Ana Maria Jaller-Makarewicz, Energy Analyst, Europe
Arjun Flora, Director of Energy Finance Studies, Europe
March 2022

Institute for Energy Economics and Financial Analysis
IEEFA.org

Belgian LNG Terminal Zeebrugge Supporting Year-round Russian LNG Supplies to Non-European Markets

Fluxys Shareholders Guarantee Profits From 20-year Yamal LNG Contract for Dedicated Storage in Belgium

Introduction

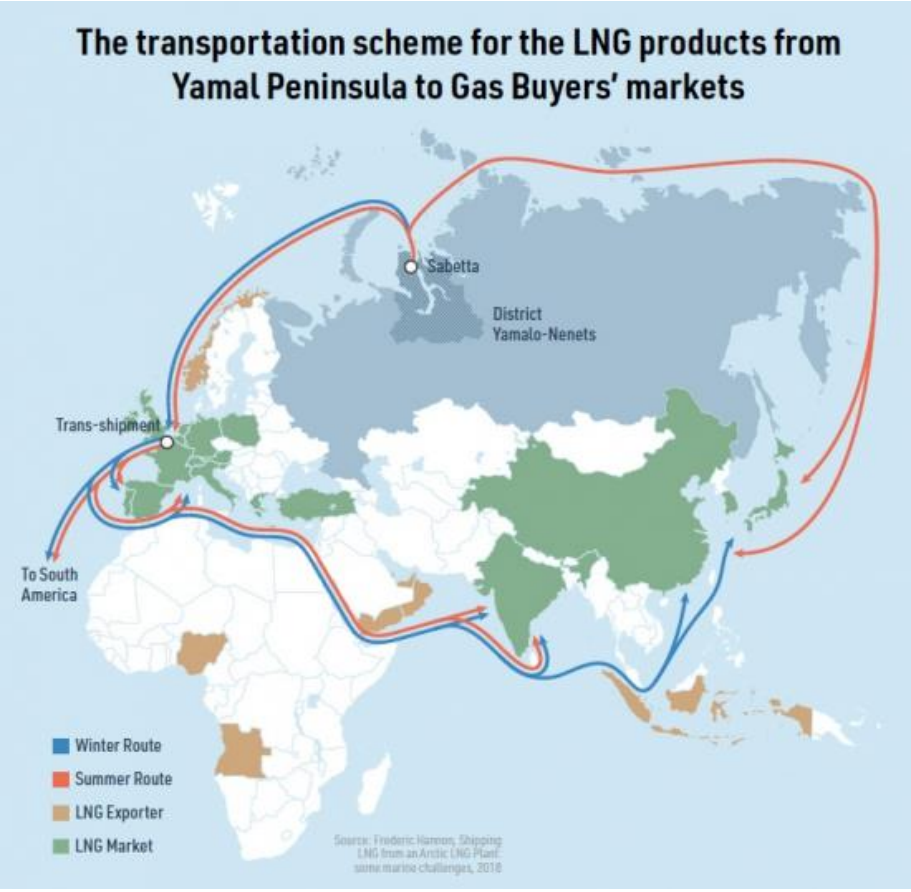
Fluxys, Belgium's regulated monopoly gas grid operator, has been tapping the Russian liquefied natural gas (LNG) export market to deliver dividend growth for its shareholders after a decade of flat gas demand in Belgium. In recent years, the company's revenue growth has been driven by increased activity at the LNG Terminal in the port of Zeebrugge, which struggled with a utilisation rate of only 11% in 2016.

Zeebrugge LNG was initially conceived as a way to ensure a secure supply of gas for Belgium, and the terminal kept this basic role until its initial supply contract expired in 2007. Now however, the terminal functions as a multi-shipper terminal, supplying LNG to destinations all around the world.

From 2007, Qatar was the main supplier of LNG to Belgium, but since 2018 there has been a significant increase in Russian LNG from the Yamal Peninsula in the Siberian Arctic reserves. In 2019, an entire storage tank was built in Zeebrugge, expanding the terminal's LNG storage capacity by almost one-half, purely to serve a 20-year trans-shipment contract with Yamal LNG. The aim is to transship LNG transported by ice-breaker LNG carriers from the new production terminal in Sabetta, Yamal, to conventional LNG carriers.

Since then, Fluxys and its shareholders have profited by facilitating Russian exports of LNG to Asian, South American and Middle East markets, especially during the winter months—exacerbating the European energy crisis and adding to the profit margins of Russian fossil fuel interests.

Figure 1: Yamal LNG Route



Source: Natural Gas World. Project Spotlight: Arc 7 LNG Carriers [LNG Condensed]. January 13, 2021.

The majority of transshipment trades at the Zeebrugge LNG terminal have been spot cargoes, being charged at possibly high spot market prices rather than contract prices.

In 2021, 89% of Yamal LNG cargoes that transshipped at Zeebrugge wound up in countries in Asia, the Middle East or South America; in 2020, the figure was only 59%.

Between January and February 2022, five of eight cargoes exporting Yamal LNG transshipped at Zeebrugge; seven of the eight were sent to buyers in China, Taiwan, South Korea and Japan.

Table 1: Transshipment Trades at Zeebrugge LNG Terminal

	Total Transshipments at Zeebrugge From Yamal LNG				Yamal LNG Exports, MTPA	
Year	Number of Trades	Spot Cargo	% Total Trades	Unloaded MTPA	Total Yamal LNG Exports, MTPA	% Yamal LNG Exports Transshipped at Zeebrugge
2018	7	5	71%	0.46	5.69	8%
2019	14	7	50%	0.94	9.24	10%
2020	41	21	51%	2.95	9.84	30%
2021	36	22	61%	2.51	17.46	14%
Mar-22	8	5	63%	0.56	4.70	12%
	Transshipments Destined to Countries in Asia, Middle East or South America				**Yamal LNG Exports to Asia, Middle East and South America, MTPA**	
Year	Number of Trades	Spot Cargo	% Total Trades	Unloaded MTPA	Yamal LNG Exports to Asia and Other, MTPA	% Yamal LNG Exports Transshipped at Zeebrugge
2018	7	5	71%	0.46	1.44	32%
2019	10	4	40%	0.65	1.09	60%
2020	24	19	79%	1.71	4.82	36%
2021	32	20	63%	2.25	6.43	35%
Mar-22	7	5	71%	0.48	1.27	38%

Source: IHSMarkit. Transshipment analysis. March 2022. (Proprietary)

About 10% of total Russian LNG exports use transshipment services at Zeebrugge; between 10% and 16% of trades to Asian, Middle Eastern and South American countries have used transshipment at Zeebrugge.

Considering the total LNG exports from Yamal, almost one-third of 2020 trades were transshipped at Zeebrugge. Between 35% and 38% of trades to Asian, Middle Eastern and South American countries used transshipment at Zeebrugge in 2020, 2021 and the first months of 2022.

Table 2: Percentage of Russian LNG Exports Transshipping at Zeebrugge LNG Terminal

LNG Exports to European and Non-European Markets					
Year	Russian LNG Exports MTPA	Yamal LNG Exports MTPA	Transshipments at Zeebrugge MTPA	% of Russian LNG Transshipped at Zeebrugge	% of Yamal LNG Transshipped at Zeebrugge
2018	19.09	5.69	0.46	2%	8%
2019	29.31	9.24	0.94	3%	10%
2020	30.45	9.84	2.95	10%	30%
2021	29.78	17.46	2.51	8%	14%
Mar-22	5.63	4.70	0.56	10%	12%
LNG Exports to Asia, Middle East or South America					
Year	Russian LNG Exports MTPA	Yamal LNG Exports MTPA	Transshipments at Zeebrugge MTPA	% of Russian LNG Transshipped at Zeebrugge	% of Yamal LNG Transshipped at Zeebrugge
2018	14.16	1.44	0.46	3%	32%
2019	14.10	1.09	0.65	5%	60%
2020	16.72	4.82	1.71	10%	36%
2021	16.68	6.43	2.25	13%	35%
Mar-22	2.97	1.27	0.48	16%	38%

Source: IHSMarkit. Transshipment analysis. March 2022.

1. Zeebrugge LNG Terminal

Zeebrugge is an LNG regasification terminal located along the northern part of the Belgian coastline that is built on a man-made island. It serves as a crossroads of two major axes in European natural gas flows: the east/west axis from Russia to the United Kingdom and the north/south axis from Norway to Southern Europe. It serves the small-scale LNG market, providing an alternative fuel for smaller vessels and trucks, or for industrial customers not connected to the gas pipeline system.[1]

Fluxys LNG is the owner and operator of the Zeebrugge LNG terminal and sells terminalling capacity and associated services. Fluxys LNG SA is a company established under Belgian law and is a fully owned subsidiary of Fluxys Belgium SA.

[1] Economie. International Trade in Belgium -Determining the origin and destination of imports, and exports, and eliminating transit annual data. March 4, 2021.

Zeebrugge LNG terminal has been in operation since 1987 and has a regulated Third Party Access (TPA) Regime.

Main operating capacity:[1]

- LNG carriers up to 260,000 cubic meters of LNG
- 380,000 cubic meters of storage + a 180,000-cubic meter fifth tank
- Regasification: 544 GWh/day
- Two jetties, two truck loading bays
- Capacity to import 6.7 million tonnes of LNG per year (mtpa, also equivalent to 9 billion cubic meters per year, or bcm/y)
- Transshipment capacity: 107 transshipments (214 ships) per year

Zeebrugge provides the following terminalling services:[2]

- Reloading and/or unloading any type of LNG ship
- Proceeding to transshipments between LNG ships (STS: ship-to-ship)
- Loading LNG trucks
- Regasifying LNG so it can be injected into the transmission network
- Loading of bunkering ships (use of imported LNG at the receiving terminal to serve as marine or "bunker" fuel)
- Bundled services: ship unloading + LNG storage + ship reloading[3]
- A new virtual liquefaction service, which allows producers to bring LNG into the Zeebrugge Terminal without needing a ship

[1] EC Europe. Fluxys LNG Terminal Zeebrugge. February 20, 2019.
[2] Fluxys. LNG in Belgium.
[3] Council of European Energy Regulators. Removing LNG barriers on gas markets. December 1, 2017.

The first LNG imports to the terminal came from Algeria in the 1980s. Since 2007, Qatar has been the main supplier of LNG to Belgium. Since 2018, however, there has also been an increase in Russian LNG.

In 1987, a long-term contract was signed with Algerian supplier Sonatrach to deliver up to 3.3 million metric tonnes per annum (MMtpa) over a 20-year period in the form of LNG. Since this expired in 2007, 20-year-long contracts were signed

with: Distrigaz, 2.75 billion cubic metres per annum (bcma); Qatar Petroleum/Qatar Terminal, 4.5bcma; and Tractebel, 1.8 bcma.[2]

In 2018 Zeebrugge LNG terminal performed its first direct ship-to-ship transfer of LNG. The cargo was transferred from the 172,000-cubic-meter *Eduard Toll*, a Yamal LNG project vessel, to the 170,000-cubic-meter *Pskov*, a vessel controlled by Gazprom.[3]

In September 2019, a new long-term contract was entered into with Qatar Petroleum, a subsidiary of Qatar Terminal Limited (QTL), for the remaining unloading slots until 2044, after the expiry of the current long-term slots (partly in 2023, the majority in 2027).

In December 2019, Zeebrugge LNG commissioned its fifth storage tank under a 20-year agreement with Yamal LNG, Russia.[4] The contract allowed for as much as 8 MMtpa (around 11 bcm, equivalent to approximately 65% of Belgium's total gas demand of 17 bcm)[5] of LNG transhipments and as many as 107 annual transshipments to support year-round LNG deliveries from Yamal to Asian markets.[6] The contract was signed in March 2015.[7]

Yamal LNG started using a dedicated, 180,000-cubic-meter LNG transshipment tank at the Zeebrugge LNG terminal in Belgium that was built specifically for it. The additional LNG storage tank serves as a buffer for the transshipment of LNG between two vessels that are not berthed at the same time.

[2] The Oxford Institute for Energy Studies. Finding a home for global LNG in Europe. January 2020.
[3] S&P Global Commodity Insights. First LNG transhipment performed at Zeebrugge LNG terminal. May 3, 2018.
[4] Novatek. Yamal LNG Receives Transshipment Tank at Zeebrugge LNG Terminal. December 27, 2019.
[5] *Ibid*.
[6] GCaptain. Ship photos – First icebreaking Yamal LNG carrier launched at DSME. January 26, 2016.

Table 3: Evolutions at Zeebrugge LNG Terminal

	1987	1990	2000	2007	2008	2010	2013	2016	2017	2018	2019	2020	2021	2024	2026	2027	2039	2044
	In operation																	
Jetty	1st jetty. Unloading capacity of up to 14,000m³/h of LNG.																	
								2nd jetty (LNG carriers from 2,000m3 to 217,000m3)										
Terminal Capacity	4.5 bcm/yr																	
					4.5 bcm/yr (Capacity of expasion). TOTAL 9 bcm/yr													
														2 bcm/yr expasion				
															6 bcm more			
LNG Storage Tanks	3 tanks (80,000 m3 each). Total 240,000 m3																	
					4th tank capacity 140,000m3. Total 380,000 m3													
											5th tank 180,000m3=560,000m3							
ORV							Open Rack Vaporiser was commissioned											
												3ORV more						
Contracts	20yr contract with Distrigas (Algerian LNG)																	
					20 yr contract: Qatar 4.5 bcm/yr, Distrigas 2.75 bcm/yr, Tractebel 1.8 bcm/yr													
											20yr transshipment contract Yamal LNG, 214slots/yr, max 11 bcm/yr							
																Qatar (unloading/storage) full capacity		
SSLNG: LNG Loading					LNG loading service, 7,500 m3 LNG													
SSLNG: Truck Loading						Truck loading service: offer 4,000 load slots												
											2nd truck loading, extra 4,000 slots							
ENGIE Bunkering Service								5,100 m3 bunkering vessel at Zeebrugge. Ships can refuel.										
LNG to Power								LNG weekly supplied from truck to cruise AIDAPrima elect gener										
LNG to Train Loading												1st loading						

Source: IEEFA calculations.

2. Yamal LNG

The Yamal LNG project (17.4 MMtpa) is Novatek's first liquefaction project and the second large-scale project in Russia.

The Yamal LNG joint venture includes Novatek (50.1%), TotalEnergies (formerly known as TOTAL; 20%), China National Petroleum Corporation (CNPC, 20%) and Silk Road Fund (9.9%).[8]

The project is estimated to produce about 16.5 million metric tons of LNG per year.[9]

In September 2013, Novatek concluded a final agreement with CNPC to take a 20% stake in the project. The deal also included Yamal LNG's first offtake contract. CNPC committed to purchase 3 MMtpa for 20 years. In November 2013, Naturgy (then Gas Natural Fenosa) agreed to offtake 2.5 MMtpa for 24 years.

By the end of 2015, Yamal LNG had secured buyers for 14.8 MMtpa, or 90% of the production from Yamal LNG's first three trains. Long-term offtakers included TotalEnergies (4 MMtpa), CNPC (3 MMtpa), Naturgy (2.5 MMtpa), Gazprom (2.9 MMtpa) and Novatek (2.4 MMtpa). The remaining 2.6 MMtpa of capacity was marketed by Yamal Trade (the 0.9 MMtpa added by the fourth train would be marketed by Yamal Trade, as well).

[8] TotalEnergies. Yamal LNG: the gas that came in from the cold.
[9] The Journal of Cross-Regional Dialogues. Energy Policy in the Arctic: Yamal LNG in Russian International and domestic political agenda. September 2019.

There are substantial additional spot market volumes, which are assigned to the project partners on an equity basis.

The first train (production line) was started in December 2017. In April 2018, Yamal LNG started shipping under long-term contracts with Total, CNPC, Gazprom Marketing & Trading, Spanish Gas Natural Fenosa, and Novatek Gas & Power.

Cargoes from Yamal LNG have been reloaded, transshipped, and unloaded at terminals in northwestern Europe, including GATE in the Netherlands, Montoir and Dunkirk in France, and Grain in the UK, as well as near the port of Honningsvag in Norway and Kildin in Russia.

The first STS transshipment at Zeebrugge, which has a long-term deal with Yamal LNG for such operations, occurred in April 2018. Transshipments at Zeebrugge have ramped up since the beginning of 2020 after its fifth storage tank came online.

The startup of Yamal LNG has introduced Russian LNG into Europe. Throughout 2018, some volumes stayed in northern European markets, despite Yamal LNG's original plan to not compete with Gazprom's pipeline supplies.

3. Fluxys Belgium Revenues

Fluxys Belgium obtains approximately 97% of its operating income from the sale of capacity and related services in its infrastructure for the transmission and storage of natural gas, as well as LNG terminalling. Its operations are monitored by the Belgian Federal Commission for Electricity and Gas Regulation (CREG).

Over the last three years, there has been a significant increase in revenues from terminalling activities.

- In 2018: Turnover from terminalling services generated an increase in regulated revenue (€4.3 million), reflecting the progression in the number of large tanker loadings and transshipment operations. Terminalling activities at Zeebrugge accounted for 20% of Fluxys Belgium operating revenues.

- In 2019: Terminalling services generated a €32.1 million increase in regulated revenue. The increase primarily reflected the regulated authorised return on expansion investments in accordance with the tariff proposal of June 2019 and the expansion investments for transshipment services at the Zeebrugge terminal. Terminalling activities at Zeebrugge accounted for 25% of Fluxys Belgium operating revenues.

- In 2020: The bulk of the increase in sales and regulated services related to terminalling activities (€16 million) can primarily be explained by the commissioning at the end of 2019 of the fifth tank at the Zeebrugge LNG Terminal. The new tank helped create a strong increase in STS transhipment services. Terminalling activities at Zeebrugge accounted for 26% of Fluxys Belgium operating revenues.

Table 4: Fluxys Belgium Operating Revenue (millions €)

Operating Revenue (millions €)	2015	2016	2017	2018	2019	2020
Transmission	397.0	372.3	379.8	367.5	360.4	369.0
Storage	31.6	24.8	33.9	33.0	31.8	34.1
Terminalling	91.3	100.6	96.8	101.2	133.0	148.7
Of which Terminalling Belgium (Zeebrugge)	*91.3*	*100.6*	*94.8*	*99.2*	*131.2*	*147.2*
Other	18.2	11.8	18.9	21.7	24.2	26.0
Elimination between segments	-	-	(18.9)	(20.1)	(18.4)	(17.2)
Total Operating Revenue	**538.0**	**509.5**	**510.5**	**503.2**	**531.0**	**560.6**
Terminalling Belgium (Zeebrugge) % of total revenue	***17%***	***20%***	***19%***	***20%***	***25%***	***26%***
Annual Change in Revenue (millions €)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Transmission		(25)	7	(12)	(7)	9
Storage		(7)	9	(1)	(1)	2
Terminalling		9	(4)	4	32	16
Of which Terminalling Belgium (Zeebrugge)		*9*	*(6)*	*4*	*32*	*16*
Other		(6)	7	3	2	2
Elimination between segments		-	(19)	(1)	2	1
Total Operating Revenue		(29)	1	(7)	28	30

Source: Fluxys Belgium Annual Reports.

Fluxys Belgium invested €91.3 million in infrastructure projects in 2019. Almost 80% was spent on LNG infrastructure projects, mainly on the construction of a fifth tank at the Zeebrugge LNG terminal serving the 20-year transshipment contract with Yamal LNG. The rest was spent on transmission projects and storage infrastructure (see Table 5).

Table 5: Fluxys Belgium Investment in Infrastructure Projects (millions €)

Investments in Infrastructure Projects (millions €)	2015	2016	2017	2018	2019	2020
Transmission projects	126.0	34.4	16.8	17.8	14.4	31.9
Storage infrastructure	1.9	1.0	1.8	0.8	4.5	0.7
LNG infrastructure projects	60.2	103.8	64.8	59.5	72.4	9.6
Total	188.0	139.2	83.4	78.1	91.3	42.3

Source: Fluxys Belgium Annual Reports.

Dividend Growth

Fluxys' transshipment contract with Yamal LNG allowed the company to increase its dividend per share for shareholders in 2020, from €1.30 to €1.37 per share, the highest level since 2012. The contract was so significant that it was highlighted on the company's website:

> *"Fluxys Belgium SA/NV's net profits totalled €70.8 million, compared with €42.5 million in 2019. This increase compared to the previous financial year is*

due in part to the commissioning of the fifth storage tank at the LNG terminal operated by subsidiary Fluxys LNG."[10]

Regulated Activities

Gas transport and storage, as well as terminalling activities, are regulated with tariffs within the European Union. Under the main principle of regulation, revenue must be sufficient to cover the eligible costs and allow shareholders to obtain a "fair" return. Revenue must be fixed, taking into account operational expenses; authorized depreciation; cost of debt; and fair margin for shareholders.[11]

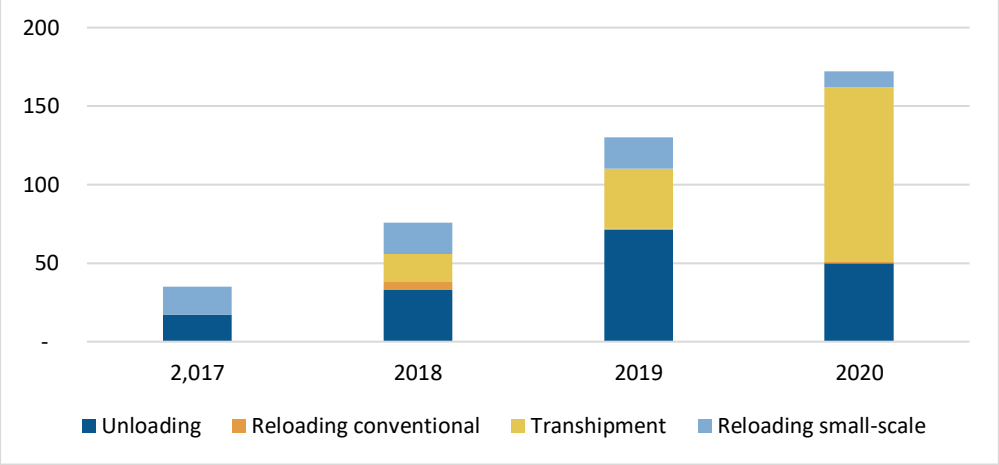
Regulation is applied to terminalling activities in the same way as transmission and storage activities. However, some investments may be remunerated via an IRR (Internal Rate of Return) model, as is the case in Belgium.

Within the Fluxys group, there are several entities that are regulated: Fluxys Belgium, Fluxys LNG, Fluxys Deutschland, Fluxys TENP and DESFA.

4. Main Activities at Zeebrugge

In 2020, activities in Zeebrugge LNG terminal included a record total of 162 vessel operations and 3,195 trucks loaded. The increase in vessel operations was mainly due to 111 transshipments where LNG was either transferred ship-to-ship or stored in an LNG tank before reloading on another ship. In these operations, as in truck loading, LNG was not regasified or injected into the gas network in Belgium.

Figure 2: Zeebrugge LNG Terminal Operations



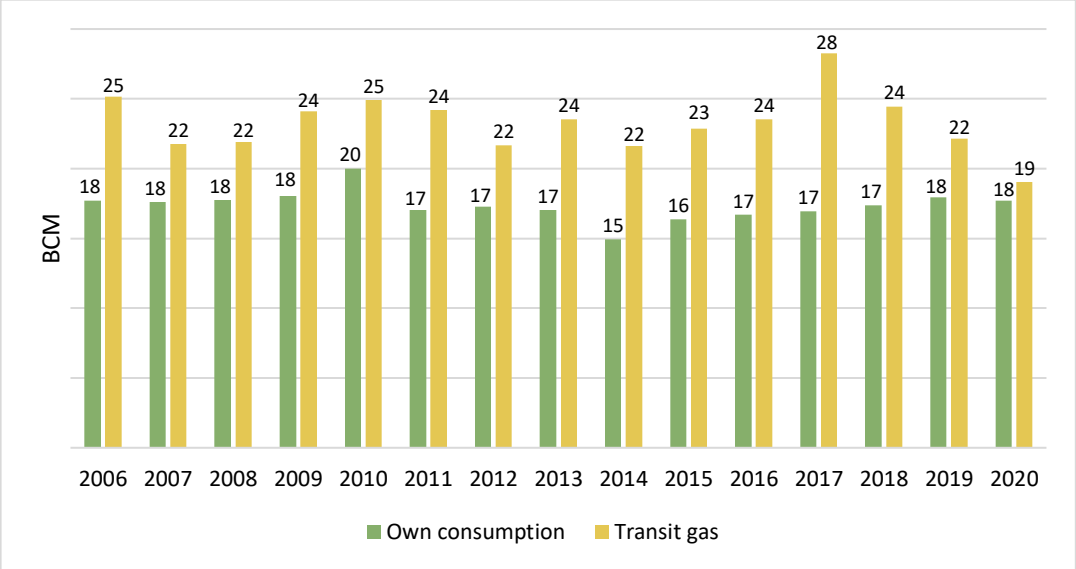
Source: IHS Markit. Zeebrugge analysis. (Proprietary)

Neither gas consumption in Belgium nor transit gas volumes have been growing lately. Gas demand in Belgium hasn't grown for the last 10 years. Demand peaked at 20 bcm in 2010, and has averaged 17 bcm for the last decade. Gas transit volumes

[10] Fluxys. Financial Information.
[11] Fluxys, *op. cit.*

through Belgium have averaged 23 bcm since 2006 and have been declining since 2017.

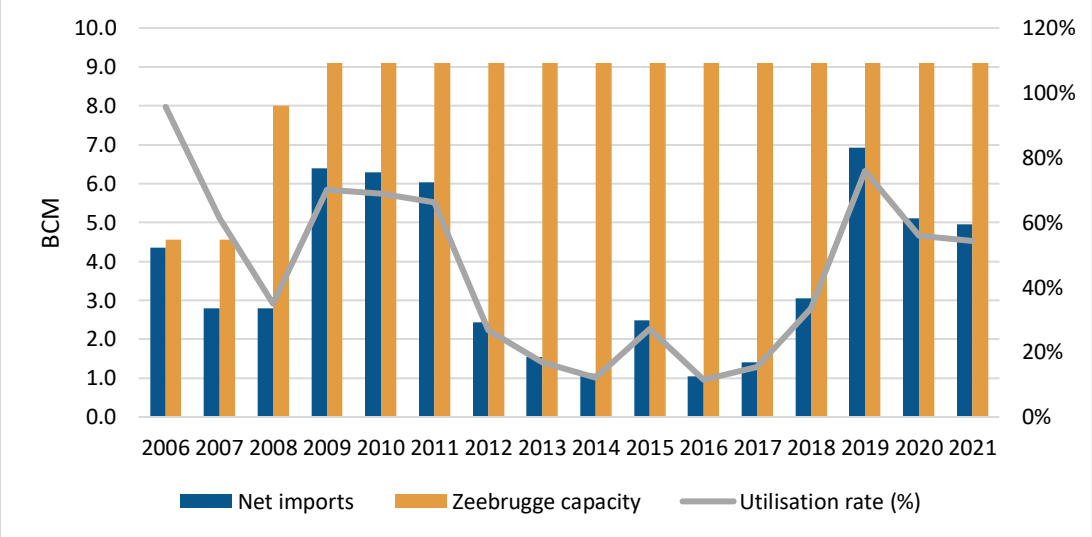
Figure 3: Belgium's Total Gas Imports (BCM)



Source: IEEFA calculations.

The actual capacity at Zeebrugge LNG terminal is 9 bcm and its utilisation rate was around 55% in 2020 and 2021. The utilisation rate hit its lowest level in 2016 at 11% before rebounding to 76% in 2019.

Figure 4: Zeebrugge LNG Terminal Utilisation Rate

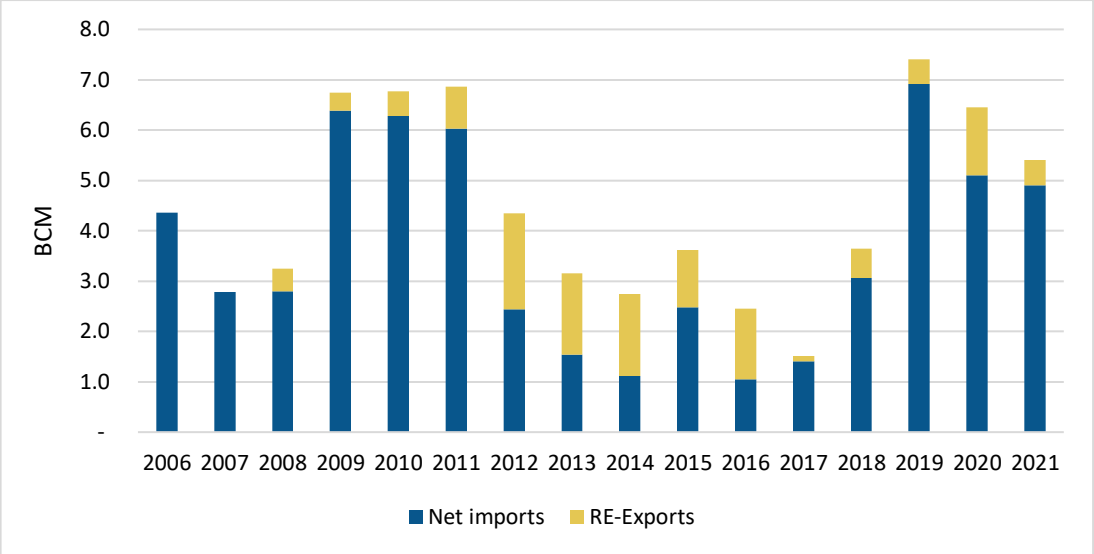


Source: IHS Markit. Zeebrugge analysis. (Proprietary)

The following figure shows the volumes of gross LNG imports at Zeebrugge that consist of net LNG imports, which are then regasified and sent to the gas network in

Belgium. Re-exports represent the LNG that is transferred from the storage tank in the terminal back to a ship and then transported by tanker to another terminal (ship-storage-ship transshipment). In 2020, re-exports reached 1.4 bcm but were still lower than the 1.9 bcm recorded in 2012.

Figure 5: Zeebrugge LNG Terminal Gross Imports (BCM)



Source: IHS Markit. Zeebrugge analysis. (Proprietary)

The 2020 increase was caused by the Yamal LNG transshipment contract at Zeebrugge, but it is not known how much re-exports will increase in the following years as Russia develops its own transhipment terminals. During the 2020-21 winter, Novatek-Western Arctic, a wholly owned Novatek subsidiary, conducted eight STS transhipments near Kildin, small Russian island in the Barents Sea. However, Fluxys will profit regardless, since its contract with Yamal LNG stipulates payment even if Yamal does not use the service.

Conclusion

The Zeebrugge LNG terminal was initially designed to secure gas for Belgium. The terminal kept its basic role until the initial supply contract expired in 2007.[12] Since then, the terminal has developed into a multi-shipper facility, using contracts with flexible destination clauses. In 2019, Zeebrugge expanded its LNG transshipment storage by almost half, purely to service a 20-year contract with Yamal LNG in Russia.

During the winter months, vessels shuttle from Sabetta in Yamal to Zeebrugge, where Russian LNG is temporarily stored before being transported to Asian, Middle Eastern and South American markets. **Fluxys is arguably working *against* Europe's security of supply, enabling Russian LNG to be shipped to other**

[12] GTI Energy. Zeebrugge LNG Terminal: From Regas Terminal to Veritable LNG Hub in North-Western Europe. December 2018.

markets at high prices in winter, even when stocks in Europe may be running low or require refilling. The majority of transhipments are priced by the "spot" market and so are much more expensive during times of low supply, further increasing profits to the suppliers of Russian LNG.

Allowing transshipment services at LNG terminals in Europe has facilitated Russian LNG exports to global markets. Since 2021, around 89% of the total Yamal LNG exports that have transshipped at Zeebrugge LNG terminal have been destined for non-European markets.

Regulated European gas grid operators, such as Fluxys in Belgium, are profiting from this trade, arguably to the detriment of European energy consumers.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

About the Authors

Ana Maria Jaller-Makarewicz

Energy Consultant and Training Facilitator withBSc and MSc in Electrical Engineering. Ana worked in Colombia at Electric Utilities, Gas Distribution Company and Universidad de Norte. In UK she has worked as an Energy Consultant analysing the global natural gas market and industry. She advised electricity regulators in BiH and Ministry of Power in Nigeria and worked as an individual contractor for UNFCCC. She has delivered Energy Training programmes in Africa, Asia, Middle East, Latin America and Europe. ajallermakarewicz@ieefa.org

Arjun Flora

Arjun Flora is an energy finance analyst at IEEFA, with a particular focus on the new energy technology sector. He previously spent six years working on M&A and financing transactions at Alexa Capital and Jefferies in London. He has also worked in transaction advisory and engineering at Arup and holds a M.Eng. from the University of Cambridge. aflora@ieefa.org