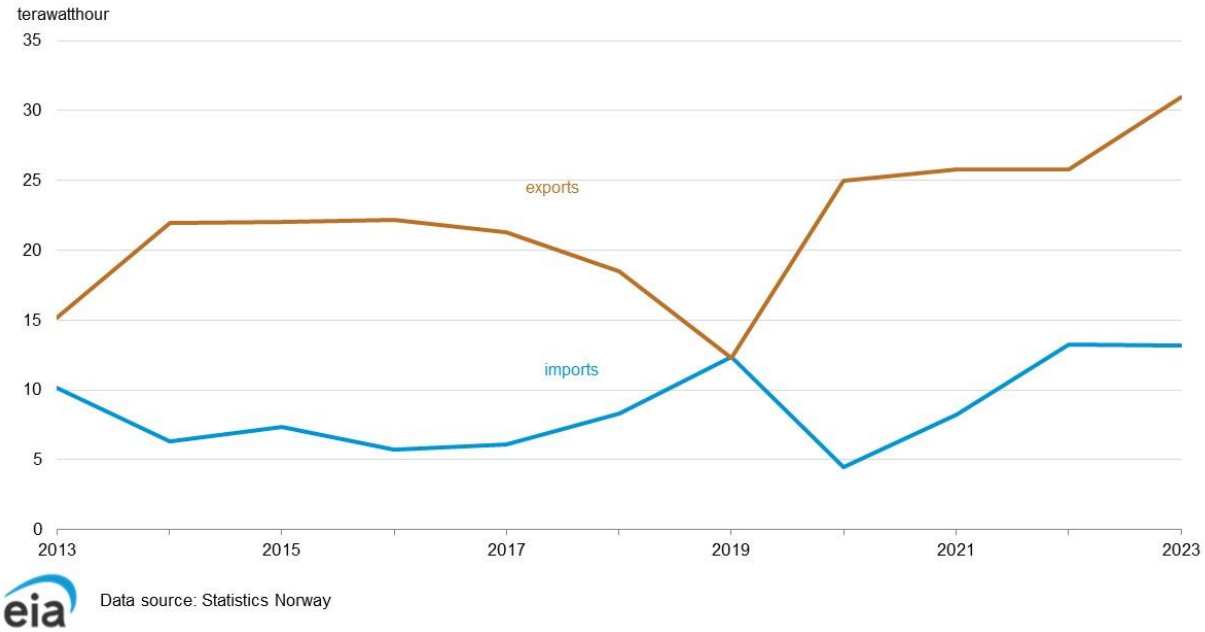


Figure 16. Norway electricity imports and exports, 2013–2023



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