



# EU Gas: Diversity of Supply or Diversity of Routes?

## *Europe Needs to Diversify Energy Sources, Not Build More Pipelines From Russia*

### Introduction

For almost two decades, European Union policymakers have emphasized the need to diversify the continent's gas sources to bolster energy security and limit supply disruptions. Instead of diversifying its sources of energy to replace gas, however, the EU has spent a great deal of time diversifying the gas supply routes.

The EU began efforts to seriously diversify its supply in 2004, when it adopted its first gas supply rules.<sup>1</sup> It expanded the rules in 2010, and revised them again in 2017. The 2010 expansion established the EU standard for gas security that still stands today: A country must be able to meet peak gas demand even if its largest single piece of gas import infrastructure goes offline.<sup>2</sup> The N-1 rule (pronounced "N minus 1") was intended to prevent the consequences of pipeline disputes that occurred when Russia cut off gas through Ukraine,<sup>3</sup> creating a supply crunch in much of Western Europe.

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In practice, the N-1 rule encouraged the continent's gas infrastructure companies—collectively called the European Network of Transmission System Operators for Gas, or ENTSO-G—to build additional gas pipelines. This was a boon for ENTSO-G, whose members were financially rewarded for building gas infrastructure, whether or not it was truly needed.

Yet the focus on building new infrastructure may have shifted attention from other important energy security priorities. New pipelines were successful in diversifying gas transportation routes, but did little to diversify the ultimate suppliers of gas. Many of the new pipelines simply provided Russian gas suppliers with more access to EU markets. At the same time, the emphasis on building redundancy in gas infrastructure undermined a more fundamental priority—the need to move away

<sup>1</sup> European Union. [Council Directive 2004/67/EC](#). April 26, 2004.

<sup>2</sup> Warwick Business School. [A New Approach to Assessing UK Gas Security](#). Undated.

<sup>3</sup> BBC News. [Ukraine 'stealing Europe's gas.'](#) January 2, 2006.

from gas entirely, and towards more secure and sustainable energy sources like renewables that are more resistant to political and market disruptions.

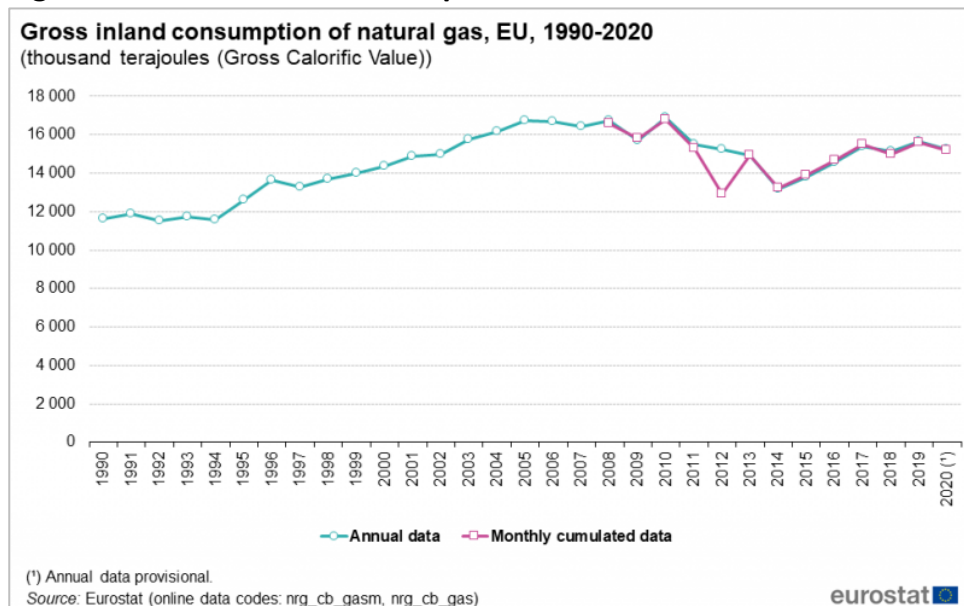
Under the 2017 rules, ENTSO-G is required every four years to carry out an EU-wide simulation of gas supply and infrastructure disruption scenarios.<sup>4</sup> The simulations are conducted in cooperation with an advisory group that coordinates security of supply measures, especially during crises. The simulations study how unusually cold winters affect supply, but do not attempt to forecast or predict real-world gas supplies.

The first simulation analysed a hypothetical disruption of all gas imports to the EU via Ukraine. The results suggested that even if gas imports through Ukraine were halted entirely, no EU country would be forced to curtail demand. Instead, demand would be met through a combination of gas storage drawdowns, LNG imports, and pipeline rerouting, including increased shipments through Belarus, the Turk Stream pipeline, and the Nord Stream pipeline. The simulation suggested the EU could handle a massive Ukrainian gas supply disruption even without the Nord Stream 2, which has been built but is pending authorization by EU regulatory authorities.

## Gas Consumption in Europe, Imports From Russia

Total EU gas consumption peaked in 2010 and has declined modestly since then. (See Figure 1.)

Figure 1: Gross Inland Consumption of Gas, EU 1990-2020<sup>5</sup>

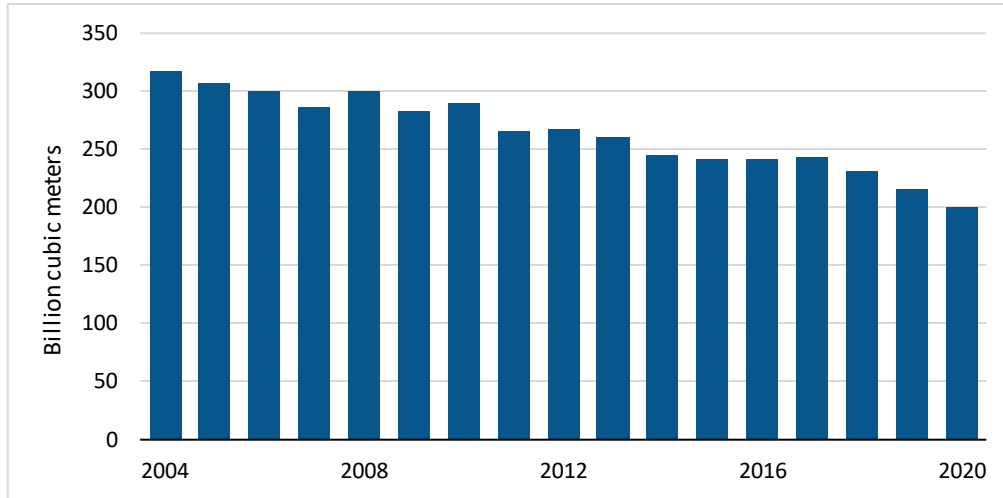


<sup>4</sup> ENTSOG. [Security of Supply Simulation Report](#). November 2021.

<sup>5</sup> Eurostat. [Gross inland consumption of gas, EU, 1990-2020](#). October 22, 2021.

EU production has fallen even faster than consumption. (See Figure 2.) Russian gas offered the cheapest and most abundant replacement for the EU's falling output, setting the stage for Russia's increasing dominance of European gas markets.

**Figure 2: European Gas Production (2004–2020)<sup>6</sup>**



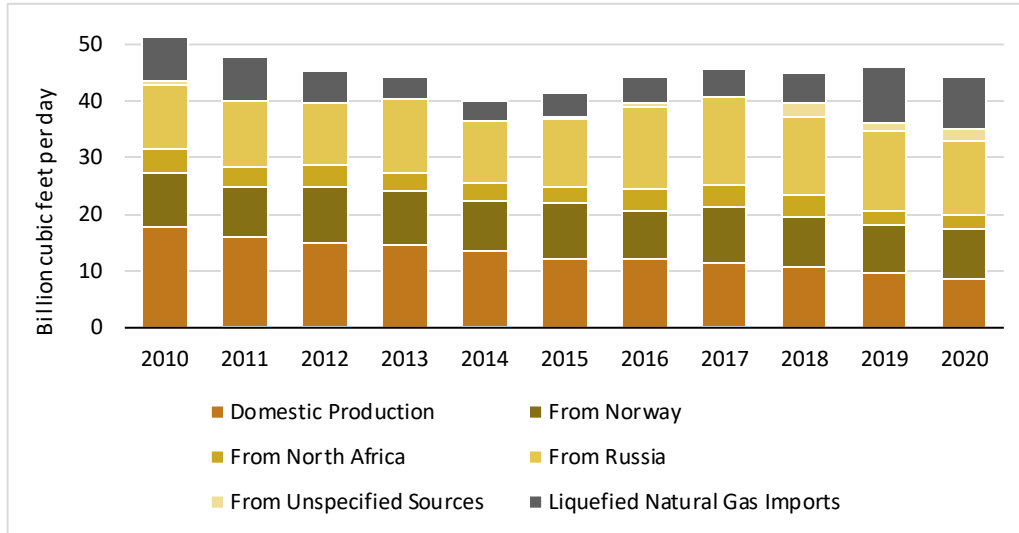
Source: BP Statistical Review of World Energy. Europe excludes Ukraine and CIS nations.

As of 2010, Russia was already the EU's largest supplier of imported gas, accounting for 34% of all EU gas imports and 22% of the total EU gas supply. That dependency grew as production from the EU's gas fields declined. (See Figure 3.) In 2019, the last full year before the pandemic's disruptions, Russia supplied about 45% of the EU's total gas imports and 35% of the EU's total gas. The EU grew even more dependent on Russian gas after Brexit, with Russia supplying an estimated 48% of total EU gas imports in 2020,<sup>7</sup> counting both pipeline and LNG imports.

<sup>6</sup> BP. *Statistical Review of World Energy*.

<sup>7</sup> European Commission. *Quarterly Report on European Gas Markets*. 2020.

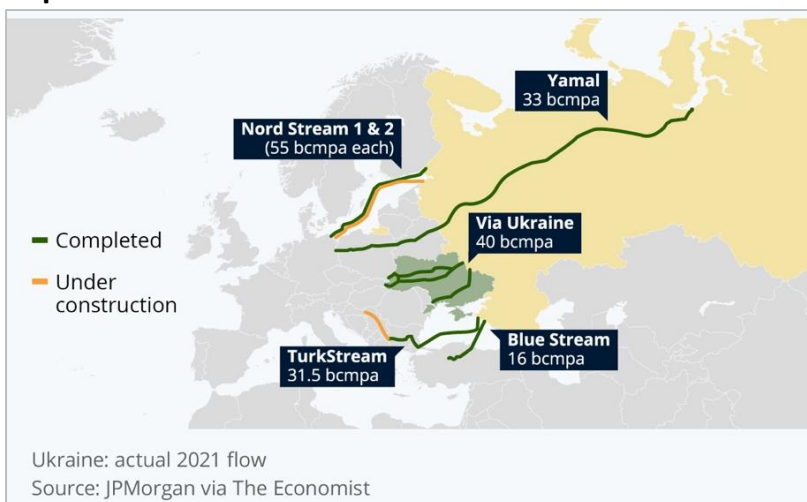
**Figure 3: Europe (EU-27) and the United Kingdom (UK) Gas Supply (2010–2020)<sup>8</sup>**



## Major Russia-to-Europe Gas Pipelines

The main Russian-European gas pipelines have different routes. The first pipelines were built between 1967 and 1988, shipping gas through Ukraine. Pipelines built between 1994 and 2006 crossed Belarus and Poland. A 2003 pipeline was built to ship gas across the Black Sea, and a pipeline was built in 2011 through the Baltic Sea.

**Figure 4: Major Russian-European Gas Pipelines and Theoretical Capacities<sup>9</sup>**



<sup>8</sup> Energy Information Administration. [Europe relies primarily on imports to meet its gas needs](#). February 11, 2022.

<sup>9</sup> Statista. [The Gas Pipelines Linking Russia and Europe](#). February 3, 2022.

The pipelines transiting Ukraine are designed to supply gas to Western Europe and to Balkan countries and have a capacity of more than 100 bcm (billion cubic meters) per year.<sup>10</sup>

**Table 1: Pipelines From Russia via Ukraine**

Pipeline	BCM	Route	Operational
Transiting Ukraine			
Brotherhood Pipeline System		Ukraine-Slovakia-Western Europe	
Urengoy – Pomary – Uzhgoro	32.0		1988
Soyuz (Orenburg-Western border)	26.0		1980
Progress (Yamburg-Western border)	26.5		1988
Trans-Balkan (through Romania)	16.0	Ukraine-Moldova-Romania-Bulgaria	1986

Meanwhile, new pipelines between Russia and Europe were built, bypassing Ukraine as a transit country. This helped to diversify routes for Russian gas.

Construction of the Yamal-Europe pipeline began in 1994,<sup>11</sup> and first sections of the pipeline were brought online in 1996. The pipeline was finished in 2006, sending as much as 33 bcm of gas from Russia through Belarus and Poland to Germany.

**Table 2: Pipeline From Russia via Belarus and Poland**

Pipeline	BCM	Route	Operational
Transiting Belarus and Poland			
Yamal-Europe	33.0	Belarus-Poland-Germany	1996/2006

Nord Stream, Blue Stream and Turk Stream were built undersea, avoiding land borders. The Blue Stream pipeline crossing the Black Sea between Russia and Turkey began operation in 2003 with a capacity of 16 bcm. Nord Stream became operational in 2011 with a capacity of 55 bcm. It crosses the Baltic Sea to ship Russian gas to Germany. And in 2020, the Turk Stream went online with 31.5 bcm capacity via the Black Sea.

**Table 3: Pipelines From Russia via Black and Baltic Seas**

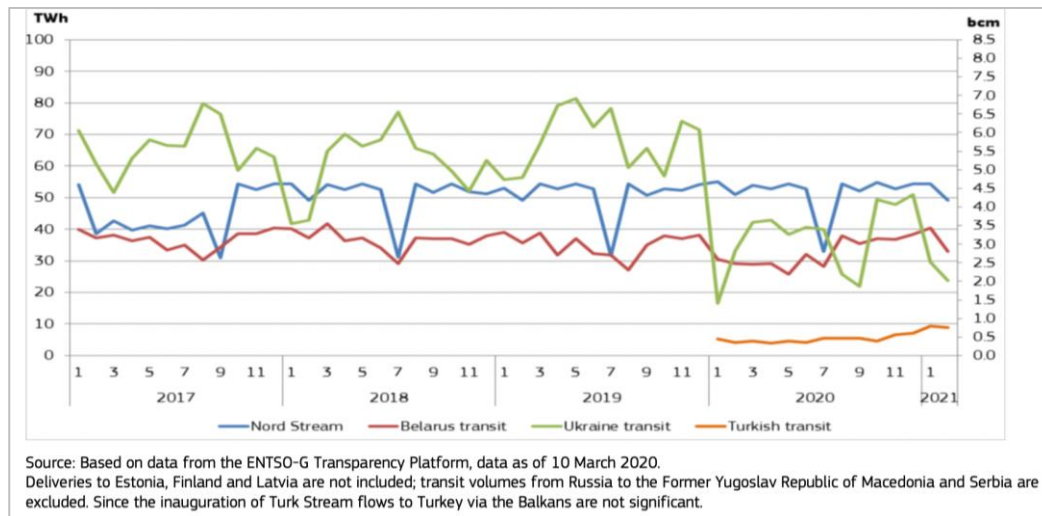
Pipeline	BCM	Route	Operational
Bypassing Transit Countries			
Nord Stream	55.0	Germany (via Baltic Sea)	2011-2012
Nord Stream (under construction)	55.0	Germany (via Baltic Sea)	
Blue Stream	16.0	Turkey (via Black Sea)	2003
Turk Stream	31.5	Turkey (via Black Sea)	2020

<sup>10</sup> Gazprom Export. [Transportation](#).

<sup>11</sup> *Ibid.*

Gas flows through Ukraine have fallen dramatically since the end of 2019 and Turkish transit that can reach southern European nations has been slowly increasing. (See Figure 5.)

**Figure 5: EU Imports of Gas From Russia by Supply Route, 2017-2020**



Nord Stream 2 was planned as a duplication of Nord Stream, having the same capacity of 55 bcm and the same route. If Nord Stream 2 comes into operation, the flow of gas through the Baltic Sea that bypasses Ukraine could be as much as 110 bcm per year.

## Europe Needs to Diversify Energy Sources, Not Energy Routes

Today's gas crisis has clearly demonstrated that even with a massive gas buildout to achieve a secure supply of gas to the continent, the EU's dependence on Russian gas has not been reduced. At the same time, overinvestment in gas infrastructure has encouraged over-reliance on gas itself, slowing investments in energy alternatives while making Europe's energy system vulnerable to stranded assets as the global renewable energy transition advances.

The N-1 measure for security of gas supply has encouraged the construction of more gas pipelines and LNG terminals. The main beneficiaries of this buildout have been Europe's gas TSOs. Under the rate-of-return regulations, the gas infrastructure companies earn a guaranteed rate of return for all approved capital investments. The more pipelines they build, the more revenues they receive. Research has shown that companies systematically overinvest in capacity if regulations allow them to earn guaranteed returns that are higher than the required return on capital.<sup>12</sup>

**The current crisis shows overreliance on a single gas supplier and a single energy source undermines energy security.**

The current energy crisis in Europe has shown that overreliance on a single gas supplier (Russia) and a single energy source (gas) has undermined the continent's energy security. Looking to the future, the EU needs to redefine energy security not as diversity of gas infrastructure, but as a true diversity of energy sources that are immune to political influence and can lessen the risk of future energy crises. An effective energy security policy would encourage major investments in renewable energy sources, efficiency and electrification, to diversify away from gas. The European Green Deal—Europe's new growth strategy,<sup>13</sup> which seeks to transform the EU into a climate-neutral economy by 2050—covers all sectors of the economy and embraces various policy areas.<sup>14</sup> But questions remain about the EU's ability to wean itself off gas, especially given the power of the gas industry.

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<sup>12</sup> IEEFA. [Gas in Spain: Oversupplied and Overcompensated](#). September 2021.

<sup>13</sup> European Commission. [A clean energy transition](#).

<sup>14</sup> Switch2Green. [The EU Green Deal—a roadmap to sustainable economies](#).

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