REPORT

Stirling LNG

Europe LNG

Overview of LNG in Europe

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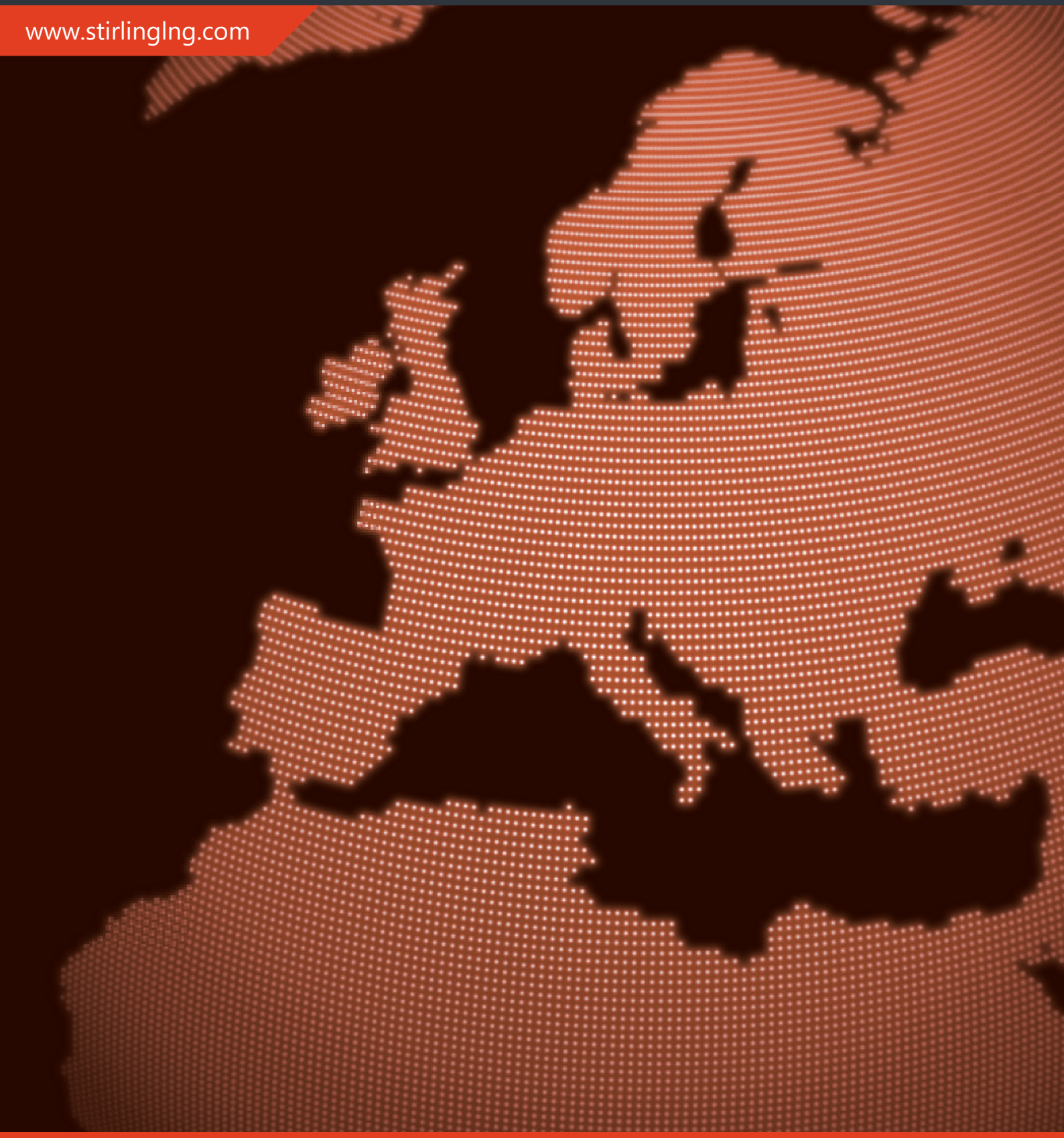


ALIGNING OF INVESTORS, LNG SUPPLIERS AND OFF-TAKERS

EUROPE MARKET INSIGHT

The purpose of this report is to illustrate the state of the LNG market in Europe, identifying the key drivers of supply and demand. Stirling LNG is committed to providing high-level market insight into the LNG market in key regions and countries. Our analysts are constantly monitoring the evolution of the medium to long-term LNG market.

We advise on developing a portfolio strategy for the purchase of LNG contracts and identify the risks and opportunities on the purchase of such contracts by region.

INTRODUCTION

Europe is a net importer of gas and most of its LNG terminals are import facilities. LNG imports are being supported by long-term declines in gas production on the UK Continental Shelf and in the Netherlands, alongside continued robust pipeline imports from Russia. Norway and Russia also export LNG.

There are 31 LNG import terminals currently operating in Europe (including Turkey) with a further two currently under construction and at least a further 10 proposed. A key uncertainty in the European LNG market is the development of the controversial Nord Stream II gas pipeline, which will connect Russian gas fields to the EU pipeline network at Germany's Baltic coast. It had been scheduled to be completed in 2019 but is now more likely be operational by mid-2020 despite being opposed by the US and dividing political opinion in Europe.

ESTABLISHED IMPORTING COUNTRIES OF NORTH WEST EUROPE

The north west European gas markets are characterised by declining domestic supply accompanied by robust residential demand which will persist well into the 2020s. Power sector gas demand growth will be driven by coal and nuclear plant closures but will be tempered by growth in renewables. Modest additional import terminal growth could occur in Germany on geopolitical security of supply concerns.

Demand Outlook: Robust but generally flat

UNITED KINGDOM

Historically, the UK has been one of the major gas-producing countries in Europe. Currently, the UK has three operating LNG import terminals with total import capacity of 36.1 million tonnes per annum (mtpa), equivalent to 48 billion cubic meters per annum (bcma). However, average utilization rates of these terminals have been low. LNG imports can vary considerably from month to month and from year to year in response to changing UK, European, and global market conditions. Qatar is by far the largest supplier of LNG imported into the UK, accounting for more than 90% of imports each year since 2012.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Grain	2005	15.0
	South Hook	2009	15.6
	Dragon	2009	5.5

FRANCE

France has four LNG import terminals and a large amount of its LNG is imported from Algeria, with smaller quantities coming from Nigeria, Norway, Peru, and Qatar. The Dunkirk terminal is connected to both French and Belgian gas distribution networks and is capable of meeting 20% of the combined annual gas consumption of France and Belgium.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Fos Tonkin	1972	4.0
	Montoir	1980	12.5
	Fos Cavaou	2010	6.0
	Dunkirk	2016	9.5

BELGIUM

Belgium does not produce natural gas domestically and thus relies solely on imports to meet its gas needs. The LNG unloaded at the Zeebrugge LNG terminal can be regasified to be traded, consumed domestically, supplied to other end consumers within the EU markets or traded on the Zeebrugge hub.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Zeebrugge	1987	9.0

NETHERLANDS

Historically, the Netherlands has been the largest gas producer in Europe after Norway, but in 2017 it became a net importer of gas as domestic production declined. The Gate terminal was developed by Gasunie and Vopak, and it delivers gas into the Dutch gas transport network, which can then be transported to north west European countries including Germany, Austria and Hungary. The terminal added two truck loading facilities in 2017. Going forward, Stirling LNG expects the Netherlands to play a more significant role in the global LNG market.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Gate	2011	9.0

GERMANY

Germany has plans to build LNG import capability in order to diversify its energy supply and decrease its dependence on Russian pipeline natural gas. Further out, the country has announced plans for phasing out coal fully by 2038. Adding in the closure of the nearby Groningen gas field in the Netherlands which raises questions about the wider region's security of gas supply, Stirling LNG expects Germany to participate more actively in the global LNG market going forward.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Proposed	Brunsbuttel LNG	2022	3.0

ESTABLISHED IMPORTING COUNTRIES OF SOUTHERN AND EASTERN EUROPE

The southern peripheral countries of Europe have historically been more dependent on imports than the gas-producing countries of the north west. Greater build out of renewables here, with higher load factors for solar, will moderate power sector gas demand growth, even in the context of coal station closures. But demand growth is likely to be strong in Turkey where CCGT and OCGT development continues apace.

Demand Outlook: Stable in the south; growing in the east

SPAIN

Mainland Spain imports the majority of its LNG from Algeria, Qatar and Nigeria via six operating terminals with a combined import capacity of 43.5 mtpa. Import rates have declined to under 15 mtpa (20 bcma) over the past few years as pipeline imports from Algeria have surged. In the Canary Islands, two new import terminals are under construction on Tenerife and Gran Canaria.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Barcelona	1969	12.8
	Sagunto	2006	6.4
	Huelva	1988	9.0
	Cartagena	1989	7.6
	Bilbao	2003	5.1
	Mugardos	2007	2.6
Mothballed	El Musel	2012	5.4
Construction	Tenerife	2021	1.0
	Gran Canaria	2022	1.0

PORTUGAL

Portugal has no domestic gas production and is dependent on imports for its gas requirements of about 4 bcm/year.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Sines	2004	5.7

ITALY

Italy is one of Europe's biggest gas consumers. Over 60% of Italy's imported natural gas is from Algeria and Russia with the rest coming from Libya, Qatar, the Netherlands and Norway. LNG is imported into Italy through 3 operational LNG import terminals.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Panigaglia	1971	2.8
	Rovigo	2009	5.9
	OLT Toscana	2014	2.7

MALTA

Malta does not produce any natural gas and only became a gas importer in 2017. In its first year, Malta imported 0.32 bcm of LNG. The Delimara LNG facility consists of a floating storage unit (FSU) and an onshore regasification facility. Its main purpose is to supply regasified natural gas to the power sector via a connecting gas pipeline.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Delimara	2017	0.4

GREECE

Greece produces a small amount of gas, and demand for natural gas is steadily increasing. Natural gas accounts for a small percentage of Greece's total primary energy supply, of which approximately one-quarter is LNG and is imported into Greece via the only LNG terminal at Revithoussa. The remaining part is imported from Russia by pipeline.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Revithoussa	2000	4.8
Proposed	Alexandroupolis	2020	0.9

TURKEY

Turkey uses gas for over 50% of its electricity generation. BOTAS, the state gas company forecasts

that Turkey's gas demand will increase to 81 bcm by 2030. As two new LNG import terminals have come into operation, Turkey has increased its LNG imports whilst reducing dependence on Russian pipeline gas. Currently, the Dörtyol Floating Storage Regasification Unit (FSRU) is the largest in the world with the ability to regasify 11,000 tonnes of LNG per day.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Marmara Ereglisi	1994	7.6
	Aliaga	1989	8.0
	Etki FLNG	2016	5.3
	Dörtyol FSRU	2018	5.3
Proposed	FSRU Iskenderun	2019	n/a
	Gulf of Saros FSRU	2019	n/a

NEW AND DEVELOPING IMPORT MARKETS ON THE BALTIC SEA

Countries with coastlines on the Baltic Sea have seen significant build out of LNG import capacity over the past few years as they look to diversify their gas supplies away from sole dependence on Russia.

Demand Outlook: Modest growth potential

POLAND

Poland is heavily dependent on coal as a primary energy source; natural gas accounts for approximately 14% of overall consumption and Poland imports gas primarily from Russia. The Świnoujście LNG terminal is Poland's flagship project to diversify gas supplies and cut dependence on Russian pipeline gas. Poland's state-owned gas company PGNiG has signed a long term LNG agreement to secure supplies from the US as the country does not intend to extend its gas contract with Russia after it expires in 2022.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Świnoujście	2016	3.6
Proposed	FSRU Polish Baltic Sea Coast	2023	2.8

LITHUANIA

Lithuania has no domestic gas production, and historically has relied entirely on Russia to meet its gas needs. Since starting LNG imports in 2014, it began mainly importing Norwegian LNG before diversifying to US cargoes in late 2017.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Klaipėda	2014	3.0

FINLAND

Finland uses natural gas in steel, shipping and other local industries and recently opened the largest LNG facility in the Nordics region at Manga. This terminal will serve industrial consumers in Finland as well as Sweden.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Pori	2016	0.0015
	Tornio Manga	2017	1.55

SWEDEN

As with Finland, Sweden uses natural gas in industry and currently has modest import capabilities.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Operating	Nynasham	2011	0.365
	Lysekil	2014	0.2

ESTONIA

Although not yet operating any LNG import facilities, Estonia plans to construct the Paldiski terminal to allow for diversification away from Russian pipeline imports.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Proposed	Paldiski LNG	2021	1.8

OTHER NEW AND PROPOSED IMPORTING MARKETS

IRELAND

Ireland has historically imported much of its natural gas from the UK but the commissioning of the Corrib field in 2016 reduced this dependence. Nevertheless, Ireland sees security of gas supply as important, especially in a post-Brexit world, and at least one of two proposed LNG import terminals would alleviate these concerns.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Proposed	Shannon LNG	n/a	2.0
	Cork LNG	n/a	n/a

CYPRUS

Cyprus has recently discovered vast natural gas reserves in its territorial waters in the eastern Mediterranean. Longer term, Cyprus could look to become a major LNG exporter in addition to developing import capabilities to serve its nearer term power generation requirements.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Proposed	Vassiliko FSRU	2021	5.0

CROATIA

The LNG Krk project is the Croatian government's dominant energy project and will contribute to the country's energy independence and security. The terminal includes a floating storage and regasification unit.

	LNG Terminal	Start-up Year	Import Capacity (mtpa)
Proposed	KrK Island FSRU	2021	1.9

EXPORTING COUNTRIES

NORWAY

Historically, Norway has predominantly served European markets with Spain, France and Lithuania being the largest recipients by volume of Norway's LNG exports.

	LNG Terminal	Start-up Year	Export Capacity (mtpa)
Operating	Snohvit	2007	4.3
	Risavika	2011	0.3

RUSSIA

Russia recently joined the global LNG export market with developments on the Yamal Peninsula. This location, and the use of specialist ice-breaker LNG tankers, means that its facilities are well positioned for both the European and Asian import markets, the latter reached via the Northern Sea Route.

	LNG Terminal	Start-up Year	Export Capacity (mtpa)
Operating	Yamal LNG	2017	16.5
Construction	Artic LNG 2	2022	19.8

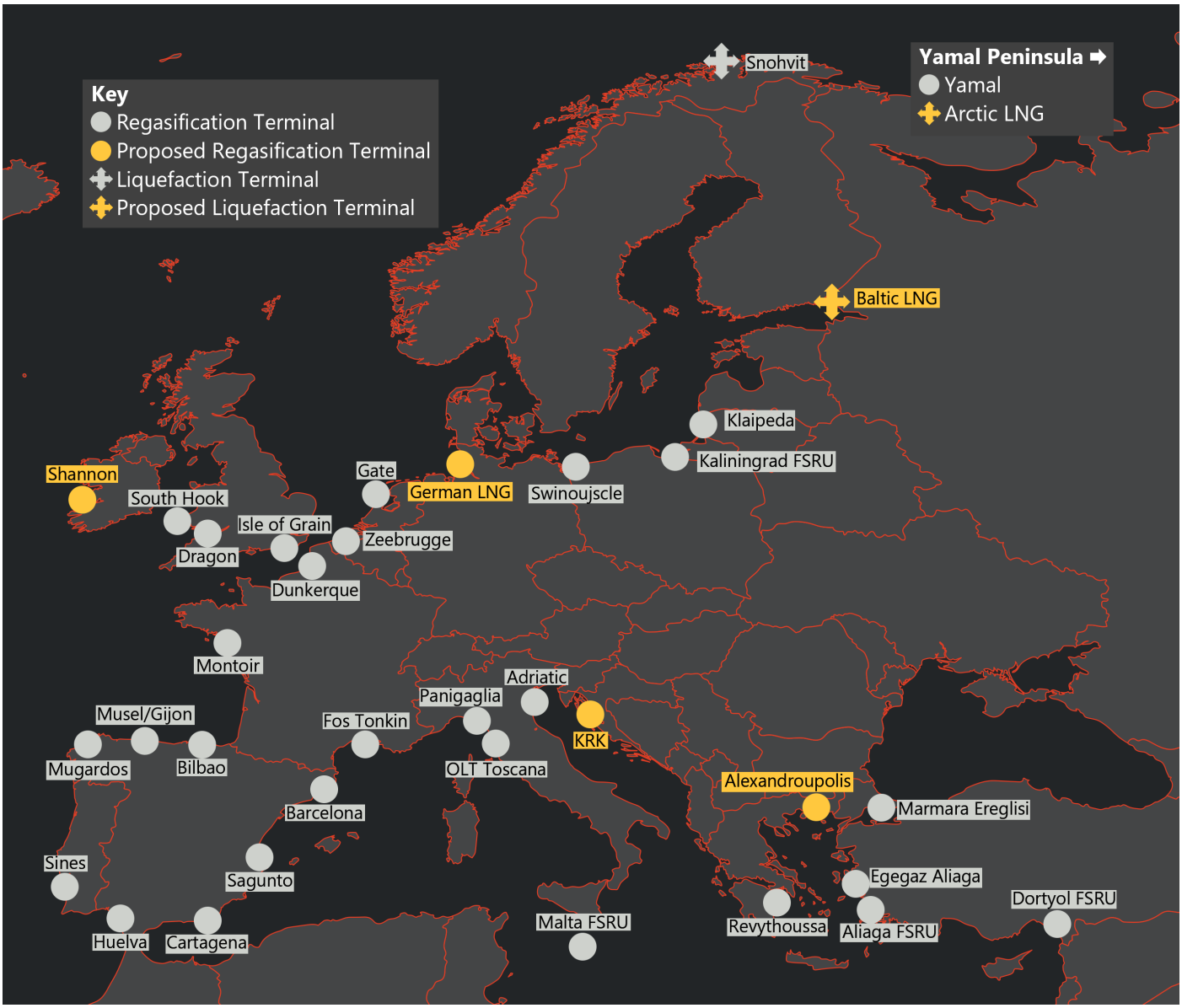
CONCLUSION

The combination of Europe's declining domestic gas production coupled with expectations around robust demand as gas continues to play a key role in Europe's domestic, industrial and power generation energy needs, means that the region will become progressively more dependent on foreign imports in our view. Some marginal additional gas will likely enter southern Europe as the Southern Corridor comes online, bringing gas from Azerbaijan through Turkey and into Greece and Italy. But our expectation is that Europe's increasing supply gap will be mostly filled by pipeline imports from Russia and from LNG. Thus prospects for investors in LNG infrastructure in Europe remain strong and, as this report has shown, there is a healthy pipeline of proposed future projects in play.

In addition to Europe, we also provide detailed LNG analysis in other key regions including Asia Pacific, North America, Sub-Saharan Africa and MENA.

In addition to advising on the portfolio construction for the purchase of medium to long term LNG contracts for off-takers, the firm also advises on project finance on oil and gas infrastructure projects. For further information, please visit www.stirlinglng.com.

MAP OF LNG PROJECTS IN EUROPE (AS AT 2019)



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ABOUT STIRLING INFRASTRUCTURE

Stirling LNG is a division of Stirling Infrastructure Partners. Stirling LNG performs three key functions:

Buying and selling LNG on behalf of off-takers and LNG suppliers on short, medium and long-term contracts. The firm provides purchase and sales solutions to finance these contracts.

Arranging capital for gas infrastructure and advising on the acquisition and disposal of upstream, midstream, and downstream oil and gas assets.

Arranging capital for major oil & gas companies and project sponsors. The firm specialises in financing the development of new and existing gas power plants and gas infrastructure. This includes both floating and on-land assets.

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