



**Institute for Energy Economics
and Financial Analysis**

France's LNG Paradox

Infrastructure Buildout Continues Despite Falling Gas Consumption

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Key Findings

Despite France's gas consumption plummeting to a ten-year low in August 2023, the country continues expanding its LNG infrastructure.

Russia is the second-largest supplier of LNG imports to France, even though the country wants to break its dependency on Russian gas.

Russian LNG from the Yamal plant continues to be transhipped at France's Montoir-de-Bretagne LNG terminal and sent to other markets.

As the utilisation rate of France's LNG terminals is not growing as expected, this raises the question of why the country is expanding its import capacity.



Executive Summary

With the intention of curbing Russian gas deliveries following last year's invasion of Ukraine, France and other European countries have slashed consumption of the fossil fuel while investing in infrastructure to import new supplies from alternative sources. Although France could be reducing imports of Russian gas via pipeline, surprisingly it has continuously been importing Russian liquified natural gas (LNG).

France paid about €32 billion for imported LNG in 2022, a record high, according to Eurostat. The largest amounts were paid to the U.S. (€16.0 billion), Russia (€5.4 billion), Qatar (€3.2 billion), Algeria (€2.4 billion), Angola (€1.4 billion) and Norway (€1.2 billion).

Not only has France been importing Russian LNG, it has been allowing transshipments of Russian LNG destined for other markets. 1.68 billion cubic metres (bcm) of LNG from Russia's Yamal plant was transshipped at France's Montoir-de-Bretagne LNG terminal in 2022 and 0.89 bcm between January and July 2023.

France's plans to expand its gas infrastructure continue, with the country contemplating increasing the capacity of operational LNG terminals and boosting the capacity and modifying the flow direction of some international gas pipelines.

While France continues investing in gas and LNG infrastructure, its gas use keeps falling. GRTgaz reported a 9% drop in gas consumption in 2022 thanks to milder weather, higher prices and lower household consumption. Gas use in the first half of 2023 was lower than the same period of the preceding two years. Based on Eurostat data, gas consumption in August 2023 plummeted to a ten-year low, to 1.351 bcm, below consumption in August 2021 (1.357 bcm) when economic output was impacted by COVID.

France exports gas to neighbouring countries, and the volumes and direction of flows are seasonal. Among those countries are Spain, Switzerland, Italy, Belgium, the Netherlands, Luxembourg and Germany since 2022. In recent months, France has been exporting more gas to Switzerland and Italy, but the flows have balanced with increased imports from Spain.

The utilisation rate of France's LNG terminals has been lower in 2023 compared to last year. If demand keeps falling, will there be a need for its new LNG terminal?

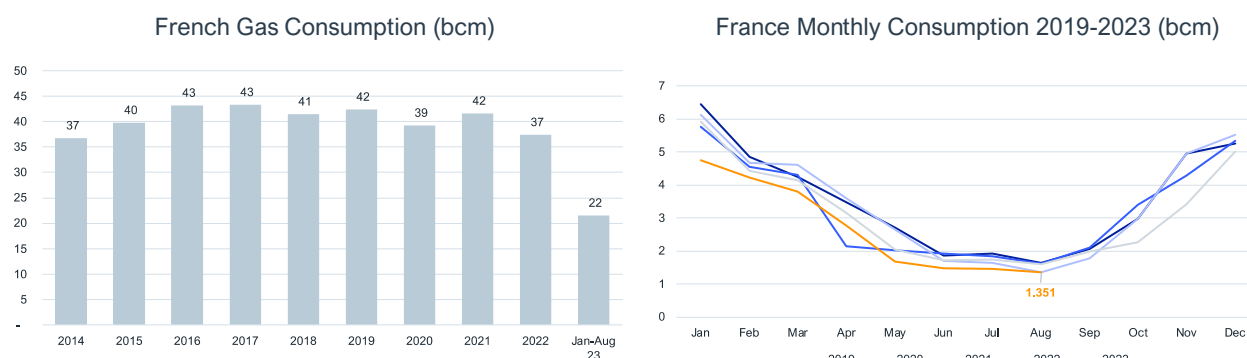
I. France Expands LNG Infrastructure Despite Decreasing Utilisation Rates

A. Evolution of Gas Consumption

After peaking at 49.6 bcm in 2010, annual French natural gas consumption has been fluctuating between 37-43 bcm over the last ten years.¹

GRTgaz reported a 9% fall in gas consumption in 2022 thanks to milder weather, higher prices and lower consumer demand due to energy efficiency plans, partly offset by increased consumption by gas-fired power plants.² Gas use in the first half of 2023 was lower than the same period of the preceding two years. Based on Eurostat data, gas consumption in August 2023 plummeted to 1.351 bcm—a ten-year low and below consumption in August 2021 (1.357 bcm) when economic output was impacted by COVID.

Figure 1: French Gas Consumption (bcm)



Source: Eurostat.

¹ Statista. [Natural gas consumption in France from 2005 to 2022](#). June 2023.

² GRTgaz. [Gas overview 2022](#).

B. French Gas Network

The French gas system³ consists of a principal network, including all of the high-pressure, wide-gauge pipelines linking interconnectors with neighbouring countries, 14 underground storage facilities and five LNG terminals in operation. The regional network and the largest industrial gas consumers are connected directly to the principal network.

There are two natural gas transmission system operators (TSOs) in France:

- GRTgaz, a subsidiary of Engie, operates the low-calorific-value gas (L-gas) network in the north of the country and the majority of the high-calorific-value gas (H-gas) network. With more than 32,500 km of high-pressure pipelines in France, GRTgaz is linked to the Norwegian, Belgian, German, Spanish (via the Teréga network), Swiss and Italian (via Switzerland) networks, as well as 14 underground storage units and five LNG terminals located on the French seaboard.⁴
- TIGF (now Teréga), a subsidiary of a consortium that includes SNAM, C31, GIC and Predica, operates the H-gas network in the southwest. Teréga's network extends over 15 departments in the southwest of France and comprises 5,100 km of pipelines and two storage sites.⁵

The Hauts-de-France region has mainly received L-gas from Groningen, a gas field in the northeastern part of the Netherlands. This field has been a major gas provider for much of Western Europe since production started in 1963, but due to earthquakes that it has caused, officials have been under pressure to close it.⁶ GRTGaz intends to entirely convert all distribution and transmission infrastructure to accept H-gas.⁷ France's L-gas distribution is geographically separated into 20 districts, all with arterial H-gas connections in close proximity.

³ French Energy Regulatory Commission. [Natural gas networks](#). April 2019.

⁴ GRTgaz. [GRTgaz in brief](#).

⁵ Teréga. [How big is Teréga's pipe network?](#)

⁶ Offshore Technology. [Dutch Government to permanently shut Groningen gas field](#). June 2023.

⁷ S&P Global Platts. [The future of European gas after Groningen](#). February 2020.

Figure 2: French Natural Gas Network Map



Source: French Energy Regulatory Commission. *Natural gas networks*. April 2019.

France is connected by pipeline with Norway, Belgium, Germany and Switzerland via the GRTgaz network and with Spain via the Teréga network.⁸ France and Italy are connected through the Swiss network.

⁸ GRTgaz. [GRTgaz in brief](#).

Table 1: Gas Pipelines

Interconnection Point	Interconnection Country	Operator 1	Operator 2	Technical Physical Capacity	
				Gigawatt-hours per day	Direction
Blaregnies L (BE)/Taisnières B (FR)	Belgium	Fluxys Belgium L-Zone	GRTgaz	230.0	Belgium to France
Obergailbach (FR)/Medelsheim (DE)	Germany	Open Grid Europe / GRTgaz Deutschland	GRTgaz	613.7	Germany to France
Oltingue (FR)/Roddersdorf (CH)	Switzerland	FluxSwiss / Swissgas	GRTgaz	100.0	France to Germany
				233.0	France to Switzerland
VIP Pirineos	Spain	Enagas	Teréga	224.4	Spain to France
				164.6	France to Spain
Virtualys*	Belgium	Fluxys Belgium	GRTgaz	640.0	Belgium to France
Dunkerque	Norway	Gassco	GRTgaz	270.0	France to Belgium
				570.0	Norway to France

Source: *European Network of Transmission System Operators for Gas (ENTSOG)*.

Note: Virtualys combines all physical interconnection points for high-calorific gas between France and Belgium: Alveringem, Blaregnies Troll and Blaregnies Segeo for Fluxys; Alveringem and Taisnières H for GRTgaz.⁹

The French and Iberian markets are interconnected thanks to two gas pipelines crossing the border at Larrau and Biriadou (France)/Irun (Spain).¹⁰ The two pipelines have an exchange capacity of about 7 bcm per year and were merged in 2014 into one single virtual point known as virtual interconnection point (VIP) Pirineos.

On 1 December 2017, Fluxys Belgium and GRTgaz introduced Virtualys, a single virtual interconnection point between the Belgian Zeebrugge Trading Point and French Point d'Échange de Gaz Nord gas trading places, with a view to facilitate cross-border trading.¹¹ This node combines all physical interconnection points for H-gas between France and Belgium: Alveringem, Blaregnies Troll and Blaregnies Segeo for Fluxys and Alveringem and Taisnières H for GRTgaz.

In October 2022, France started sending natural gas to Germany.¹² Initial volumes of gas equivalent to around 31 gigawatt-hours per day (GWh/day) (1.2 bcm/year) began flowing, potentially rising to as much as 100 GWh/day (3.7 bcm/year) at a later date with the lifting of all logistical constraints.¹³

C. Planned New Capacity

France has five operational LNG terminals and one planned expansion. The Fos Cavaou terminal recently expanded its regasification capacity by 1.5 bcm, achieved through technical and regulatory debottlenecking.¹⁴ Its expansion is detailed in the table below. A new floating storage regasification unit (FSRU) in Le Havre has now started commercial operations.

⁹ Fluxys. [Fluxys Belgium and GRTgaz to launch first virtual interconnection point in Northwest Europe](#). November 2017.

¹⁰ European Commission. [Integration of the Iberian Peninsula into the internal energy market](#). July 2018.

¹¹ Offshore Energy. [Fluxys Belgium, GRTgaz launch virtual interconnection point](#). November 2017.

¹² Enerdata. [France starts sending gas to Germany at a volume equivalent to 1.2 bcm/year](#). October 2022.

¹³ Ibid.

¹⁴ LNG Prime. [Engie's unit books long-term capacity at France's Fos Cavaou LNG terminal](#). November 2022.

Table 2: LNG Terminals

LNG Terminal	Status	Investment	Start-up Year	Type	Operator	Capacity (bcm)	LNG Storage Capacity (m3 LNG)	Number of Tanks	Third-party Access (TPA) Regime
Fos-Tonkin	Operational	Existing	1972	Large onshore	Elengy	1.50	80,000	1	Regulated
Montoir-de-Bretagne		Existing	1980	Large onshore	Elengy	10.00	360,000	3	Regulated
Fos Cavaou		Existing	2010	Large onshore	Fosmax LNG	8.50	330,000	3	Regulated
Dunkerque		Existing	2016	Large onshore	Dunkerque LNG	13.00	600,000	3	Exempted
Fos Cavaou		Expansion	2023	Large onshore	Fosmax LNG	1.50			Regulated
Le Havre		Existing	2023	FSRU	TotalEnergies LNG Services France (TELSF)	5.00			Exemption requested
Fos Cavaou	Planned	Expansion	2030	Large onshore	Fosmax LNG	2.00			Regulated

Source: Gas Infrastructure Europe (GIE), IEEFA research.

With the drop in Russian gas deliveries to Europe following last year's invasion of Ukraine, TotalEnergies LNG Services France (TELSF), a subsidiary of TotalEnergies, planned the commissioning of an LNG FSRU called Cape Ann in Le Havre.¹⁵ This terminal has a regasification capacity of 5 bcm per year (with a peak capacity of 7.5 bcm) and 142,750 cubic metres of LNG storage capacity. Cape Ann FSRU arrived at the port of Le Havre on 18 September 2023, according to several reports,¹⁶ and is expected to be in operation for five years.

TELSF has asked the French Energy Regulatory Commission for a 50% exemption from the provisions concerning third-party access (TPA) to infrastructure and tariff regulation for five years from the start of commercial operation of the FSRU. TELSf plans to book 50% of the terminal's capacity, and the remaining 50% will be commercialised and offered to third parties, thus regulated. TELSf estimates that Russian gas imports to France before 2022 will be substituted by TotalEnergies Gas & Power Limited's booking of 50% of the capacity.

Lloyd's List reported in 2007 that this project has an overall cost of €600 million.¹⁷

Three out of five operational LNG terminals in France are functioning on the basis of full TPA.¹⁸ While the majority of the LNG terminals in Europe are regulated, six are exempted—in the UK, France, Italy and the Netherlands—meaning they can negotiate contracts directly with customers. Following a ministerial order on 18 February 2010, the Dunkerque LNG terminal is exempted from regulated TPA and tariff regulation for all regasification capacities for 20 years from its commissioning date.

¹⁵ French Energy Regulatory Commission. [Exemption request file for the Le Havre floating storage and regasification unit \(FSRU\)](#).

¹⁶ LNG Prime. [TotalEnergies: FSRU arrives in Le Havre, first gas supplies to grid expected in September](#). 19 September 2023.

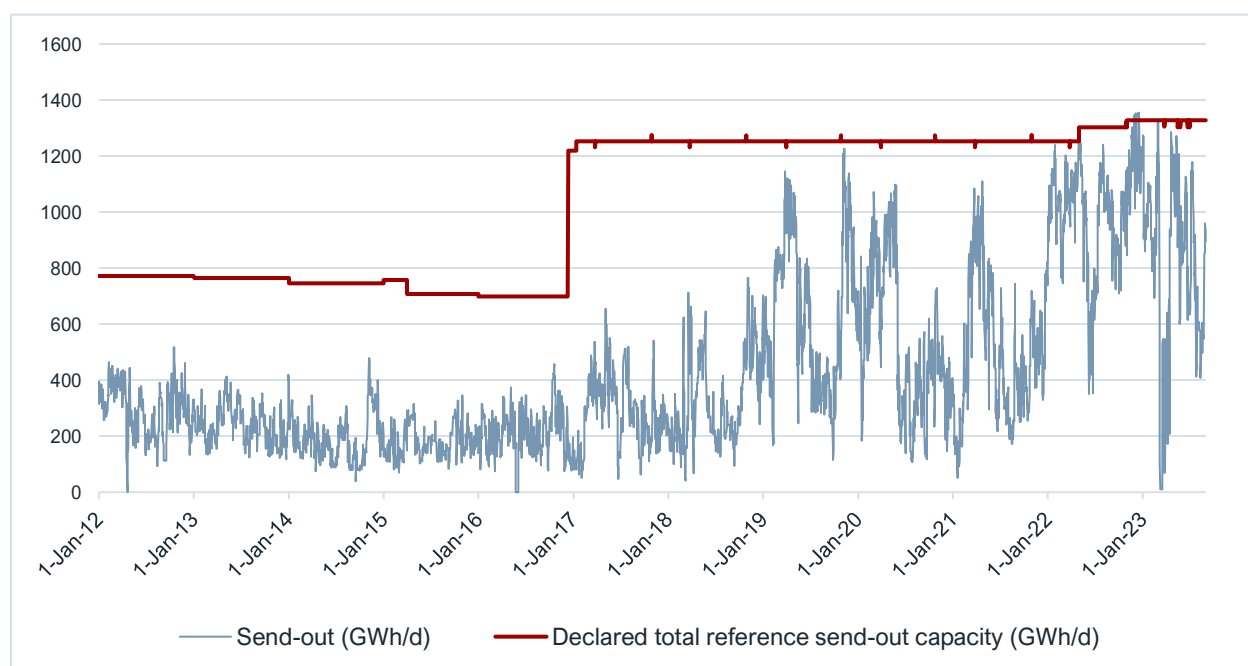
¹⁷ Lloyd's List. [Le Havre €600m LNG facility](#). June 2007.

¹⁸ Trinomics. [Gas market upgrading and modernisation – Regulatory framework for LNG terminal](#).

D. Utilisation Rates at French LNG Terminals Have Dropped in 2023

Since the Le Havre terminal has now started commercial operations, it is crucial to understand how the four other terminals are operating. The utilisation rate of each terminal varies depending on the weather and demand for power generation, among other factors. Due to industrial action, the terminals were closed for several days in March and April 2023. In addition, maintenance and renovation works at LNG carrier terminals have affected available send-out flow rates.¹⁹

Figure 3: French LNG Terminals' Nominal Capacities and Regasification Volumes 2012-2023

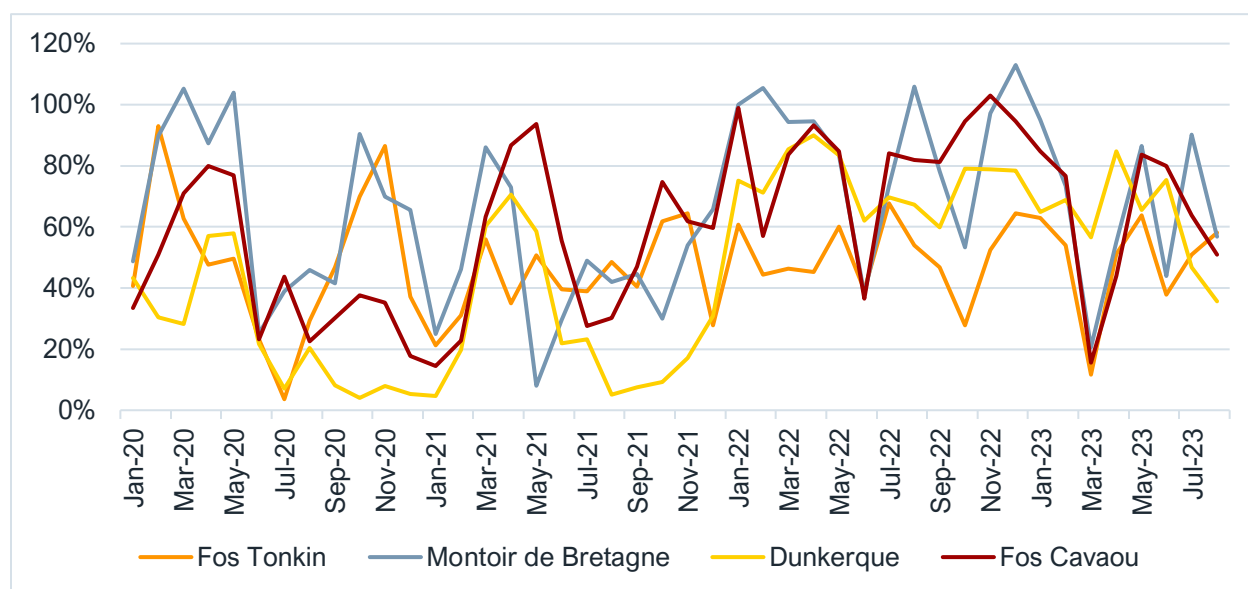


Source: GIE.

The average utilisation rate of the LNG terminals varies. In 2022, Montoir-de-Bretagne had the highest average utilisation rate (86%), followed by Fos Cavaou (83%), Dunkerque (75%) and Fos Tonkin (51%).

These figures have been falling this year: Between January and August 2023, Fos Tonkin's average utilisation rate was 49%, while Fos Cavaou (which increased capacity in 2022) and Dunkerque (the terminal with the highest capacity) both had 62% and Montoir-de-Bretagne 65%. If these numbers continue dropping, what will the utilisation rate be at the new Le Havre terminal?

¹⁹ Elengy. [Works and maintenance works schedule.](#)

Figure 4: French LNG Terminals' Monthly Average Utilisation Rates (%)

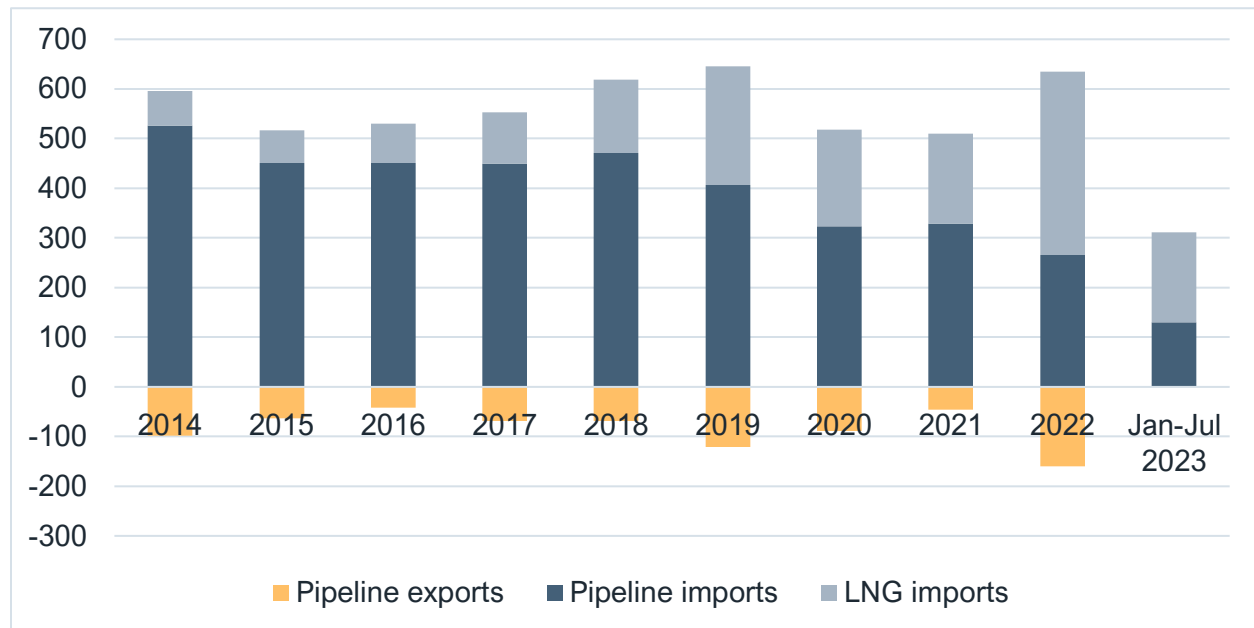
Source: GIE.

II. French LNG Flows Exceed Pipeline Imports

France's gas demand has been supplied by imports via pipelines and LNG as well as indigenous production. Imported gas and LNG volumes reached a record high of 646 terawatt-hours (TWh) per year in 2019, followed by 635 TWh/year in 2022.

Historically, imports were mainly via pipeline, reaching 526 TWh/year in 2014. By 2022, pipeline imports had halved to 266 TWh/year.

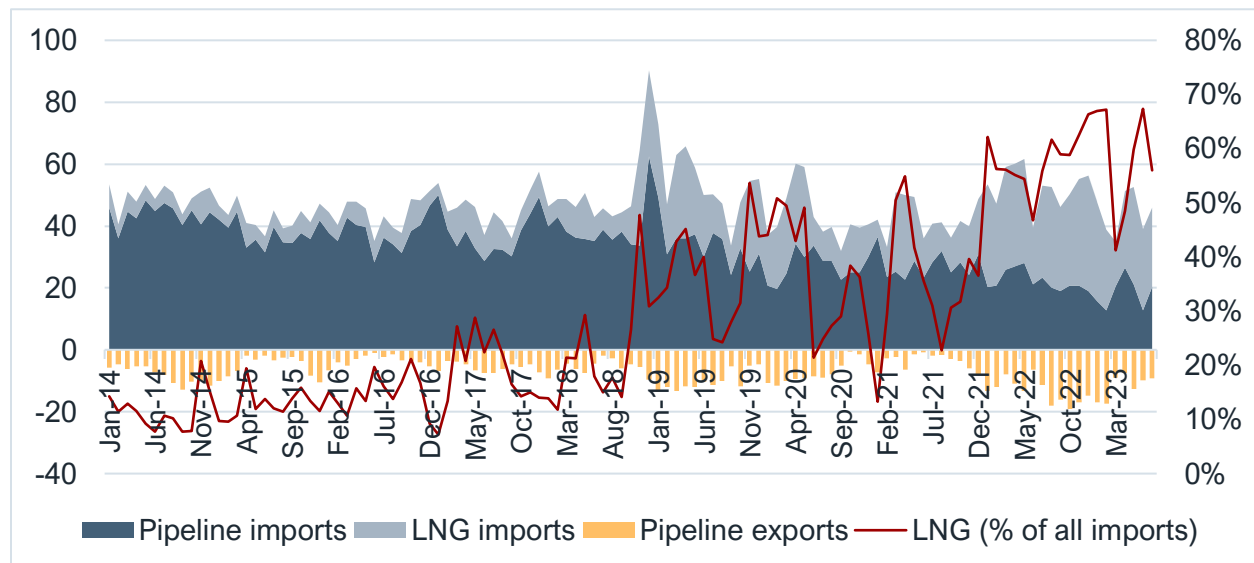
Figure 5: French Gas and LNG Imports Versus Gas Exports (TWh/Year)



Source: ENTSOG.

After the Dunkerque LNG terminal started commercial operation in 2016, France's LNG imports greatly increased, and LNG imports as a percentage of all gas imports changed dramatically from about 17% in November 2016 to 48% in November 2018.

Figure 6: French Gas Imports and Exports (TWh/Month)



Source: ENTSOG.

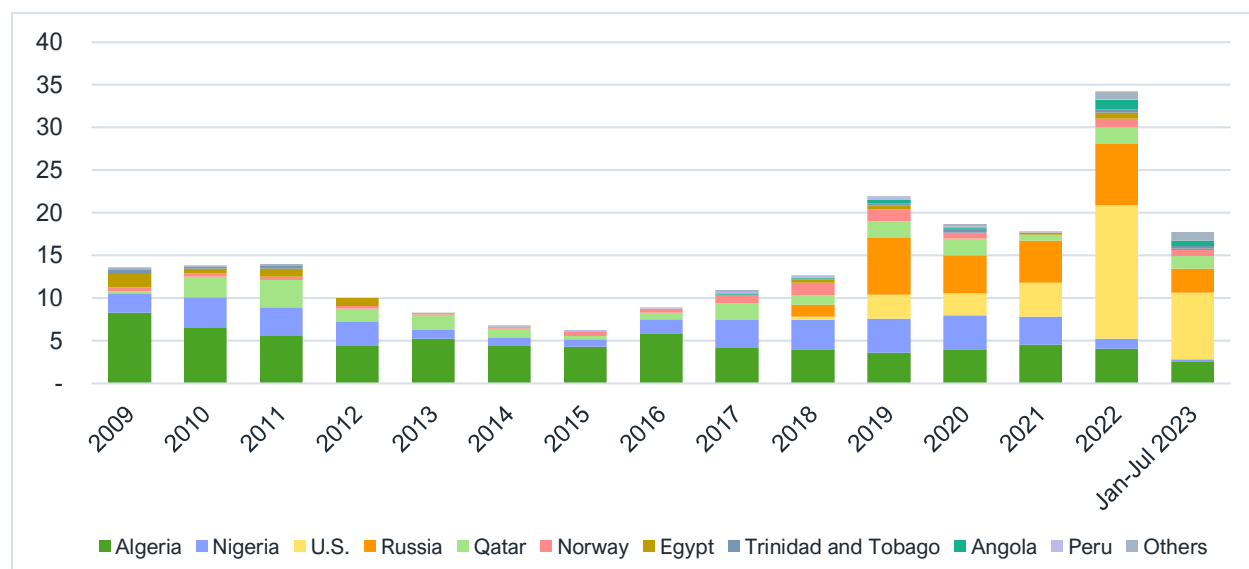
A. Russia Is the Second-largest Exporter of LNG to France After the U.S.

The U.S., Russia, Algeria and Qatar are the top exporters of LNG to France.

According to Kpler, France imported 34.25 bcm of LNG from 16 different countries in 2022: The U.S. (accounting for 45.5%), Russia (21.0%), Algeria (12.0%), Qatar (5.7%), Nigeria (3.4%), Angola (3.2%), Norway (3.0%), Egypt (2.0%), Trinidad and Tobago (1.3%), Peru (0.3%) and the remaining 2.7% from Cameroon, Yemen, Spain, Oman, Indonesia and the United Arab Emirates.

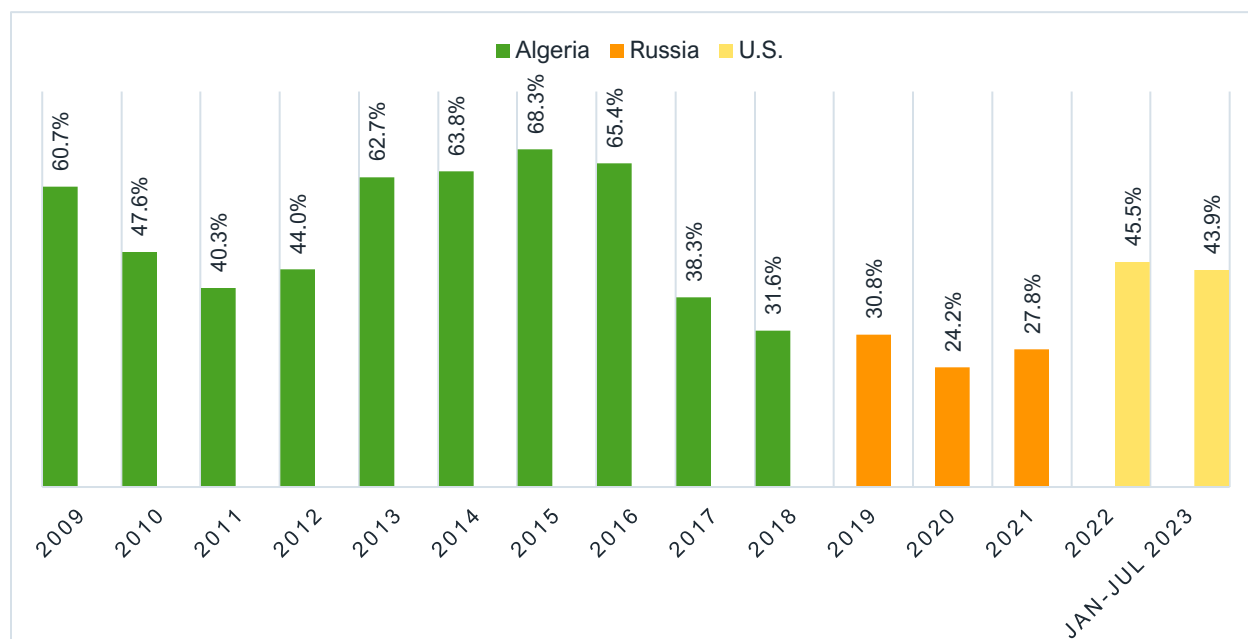
From January to July 2023, Russia remained the second-largest exporter of LNG to France: 43.9% of LNG imports came from the U.S., followed by 15.7% from Russia, 14.6% from Algeria and 8.3% from Qatar.

Figure 7: French LNG Imports (bcm)



Source: Kpler.

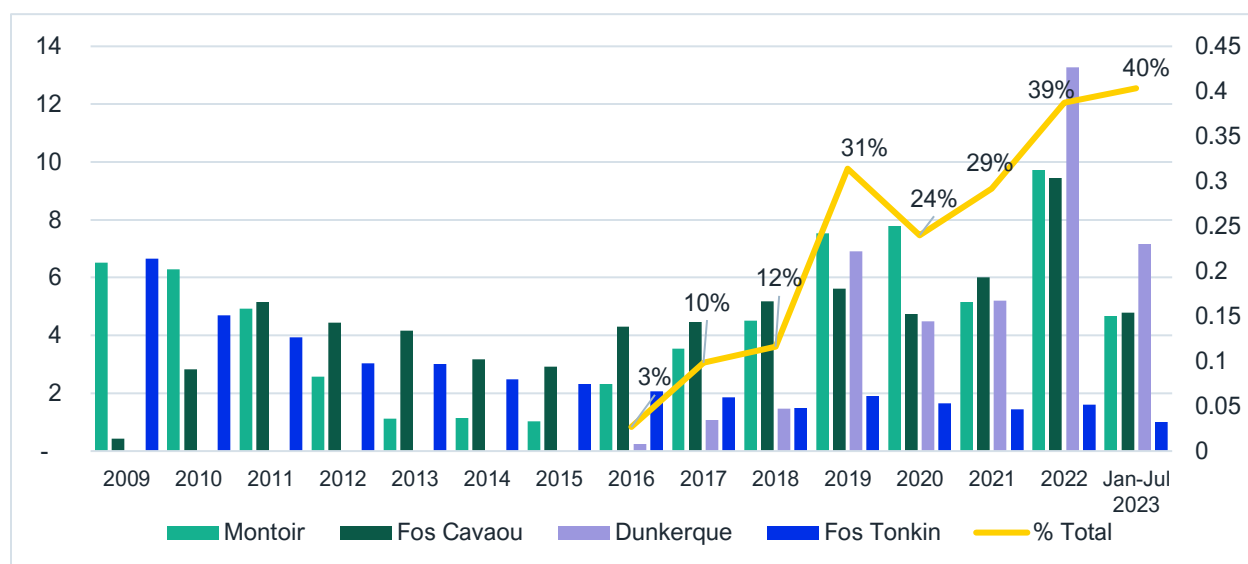
France's LNG import mix has changed in recent years. The largest source of LNG imported into France was Algeria until 2018, Russia from 2019 to 2021 and the U.S. since 2022.

Figure 8: Biggest Share of LNG Imports Into France

Source: Kpler.

French LNG imports significantly increased in 2019 (21.95 bcm) and 2022 (34.25 bcm). The country started importing Russian and U.S. LNG in 2018, when flows were 0.42 bcm and 1.38 bcm, respectively.

In 2016, with the Dunkerque LNG coming into operation, the country's installed LNG capacity jumped 65% from 20 bcm to 33 bcm, and between 2016 and 2019 LNG imports almost tripled. Dunkerque has recently started accounting for a significant share of France's LNG imports, reaching 39% in 2022 and 40% from January to June 2023.

Figure 9: France LNG Imports by Regasification Terminals (bcm)

Source: Kpler.

B. Cost of French LNG Imports Reached a Record High in 2022

In 2022, France paid about €32 billion for imported LNG, a record high, according to Eurostat. The largest amounts were paid to the U.S. (€16.0 billion), Russia (€5.4 billion), Qatar (€3.2 billion), Algeria (€2.4 billion), Angola (€1.4 billion) and Norway (€1.2 billion).

While France's LNG imports almost doubled from 2021 to 2022, the cost of imported gas and LNG increased about sixfold.

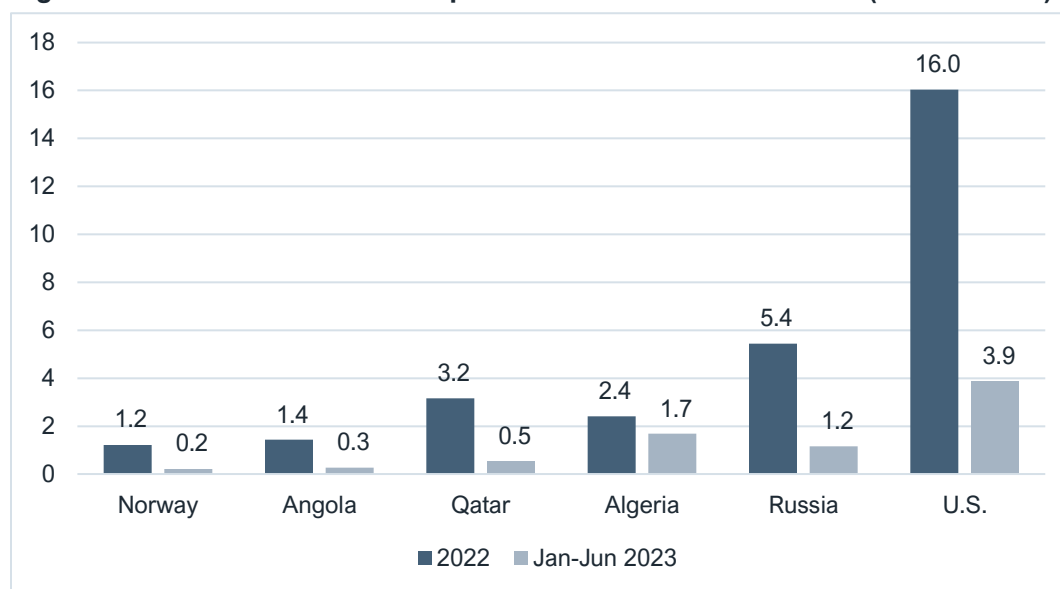
Table 3: Cost of French LNG Imports (Millions of Euros)

Supply Country	2018	2019	2020	2021	2022
Algeria	789.79	785.90	695.12	1,251.97	2,417.23
Angola	19.40	49.96	21.32		1,423.94
Belgium (incl Luxembourg)	6.42	7.87	8.10	23.91	75.95
Cameroon					299.10
Egypt	33.89	62.83		123.66	763.46
Indonesia					60.55
Nigeria	781.76	874.18	544.77	601.27	575.00
Norway	381.08	243.13	75.63		1,221.23
Oman					111.64
Peru	25.44	122.08	12.85	122.14	74.92
Qatar	285.03	221.12	148.73	341.79	3,166.66
Russia	396.34	1,059.00	535.16	1,832.83	5,433.02
Spain	7.61	7.50	7.14	12.12	31.56
Trinidad and Tobago	14.58	35.35	72.01		358.85
United Arab Emirates					79.59
United States	35.62	477.96	287.52	1,163.61	16,031.41
TOTAL	2,776.96	3,946.87	2,408.36	5,473.30	32,124.11

Source: Eurostat.

In 2022, Russia was the country that received the second-highest payments from France for LNG; in the first half of 2023, it dropped to third, behind the U.S. and Algeria.

Figure 10: Cost of French LNG Imports in 2022 and Jan-Jun 2023 (Billion Euros)

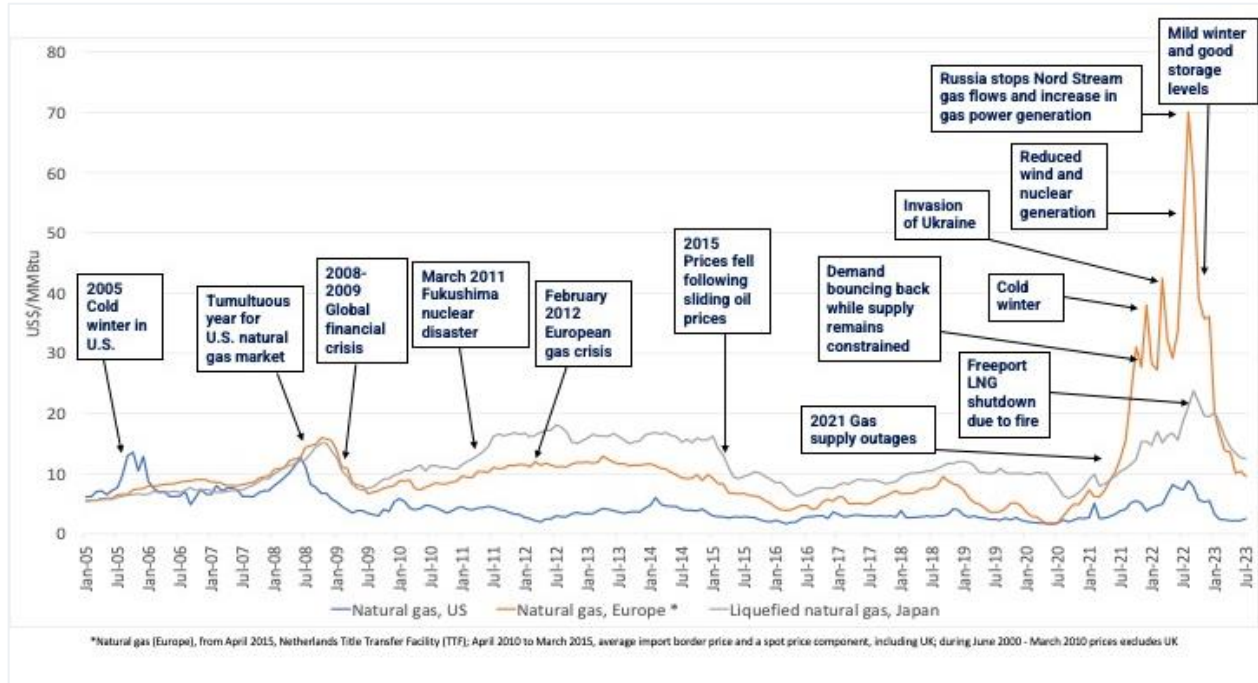


Source: Eurostat.

Besides LNG import volumes, the increase in costs has also been determined by the price of futures contracts for physical delivery at the Netherlands' Title Transfer Facility. As explained in an IEEFA commentary on gas price volatility, amid decreasing gas consumption, European gas markets have witnessed constant price fluctuation in recent months, due to extreme weather, maintenance at gas plants and strikes.²⁰ The fear of an unbalanced gas supply and demand seesaw has dominated markets.

²⁰ IEEFA. [Seesawing gas market dominated by fear and volatility](#). September 2023.

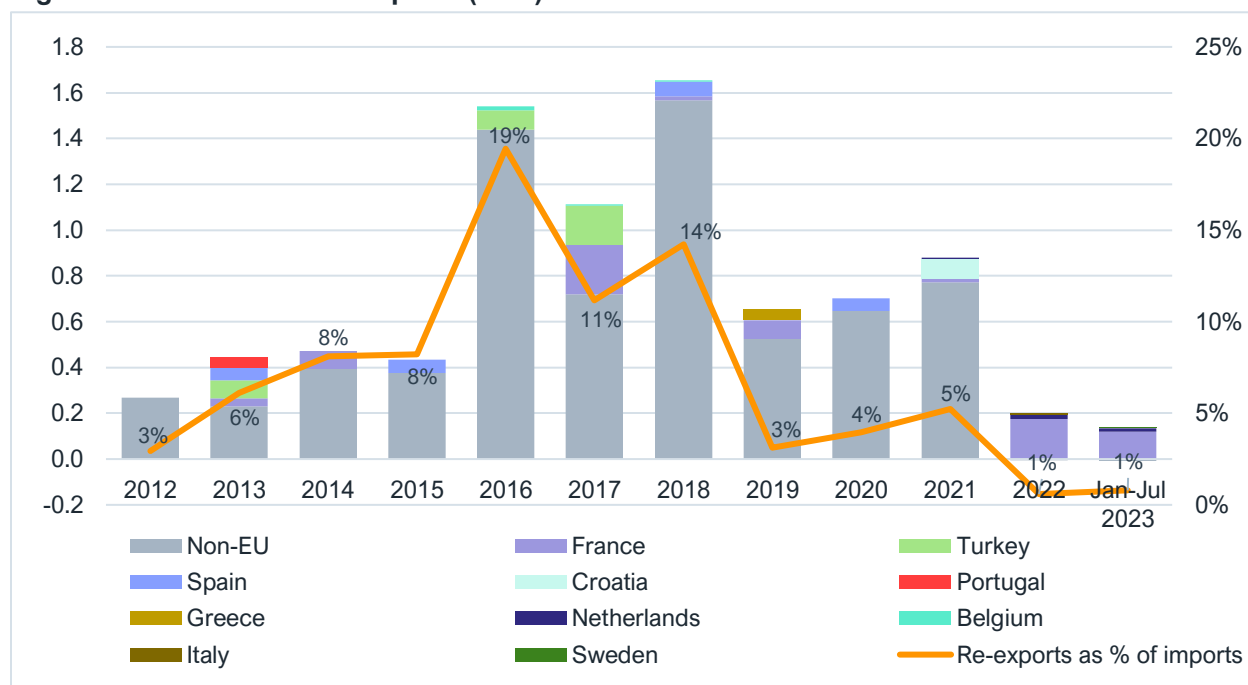
Figure 11: Historical Gas Prices



C. LNG Re-exports Have Declined Since 2022

While the majority of French LNG re-exports were destined for non-European Union (EU) countries between 2012 and 2021, the majority of re-exports since 2022 have been to European countries, including France. The largest number of re-exports happened in 2016, accounting for 19% of all imports, but volumes have now fallen to around 1%.

Figure 12: France LNG Re-exports (bcm)



Source: Kpler.

Re-exports into France include trades between domestic LNG terminals, and from 2022 they include the trades of Gas Vitality, the first LNG bunkering vessel deployed in France.²¹ On 30 December 2021, the vessel completed its first LNG loading operation at the Fos Cavaou LNG terminal operated by Elengy, part of the Engie Group, at the Marseille-Fos Port. The 18,600 m³ bunker vessel is TotalEnergies Marine Fuels' second collaboration with shipowner Mitsui O.S.K. Lines, Ltd and shipbuilder Hudong-Zhonghua Shipbuilding following the signing of a long-term charter contract in November 2019. Gas Vitality is based at the Marseille-Fos Port, southern France, serving the Mediterranean region and performing LNG bunkering services to CMA CGM's LNG-fuelled containerhips and MSC Cruises' LNG-powered cruise ships calling at the port.²²

²¹ Manifold Times. [LNG bunkering vessel "Gas Vitality" completes first LNG loading operation](#). January 2022.

²² Ibid.

Since 2022, France's LNG re-exports to EU countries have increased, but the values are much lower than the re-exported volumes to non-EU countries in 2021 and before.

D. Yamal LNG transshipments at Montoir-de-Bretagne Increase

Montoir-de-Bretagne is one of three regulated LNG carrier terminals operated by Elengy,²³ a unit of French energy company Engie. Located on the Atlantic coast, it is one of the largest terminals in Europe in terms of size and capacity and is able to receive the world's biggest LNG carriers.

Since 2013, Montoir-de-Bretagne has been offering transshipment services, using connections made from standard articulated transfer arms and cryogenic pipes linking the terminal's two landing stages between the vessels. During transshipment, the LNG transferred is neither mixed nor stored in tanks at the terminal.

On 2 June 2015, Engie and Novatek concluded an LNG sales and purchase agreement from the Yamal LNG project in Russia.²⁴ The agreement was for Engie to receive 1 million tons of LNG annually for 23 years as of 2018. This represents 14 cargoes per year, delivered from Yamal Trade icebreaker LNG carriers to Montoir-de-Bretagne, where Novatek transfers the LNG via a transshipment service operated by Elengy. According to the agreement, the LNG would be delivered anywhere in the world depending on the client's needs. The contract was inherited by TotalEnergies in 2018.*

In January 2018, Elengy performed the first Yamal LNG transshipment at Montoir-de-Bretagne.²⁵ That year, a record of 2.1 bcm of LNG was transhipped at that terminal, followed by 1.79 bcm in 2020 and 1.68 bcm in 2022.

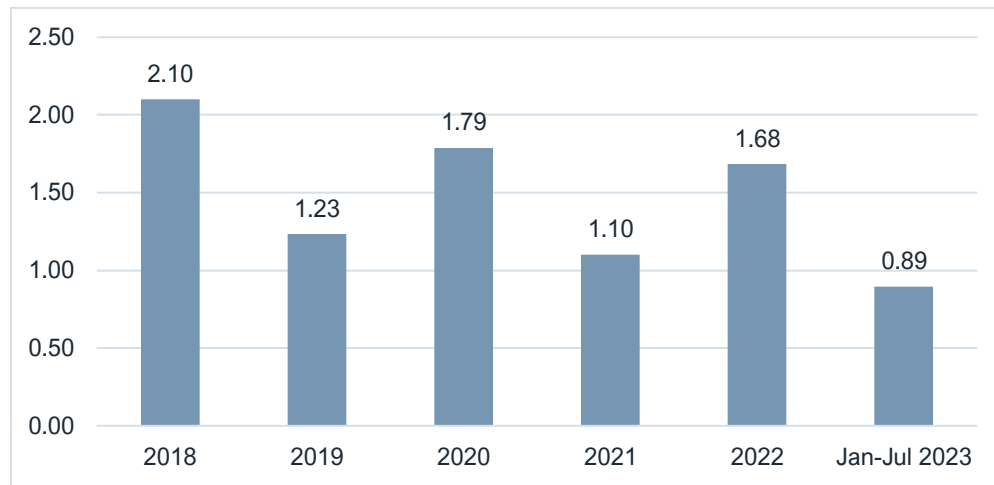
²³ Elengy. [The terminal of Montoir-de-Bretagne](#).

²⁴ International Association of Liquefied Natural Gas Importers. [ENGIE and Novatek sign LNG SPA from Yamal](#). June 2015.

²⁵ Offshore Energy. [Elengy performs Yamal LNG transshipment at Montoir-de-Bretagne](#). January 2018.

* This paragraph has been updated to show that TotalEnergies inherited Engie's contract.

Figure 13: Yamal LNG Transshipped at Montoir-de-Bretagne (bcm)



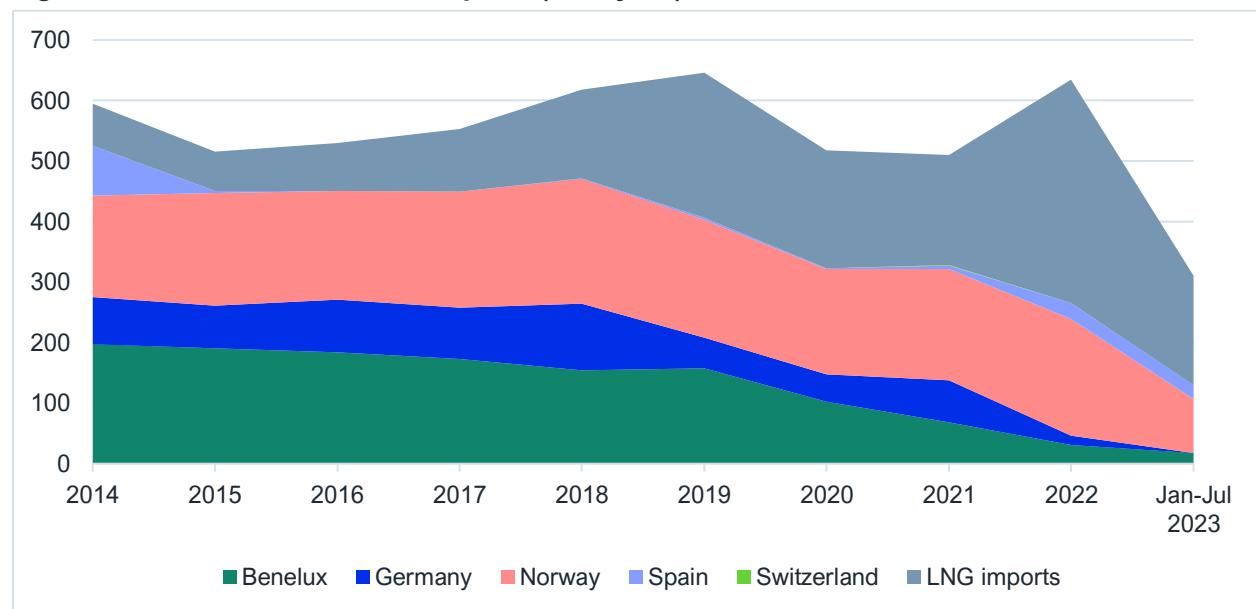
Source: Kpler.

In 2022, Yamal LNG transshipments at Montoir-de-Bretagne increased 150% on 2021 values, and so far, 2023 is expected to follow that pattern.

E. Pipeline Import and Export Trends

France's gas pipeline imports from Spain picked up from 2021, and those from Norway have remained steady in recent years. While flows from Benelux and Germany began falling in 2021, this is when LNG imports started increasing.

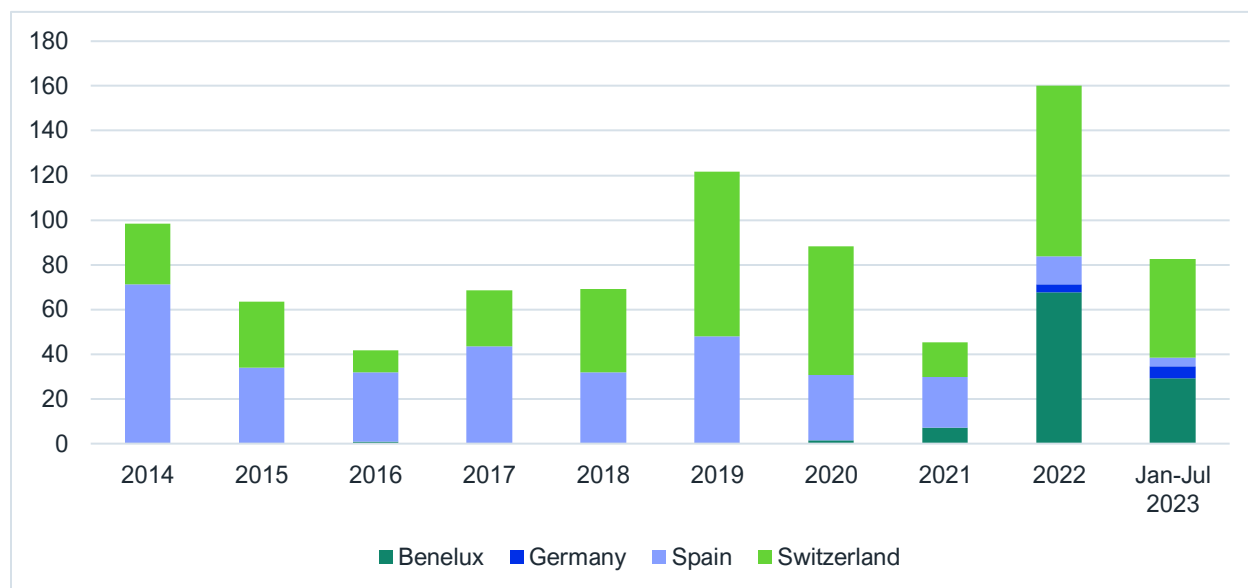
Figure 14: French Gas and LNG Imports (TWh/year)



Source: ENTSOG.

France's exports to neighbouring countries have changed over time, but they fluctuate depending on the weather, changes in power generation by other sources and prices, among other factors. Since 2014, France has been exporting gas to Spain and Switzerland/Italy. Exports to Benelux started in late 2019 and to Germany in 2022. During the last 1.5 years, France has been exporting less gas to Spain and more to Switzerland/Italy compared with previous years.

Figure 15: French Gas Exports (TWh/year)



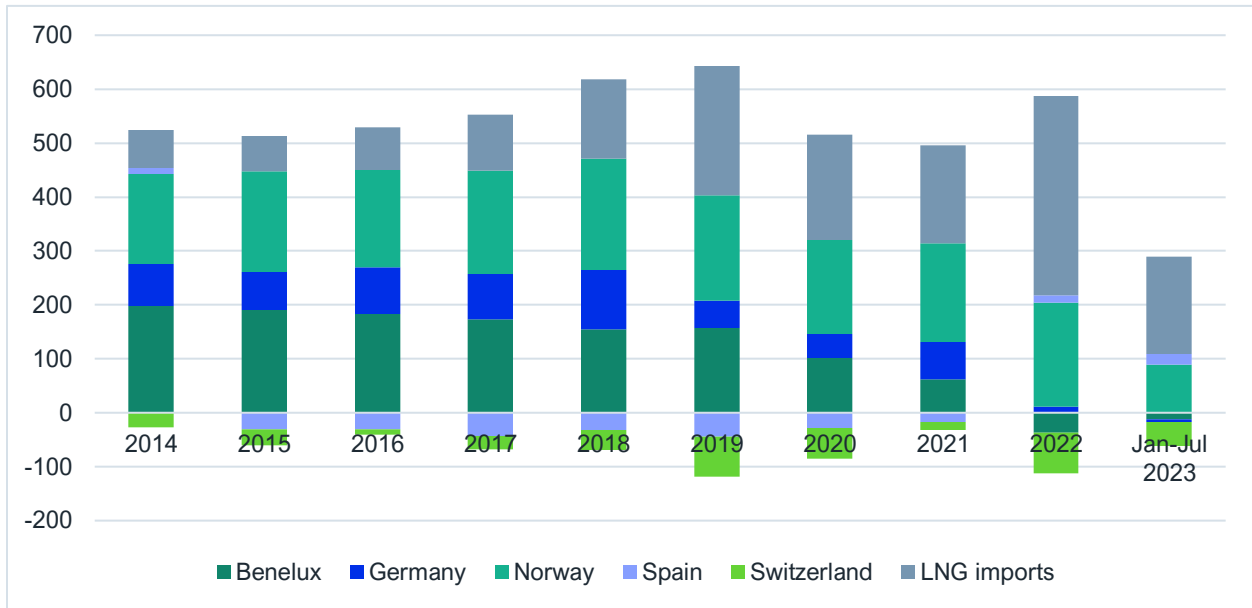
Source: ENTSOG.

Gas flows between France and Benelux changed dramatically in 2022, as the former switched from being a net importer to a net exporter. The same year saw France export less gas to Spain.

2022 Flows from Germany plummeted as the Yamal-Europe gas pipeline from Russia to Germany via Belarus and Poland stopped operating. Norway has been a steady exporter of gas to France, increasing flows in 2022 compared with previous years.

Finally, exports to Switzerland/Italy were higher than any other country in 2022, as LNG imports doubled from 2021 volumes.

Figure 16: Net Gas Flows (TWh/year)



Source: ENTSOG.

Conclusion

After Russia's invasion of Ukraine, France has been eager to replace Russian gas with alternative sources to maintain a secure energy system internally and, consequently, in Europe. But instead of diversifying sources, France has been partially replacing this gas with LNG from Russia's Yamal LNG plant.

The energy crisis has led France to expand its gas and LNG infrastructure to be able to import the fossil fuels via other routes. Investments have been made with plans to increase the capacity of LNG terminals and to boost the capacity and modify the direction of the flows of gas pipelines. Each of these investments aims to satisfy France's gas consumption and that of the neighbouring countries it exports gas to.

But while France has been busy planning and building all this new infrastructure, gas consumption has been falling. In 2022, EU gas consumption decreased by 13.2% year over year, and the International Energy Agency has cut its European demand forecast for 2023, seeing a 7% decline. Helped by lower gas consumption, the EU has reached its target of filling gas storage facilities to 95% of capacity ahead of the 1 November deadline.

Looking towards the future, it's important to highlight surging solar deployment that will see most EU countries hit their 2030 renewables targets ahead of time.²⁶

Gas and LNG infrastructure is currently at risk from falling demand and high and volatile prices. If demand keeps decreasing, there's a high possibility that France's planned investments won't be necessary to guarantee security of supply and won't be the solution needed to reduce dependency on Russian gas.

²⁶ Politico. [EU blindsided by 'spectacular' solar rollout](#). 12 August 2023.

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