

March 2022

The EU plan to reduce Russian gas imports by two-thirds by the end of 2022: Practical realities and implications

Introduction

On 8 March 2022, the European Commission published a communication entitled ‘Joint European Action for more affordable, secure and sustainable energy’.¹ According to the accompanying press release, the communication presents the “outline of a plan to make Europe independent from Russian fossil fuels well before 2030, starting with gas, in light of Russia’s invasion of Ukraine”.² The communication notes that EU gas imports from Russia in 2021 (pipeline and LNG combined) totalled 155 billion cubic metres (bcm), and states that this could be reduced by two-thirds (101.5 bcm) before the end of 2022. At the same time, the communication notes that “The Commission intends to present by April a legislative proposal requiring underground gas storage across the EU to be filled up to at least 90% of its capacity by 1 October each year”.³ Given that EU gas storage capacity is around 100 bcm (1,110 TWh), this implies a stockholding of 90 bcm by 1 October.

In order to meet the target, the communication proposes the following estimates:

1. Increase imports of liquefied natural gas (LNG) by 50 bcm
2. Increase pipeline gas imports by 10 bcm
3. Increase biomethane production by 3.5 bcm
4. EU-wide energy saving to cut gas demand by 14 bcm
5. Rooftop solar to reduce gas demand by 2.5 bcm
6. Heat pumps to reduce gas demand by 1.5 bcm
7. Reduce gas demand in the power sector by 20 bcm by deployment of wind and solar

Overall, non-Russian gas supply is proposed to be increased by 63.5 bcm and gas demand to be reduced by 38 bcm – This would be sufficient to displace 101.5 bcm of Russian gas imports. Regarding gas storage, stocks are likely to be between 20 and 25 bcm by the end of winter (1 April). This implies that summer injections of around 65-70 bcm will be needed to bring stocks up to 90 bcm by 1 October 2022. Given that the net injection into European gas storage between 1 April and 1 October 2021 was 45.5 bcm, storage injections between 1 April and 1 October 2022 need to be around 20-25 bcm higher

¹ European Commission, 2022. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS REPowerEU: Joint European Action for more affordable, secure and sustainable energy. COM/2022/108 final. 8 March. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A108%3AFIN>

² European Commission, 2022. REPowerEU: Joint European action for more affordable, secure and sustainable energy. *Press Release*, 8 March. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511

³ Ibid.

than in the same period in 2021. This actually adds to the need for gas in 2022, so the target gas requirement is 121.5 - 126.5 bcm, not just replacing the imports from Russia of 101.5 bcm.

This Insight focuses on the immediate short-term impact of the measures proposed in the European Commission communication and discusses the gas supply diversification measures in points 1 to 3 above (LNG, pipeline imports, and production, plus the impact of the storage obligation) and then the measures to reduce the demand for natural gas this year as set out in points 4 to 7 in the list above.

This Insight also only addresses the numerical analysis and does not unpack the legal ramifications of achieving this. Of particular relevance is the fact that the reduction in imports from Russia to the extent envisaged would take the level of imports to well below the take-or-pay (TOP) levels in the long-term contracts. Furthermore, we do not address the legal issues that may be involved in the support that may need to be given to EU member states to purchase gas for summer stockbuild (in relation to EU state aid provisions) and the EU regulations that may otherwise prevent increased consumption of coal for power generation (in relation to environmental policy and the Large Combustion Plants Directive).

The aim of this paper

Another point to note is the rate at which the European Commission proposes to displace the need for gas imported from Russia. The text of the communication itself refers only to the volume of gas that could be “replaced by the end of 2022”.⁴ Likewise, the press release that accompanied the communication states:

“Full implementation of the Commission's ‘Fit for 55’ proposals would already reduce our annual fossil gas consumption by 30%, equivalent to 100 billion cubic metres (bcm), by 2030. With the measures in the REPowerEU plan, we could gradually remove at least 155 bcm of fossil gas use, which is equivalent to the volume imported from Russia in 2021. **Nearly two thirds of that reduction can be achieved within a year**, ending the EU's overdependence on a single supplier.”⁵

Finally, the ‘Questions and Answers’ document published alongside the communication states that “Already before the end of the year REPowerEU could result in the EU's gas demand going down by volumes equivalent to two thirds of Russian gas imports from last year”.⁶

To be clear, this paper addresses the potential for EU-27 gas imports from Russia to be 101.5 bcm lower in 2022 than in 2021 (or even 121.5 - 126.5 bcm lower, if the storage target is included).

⁴ European Commission, 2022. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS REPowerEU: Joint European Action for more affordable, secure and sustainable energy. COM/2022/108 final. 8 March. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2022%3A108%3AFIN>

⁵ European Commission, 2022. REPowerEU: Joint European action for more affordable, secure and sustainable energy. *Press Release*, 8 March. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511

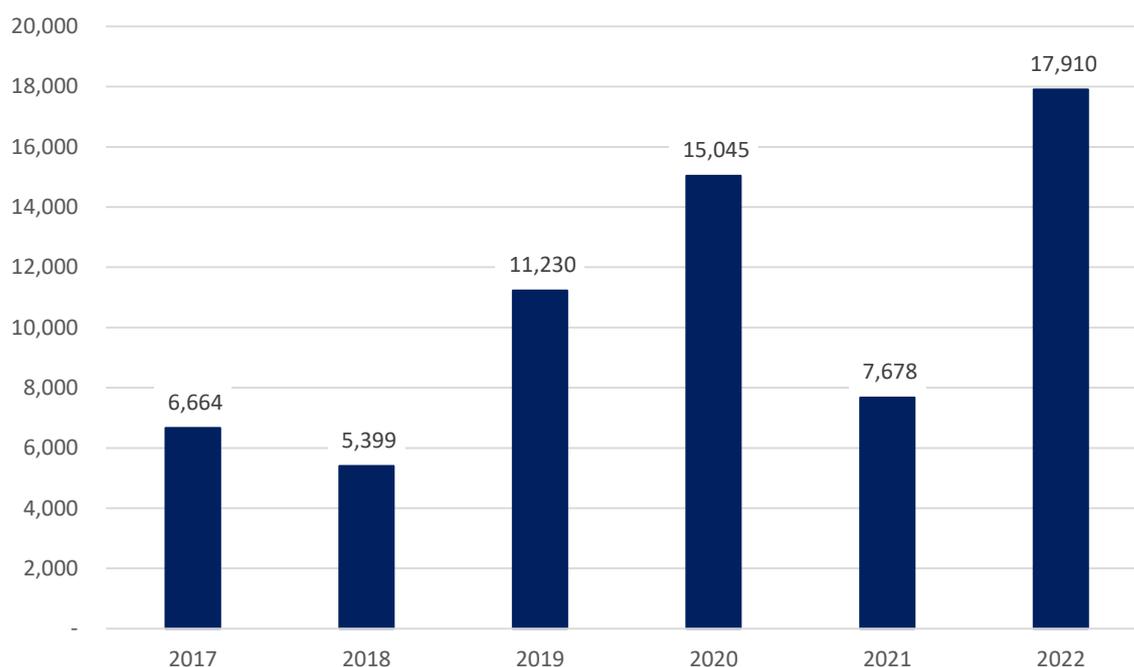
⁶ European Commission, 2022. Questions and Answers on REPowerEU: Joint European action for more affordable, secure and sustainable energy. *Press Release*, 8 March. https://ec.europa.eu/commission/presscorner/detail/en/qanda_22_1512

1. Step 1 - Can the EU import 50 bcm more LNG in 2022 than in 2021?

The bulk of the heavy lifting – almost half – in replacing Russian imports is to be achieved by importing 50 bcm more LNG compared to 2021. It is worth noting that, in the first two months of 2022, LNG imports into the EU were already around 10 bcm higher than in 2021.

Adding in the non-EU members, UK and Turkey – the UK especially might be crucial – LNG imports into Europe were 11.3 bcm higher year-on-year.⁷ Achieving a 50 bcm year-on-year increase will face several issues addressed below, although some 30 bcm of this is likely achievable.

Figure 1: EU-27 LNG imports in January and February combined (mmcm)



Source: Data from Kpler, graph by the author

Does the EU have enough regasification capacity to take an additional 50 bcm?

In 2021, the EU imported some 77 bcm of LNG. Adding in the UK and Turkey takes that figure to 108 bcm. As shown in the table below, compared to the level of regasification capacity, there would appear to be plenty of spare capacity available in the EU, as utilisation was around 50 per cent. However, a substantial amount of the EU's LNG import capacity is in Spain and Portugal. The pipeline capacity between Spain and France is just 7.5 bcm per year, while flows on this route totalled just 0.5 bcm in 2021. The existence of 7 bcm per year of available pipeline capacity from Spain to France is a serious bottleneck to utilising the 36.2 bcm of LNG import capacity that was unused in Spain and Portugal in 2021, as illustrated in the table below.^{8 9 10} The EU less Iberia (also deducting Malta) would not appear to have enough capacity to import an additional 50 bcm of LNG to the markets that actually need it.

However, Spain has large-volume pipeline supply contracts with Algeria, as does Italy, and it is possible, either within the contract terms or by requesting some flexibility, that Algeria could send more pipeline gas to Italy and less to Spain, with Spain making up any shortfall by importing more LNG. This may not

⁷ Data from Kpler

⁸ The Pirineos Virtual Interconnection Point (VIP) on the Spain-France border (which covers the Irun/Biriattou and Larrau physical interconnections) is listed as having 224.4 GWh/d (20.4 Smcm/d) of capacity from Spain to France, which equates to around 7.5 bcm. In 2021, flows from Spain to France via this route totalled 0.5 bcm.

⁹ ENTSOG, 2022. *Transparency Platform*. <https://transparency.entsog.eu/#/map>

¹⁰ ENTSOG, 2021. *Transmission capacity map 2021*. <https://www.entsog.eu/maps#transmission-capacity-map-2021>

be sufficient, however, to achieve the 50 bcm target increase. A more likely option is that the UK would import more LNG and effectively re-export those volumes to the EU via the Interconnector and BBL pipelines, as it seems to have been doing in the last few months. The UK's large amount of LNG import capacity makes this a very viable option. The pipelines connecting the UK with the Netherlands and Belgium have a combined capacity of 31 bcm per year (25.5 bcm to Belgium and 5.4 bcm to the Netherlands), which is slightly higher than the spare capacity at UK LNG import terminals in 2021.

According to Argus, there is also the possibility that the import capacity of the Gate Rotterdam LNG import terminal could be expanded from 12 bcm per year to 20 bcm per year in 2022, but the details as to how this could be achieved are not available. Gasunie has also floated the possibility of leasing a 4 bcm per year capacity floating LNG import facility. The Dutch Economy Ministry is reportedly working with Gasunie and its subsidiary, GTS, on these plans, which it hopes to have "ready for next winter".¹¹ This increase of 8-12 bcm per year of LNG import capacity into the Netherlands could make a significant difference to total LNG imports into North-Western Europe, but may come too late to even partially address the import capacity bottleneck noted above.

Table 1: Europe LNG Imports and Capacity in 2021 (bcm per year)

	Capacity	Imports	Spare Capacity	Utilization Rate
Belgium	8.65	4.65	4.01	54%
Croatia	2.48	1.66	0.82	67%
Finland	0.65	0.27	0.38	41%
France	34.92	18.11	16.80	52%
Greece	6.67	2.42	4.24	36%
Italy	14.25	9.63	4.62	68%
Lithuania	3.79	1.56	2.24	41%
Malta	0.65	0.44	0.21	68%
Netherlands	11.51	8.42	3.08	73%
Poland	4.81	3.90	0.91	81%
Portugal	7.31	5.93	1.38	81%
Spain	54.38	19.59	34.79	36%
Sweden	0.89	0.49	0.40	55%
Turkey	30.73	14.06	16.67	46%
UK	46.16	16.62	29.54	36%
Total	227.86	107.76	120.10	47%
EU-27	150.96	77.07	73.89	51%
EU less Iberia	88.63	51.11	37.51	58%

Source: Data from Kpler, GIIGNL, NexantECA World Gas Model (WGM)

Therefore, while the key parts of the EU may be lacking in sufficient LNG import capacity, diverting some pipeline flows, using the UK as a landbridge, and potentially expanding Dutch LNG import capacity, together should ensure that there will be sufficient capacity to import an additional 50 bcm of LNG in 2022, compared to 2021, into Europe as a whole (including the UK and Turkey). This would increase total LNG imports to some 160 bcm – assuming that those supplies are available on the global market.

Is global LNG supply rising enough to help the EU meet the target?

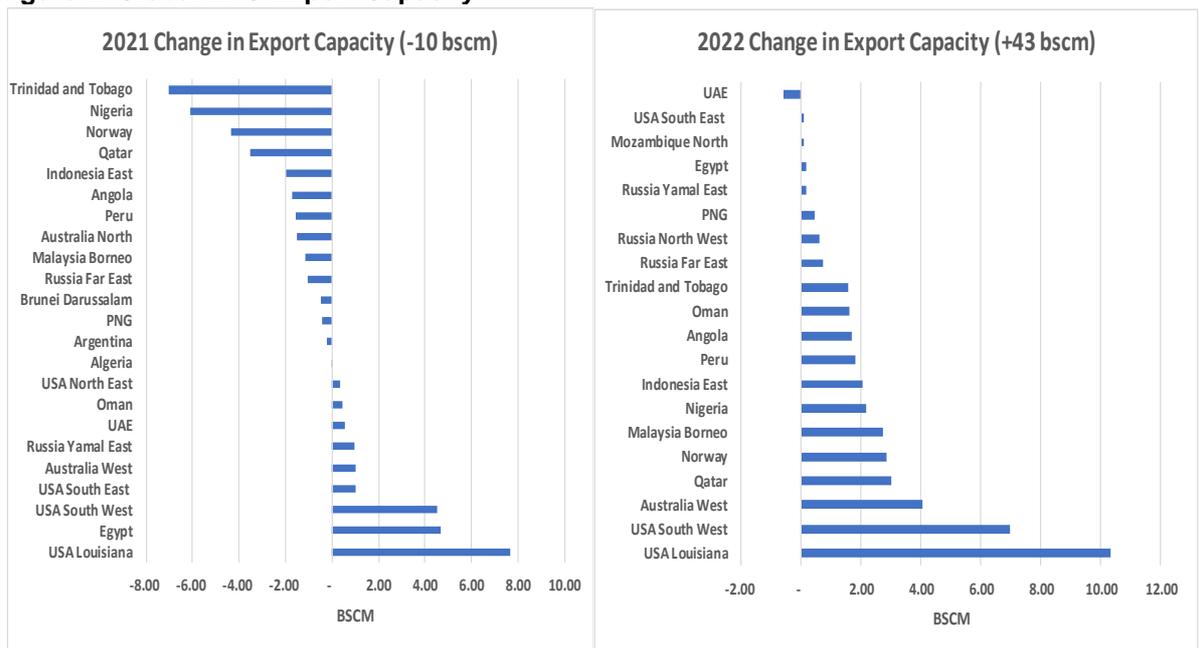
A key reason behind the sharp run up in wholesale gas prices in 2021 was the rapid rise in LNG demand outside Europe (primarily in Asia, but also elsewhere) occurring at the same time as constraints

¹¹ Argus, 2022. Dutch Gate LNG capacity could rise sharply this year. *Argus Direct*, 14 March (subscription required)



emerged on LNG supply. This supply constraint was due to many export plants having technical and feed gas issues during the year. As a result, global LNG export capacity actually declined in 2021, despite the continued rise in capacity in the USA. This issue has been reviewed extensively in previous OIES papers.^{12 13}

Figure 2: Global LNG Export Capacity



Source: NexantECA WGM

The year-on-year decline in available LNG export capacity¹⁴ in 2021 is estimated at some 10 bcm. In some cases, such as the export plants in Trinidad & Tobago and Nigeria, the decline was due to issues with feed gas supply, rather than the plants themselves. At other plants, there were temporary reductions due to technical issues and extended maintenance, for example, in Qatar, Indonesia, and Peru. Finally, the Hammerfest LNG export plant in Norway was taken completely offline by a fire in September 2020, but is expected to restart on 17 May 2022.¹⁵

It is estimated that overall global LNG export capacity will increase by some 43 bcm in 2022. A substantial proportion of this is from plants that were having technical issues and partial shutdowns in 2021 coming back online, plus a better feed gas outlook for the year. The only new capacity coming on in 2022 is largely restricted to the US. The expansion project at Sabine Pass (Train 6) came online in February 2022,¹⁶ while an entirely new export plant – Calcasieu Pass – loaded its inaugural commissioning cargo on 1 March 2022.¹⁷ However, not all of the capacity of these new supply sources

¹² Fulwood, M., and Sharples, J., 2021. Why are Gas Prices So High? *Oxford Energy Comment*, September. <https://www.oxfordenergy.org/publications/why-are-gas-prices-so-high/>

¹³ Fulwood, M., 2022. Surging 2021 European Gas Prices – Why and How? *Oxford Energy Comment*, January. <https://www.oxfordenergy.org/publications/surging-2021-european-gas-prices-why-and-how/>

¹⁴ Our calculation of available global LNG export capacity is nameplate capacity adjusted for regular maintenance, unplanned maintenance, technical and feed gas issues, and the ability of many export plants to produce above nameplate capacity.

¹⁵ Reuters, 2022. Equinor aims for higher-than-normal gas output in summer 2022 - executive. *Reuters*, 10 March. <https://www.reuters.com/business/energy/equinor-aims-higher-than-normal-gas-output-summer-2022-executive-2022-03-10/>

¹⁶ Cheniere, 2022. Cheniere Announces Substantial Completion of Train 6 at the Sabine Pass Liquefaction Project. *Press Release*, 7 February. <https://lngir.cheniere.com/news-events/press-releases/detail/238/cheniere-announces-substantial-completion-of-train-6-at-the>

¹⁷ Venture Global LNG, 2022. Venture Global LNG and JERA announce departure of inaugural commissioning cargo from Calcasieu Pass. *Press Release*, 1 March. <https://venturegloballng.com/press/venture-global-lng-and-jera-announce-departure-of-inaugural-commissioning-cargo-from-calcasieu-pass/>

will be available for the whole year as they ramp up volumes. The Coral Floating LNG (FLNG) production unit in Mozambique and the third train of the Tangguh LNG export plant in Indonesia are slated to come on in Q4 2022, but volumes would be very small.

There is clearly considerable uncertainty surrounding this projected rise in LNG export capacity. At the beginning of 2021, it was expected that capacity would increase, but because of the numerous issues noted above, capacity actually declined. Nevertheless, in the three months between December 2021 and February 2022, global LNG supply was some 6 bcm higher than in the previous year. This was partly because the technical issues at some plants were resolved and partly due to US LNG plants producing well above nameplate capacity. This suggests that we are at least on track to achieve a significant increase in LNG export capacity as Sabine Pass Train 6 and Calcasieu Pass ramp up. To the extent that these latter plants achieve full capacity sooner, then the rise in capacity could be even larger, but not much allowance has been made in the 43 bcm increase for new issues at export plants or delays in, for example, Hammerfest LNG and the Prelude FLNG in Australia returning to near or full production. Overall, however, the promising outlook for LNG export capacity would make the realisation of the EU importing another 50 bcm of LNG at least plausible from the perspective of global LNG supply.

What are the prospects for LNG demand outside Europe?

Although the LNG supply picture may be rosy, it is also important to consider the prospects for LNG demand from regions outside Europe. In 2021, the growth in LNG demand was very strong outside Europe. This was partly due to the cold northern hemisphere winter in the early part of the year and poor hydroelectric power generation performance in South America, especially in Brazil, which generated demand for LNG imports as gas-fired power generation covered the shortfall. Total global LNG imports rose by some 28 bcm, with the regions where there was growth adding some 34 bcm (China; Japan, South Korea, and Taiwan; Central and South America and the ASEAN countries). South Asia (where a decline in India was partially offset by growth in Pakistan and Bangladesh) and the Middle East were marginally lower, while North America and Europe declined by some 5 bcm in total, leading to the overall global net increase of 28 bcm.

For 2022, we might expect to see a decline in LNG imports in at least two regions. Japan, South Korea, and Taiwan may see a fall in imports, as growth was quite strong in 2021 (in South Korea especially). In Central and South America, the better prospects for hydroelectric power generation in Brazil and Chile are likely to reduce the need for LNG. In these two regions combined, LNG imports may decline by some 8 bcm. However, for the rest of the world outside Europe, the prospects under normal circumstances would be for relatively strong demand growth. China is projected to grow by some 13 bcm and the ASEAN countries by around 5 bcm, Middle East (Kuwait) may be higher by 1 to 2 bcm while South Asia is projected to be flat with imports into India and Pakistan being constrained by high prices, and the residual flows into North America also flat. The growth regions (with a total increase of 20 bcm) more than offset the declining regions to give a net growth of some 12 bcm.

These projections are of course uncertain, but would suggest that, when combined with the projected rise in export capacity, Europe could possibly get another 30 bcm or so of LNG imports (the projected 43 bcm rise in global LNG export capacity minus the 12 bcm net growth in LNG imports outside Europe). Unfortunately, there was little or no spare LNG export capacity in 2021 in the available export plants, so there is no slack to supplement the rise in export capacity in 2022.

Achieving the 50 bcm increase in LNG imports into the EU

The EU has the capacity to be able to receive another 50 bcm of LNG but, crucially, only if the UK is used as a landbridge to import the LNG and then re-export the regasified molecules to the EU. Specifically, the EU minus Spain and Portugal had 37.5 bcm of unused LNG import capacity in 2021. Spain and Portugal had a combined 36.2 bcm of unused capacity, of which only 7 bcm could have been delivered onwards to France via unused pipeline capacity on the Spain-France border. This means that even if all EU LNG import terminals outside Spain and Portugal were used at maximum capacity in 2022, and 7 bcm of LNG imported into Spain was re-exported by pipeline from Spain to France, the EU

would still need at least 5 bcm of LNG to be regasified in the UK and re-exported to the EU to hit the 50 bcm target.

In addition, some diversion of Algeria pipeline volumes from Spain to Italy might be possible, with Spain then importing more LNG. With a significant rise in global available LNG export capacity anticipated this year, there is the prospect of getting a long way towards the target. While LNG import growth outside Europe is expected to slow in 2022 compared to 2021, demand in China and in the ASEAN countries is expected to rise. The 50 bcm target increase suggests that at least 20 bcm of LNG would need to be diverted to Europe, primarily from the Asian markets, implying a reduction in LNG imports into almost all the Asian markets between 2021 and 2022. Price differentials between Europe and Asia may achieve some of this, helped by the flexibility of US LNG in particular, but some diversions of volumes contracted to the Asian markets may also be required.

There is a lot of uncertainty regarding prospective LNG supply LNG demand growth outside Europe in 2022, so the 50 bcm target would imply significant diversions. The implication here is that such diversions would only be achieved with sustained high European prices, at a premium to other markets. To the extent that LNG supply growth will be lower than we are projecting, and/or demand growth outside Europe is higher, then the 50 bcm target would seem even more ambitious.

Implications for the global LNG market and European prices

An important additional point to be concerns the implication of the EU importing an additional 50 bcm per year of LNG for global LNG prices. Because most of the Russian pipeline gas currently imported by Europe cannot be redirected to markets that currently import LNG, the net effect will be to tighten the global market. The ability of the European market to attract the year-on-year increase in global LNG supply and, furthermore, draw cargoes away from Asia, will require Europe to outbid buyers in other markets. In short, this is likely to place upward pressure on European wholesale gas prices, and sustain them at a high level for the next several years. Aside from questions of non-European gas demand, the global LNG market will encounter downward pricing pressure in the mid-to-late 2020s when the next round of LNG supply comes online (for example, the expansion of Qatari export capacity) and if/when the 'Power of Siberia 2' pipeline (which aims to enable Russian gas production currently dedicated to Europe to be exported to China) by around 2030. This increase in Russian pipeline supply could lessen the Chinese growth in LNG imports, leaving more LNG for the rest of the global market.

2. Step 2 - Can the EU increase pipeline gas imports by 10 bcm in 2022?

Pipeline imports from Norway

The largest non-Russian supplier of pipeline gas to the EU is Norway. Norwegian supplies are delivered to continental Europe by five pipelines: Franpipe (to Dunkerque, France), Zeepipe (to Zeebrugge, Belgium), Norpipe (to Emden, Germany), Europipe I and Europipe II (to Dornum, Germany). The routes of these pipelines are illustrated below.

Figure 3: Norwegian export pipeline system



Source: Norwegian Petroleum Directorate (NPD)¹⁸

As illustrated in the two tables below, the five pipelines delivering Norwegian gas to the EU operated at 86 per cent of their nominal annual capacity in the calendar year 2021, leaving 12.9 bcm of spare capacity on an annual basis. These flows have been remarkably consistent in recent years, within a narrow corridor between 79.9 bcm and 81.5 bcm per year between 2017 and 2021. The constraints on Norwegian exports to the EU are a combination of the nominal daily capacities of the relevant pipelines and the fact that, in reality, the capacity is reduced by the need for maintenance of both the pipelines and the fields that serve those pipelines. Therefore, the volume of 'real world' spare capacity is less than the mathematical difference between the nominal annual capacity (the daily capacity multiplied by 365) and the annual flow. As a consequence, it should be concluded that the Norwegian pipelines to the EU are running at closer to full capacity than the nominal figures in Figures 4 and 5 suggest.

Since July 2021, monthly average flows from Norway to the EU have been above 243 mmcm/d, and averaged 259 mmcm/d (effectively full daily capacity) in February 2022. If those rates are maintained for the rest of the year, Norwegian supply to the EU will be almost 13 bcm higher year-on-year. Such a dramatic increase in Norwegian annual production is not likely, but several announcements in recent months have indicated that an increase in Norwegian gas production and export should be expected.

¹⁸ NPD, 2022. *Illustrations and quick downloads*. <https://www.norskpetsroleum.no/en/interactive-map-quick-downloads/quick-downloads/>

In January 2022, Norsk Petroleum¹⁹ published a forecast for 2 bcm year-on-year increase in Norwegian gas production.²⁰ This increase was to be provided by the re-start of the Hammerfest LNG export terminal in May 2022. The terminal produced the equivalent of 6.45 bcm of natural gas in 2018, and production in H2-2022 would likely have added around 3 bcm to Norwegian production, implying a slight decline in production for pipeline export. In February 2022, the Norwegian Petroleum Directorate published a revised forecast for gas production in 2022, which implied a 5.15 bcm year-on-year increase in production.²¹ Most recently, Kjetil Hove, Equinor’s head of Norwegian output, told Reuters on 10 March 2022 that the company was examining ways to increase summer gas production, including by exporting gas that would normally be re-injected.²² On 16 March, the Norwegian Ministry for Petroleum and Energy announced that it had approved revised production permits for three fields, noting: “The approved applications for the Oseberg, Troll, and Heidrun fields will not increase the daily total Norwegian gas production significantly, but will contribute towards maintaining today’s high export volumes of Norwegian gas”.²³

Figure 4: Capacities of pipelines bringing Norwegian gas to continental Europe

	Capacity (bcma)	Capacity (mmcm/d)
Franpipe to Dunkerque (France)	20.0	54.8
Zeepipe to Zeebrugge (Belgium)	15.4	42.2
Pipelines to Germany, of which:	58.9	161.3
- <i>Norpipe to Emden</i>	(16.2)	(44.4)
- <i>Europipe I to Dornum</i>	(16.7)	(45.7)
- <i>Europipe II to Dornum</i>	(26.0)	(71.2)
Total	94.3	258.3

Source: Gassco.²⁴ Note that these numbers are in standard cubic metres. The annual capacity is the daily capacity multiplied by 365 – The ‘real’ annual capacity is likely lower, given maintenance downtime.

Figure 5: Utilization of pipelines bringing Norwegian gas to continental Europe in 2021

	Volume delivered (bcma)	Utilisation rate (%)
Franpipe to Dunkerque (France)	17.0	85.6%
Zeepipe to Zeebrugge (Belgium)	15.1	98.4%
Norpipe plus Europipe I/II (Germany)	49.3	83.7%
Total	81.4	86.3%

Source: ENTSOG Transparency Platform.²⁵ Note that these numbers are in standard cubic metres.

¹⁹ Norsk Petroleum is an informational website run jointly by the Norwegian Petroleum Directorate and Norwegian Ministry of Petroleum and Energy.

²⁰ Norsk Petroleum, 2022. *Production Forecasts*. (See the graph: Historical and expected production in Norway, 1970-2026). <https://www.norskpetroleum.no/en/production-and-exports/production-forecasts/>

²¹ Norwegian Petroleum Directorate, 2022. Production figures January 2022. See ‘Background data (excel)’. Press Release, 22 February. <https://www.npd.no/en/facts/news/production-figures/2022/production-figures-january-2022/>

²² Reuters, 2022. Equinor aims for higher-than-normal gas output in summer 2022 - executive. *Reuters*, 10 March. <https://www.reuters.com/business/energy/equinor-aims-higher-than-normal-gas-output-summer-2022-executive-2022-03-10/>

²³ Norwegian Ministry for Petroleum and Energy, 2022. Enabling high Norwegian Gas Production. *Press Release*, 16 March. <https://www.regjeringen.no/en/aktuelt/justerte-produksjonstillatelser-legger-til-rette-for-a-oppretholde-dagens-hoye-gassproduksjon-utover-i-2022/id2904201/>

²⁴ Gassco, 2022. *Transport – Pipelines*. <https://www.gassco.no/static/transport-2.0/>

²⁵ ENTSOG, 2022. *Transparency Platform*. <https://transparency.entsog.eu/#/map>

Figure 6: Monthly average Norwegian gas flows to the EU in 2017-2022 (mmcm/d)



Source: ENTSOG Transparency Platform²⁶

In addition to its exports to the EU, Norway also exports pipeline gas to the UK. It does so primarily via the Langeled pipeline to the Easington gas receiving terminal, which also receives UK offshore gas production from the southern part of the North Sea. Norwegian pipeline gas is also delivered to the St Fergus gas receiving terminal. St Fergus receives a mixture of UK offshore production and Norwegian imports via multiple pipelines (including Frigg/Vesterled, FLAGS, and SAGE) from the northern part of the North Sea. According to UK government data, Norway supplied 21.8 bcm via Langeled, and a further 10.7 bcm to St Fergus, giving a total in 2021 of 32.5 bcm.²⁷

Given the high rate of utilisation of Norwegian pipelines delivering gas to France, Belgium, and Germany, there remains the theoretical possibility of increasing Norwegian pipeline supplies to the EU through increased flows from Norway to the UK, which could then be re-exported via the BBL and Interconnector to the Netherlands and Belgium, respectively. This would require increased flows of Norwegian gas to Easington and St Fergus. An important related point is the ability of National Grid to move the additional volumes around the UK gas transmission system, and the potential for bottlenecks as it does so.

Gassco states that the capacity of the Langeled pipeline – from Norway to Easington – is 75 mmcm/d.²⁸ According to National Grid, the single largest daily flow on Langeled arriving at Easington between 2017 and 2022 was 76.4 mmcm/d. In 2021, supplies via Langeled totalled 21.8 bcm, at an average of 60 mmcm/d.²⁹ This implies around 5.5 bcma of spare capacity on the Langeled pipeline, on an annual basis. However, as the graph below shows, since the beginning of October 2021, Langeled has generally operated at full capacity (aside from several brief downturns). A year-on-year increase in Norwegian supplies to the UK via Langeled would require the pipeline to operate at full capacity throughout the year, without the summer downturn seen in 2021.

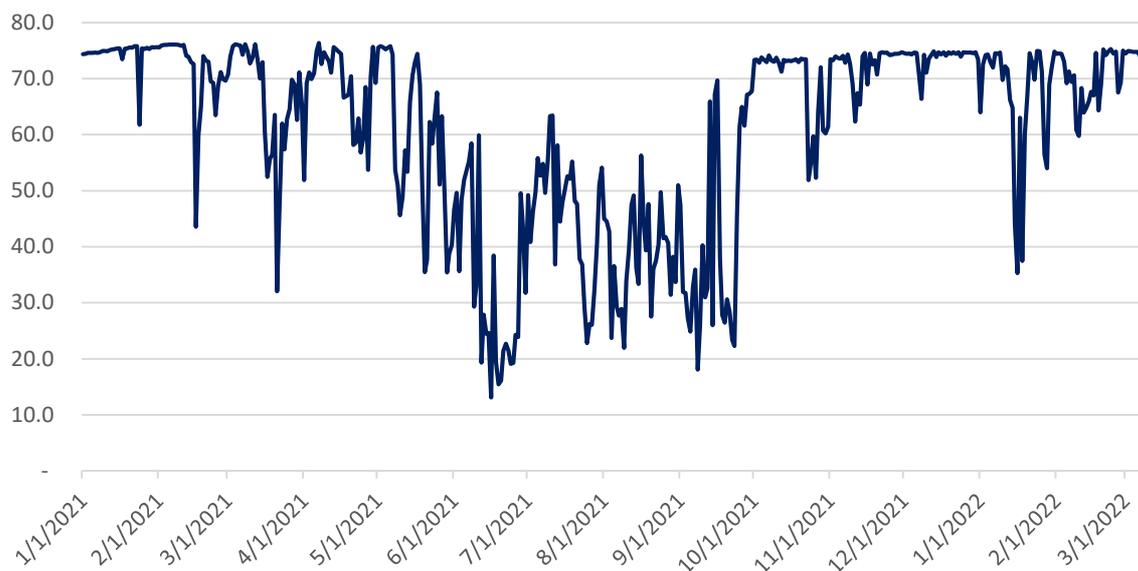
²⁶ ENTSOG, 2022. *Transparency Platform*. <https://transparency.entsog.eu/#/map>

²⁷ UK Government, 2022. *National Statistics: Energy Trends: UK gas - Natural gas imports (ET 4.4 - monthly)*. <https://www.gov.uk/government/statistics/gas-section-4-energy-trends>

²⁸ Gassco, 2022. *Pipelines and platforms – Langeled*. <https://www.gassco.no/en/our-activities/pipelines-and-platforms/langeled/>

²⁹ National Grid, 2022. *Transmission operational data – Data Item Explorer. Supplies – Daily Actuals – Volume – Easington (Langeled)*. <https://mip-prd-web.azurewebsites.net/DataItemExplorer/Index>

Figure 7: Daily gas flows from Norway to the UK via the Langeled pipeline (mmcm/d)



Source: Data from National Grid³⁰

Daily data is reported by both National Grid and ENTSOG for all volumes arriving in St Fergus, and Norwegian imports are not distinguished from UK production. Between October 2021 and February 2022, the monthly average flows into St Fergus generally left between 75 and 95 mmcm/d of spare capacity (50-63 per cent of the capacity of the receiving terminal). Gassco provides only historical data for nominations on the pipeline that it operates, Vesterled, but this does not cover flows of Norwegian gas into St Fergus via FLAGS or SAGE. Given that the pipeline system for bringing gas ashore was built to serve high levels of production that peaked almost two decades ago, there is substantial spare capacity on the pipelines themselves, but not the production volumes to make use of that capacity. By contrast, the Langeled pipeline is connected to fields with sufficient production to allow Langeled to flow at full capacity outside times of field or pipeline maintenance.

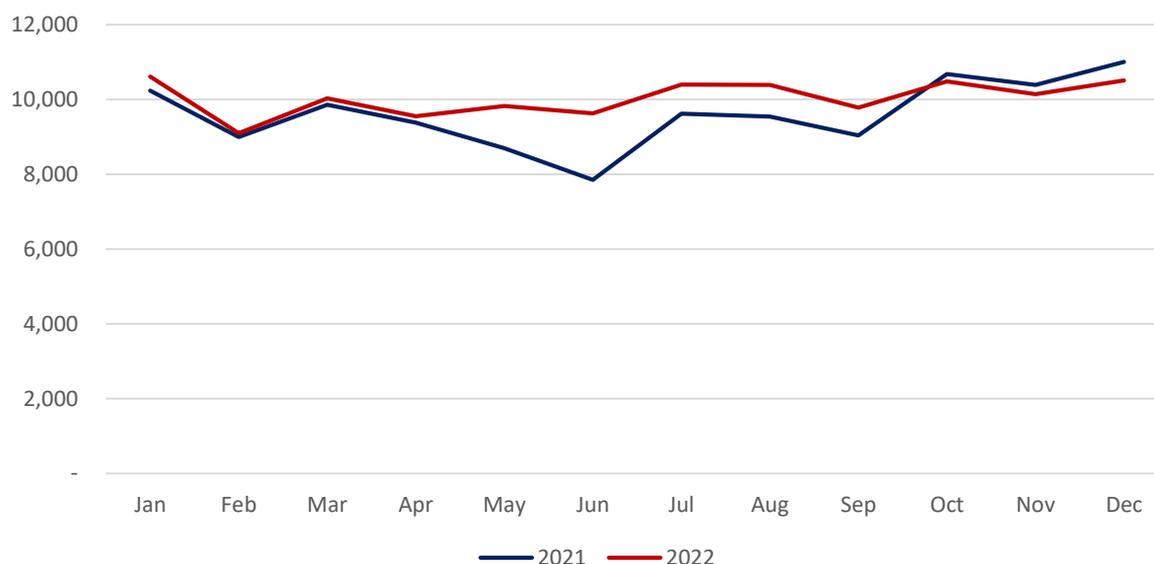
Therefore, higher Norwegian pipeline supplies to the UK would require the continued use of Langeled at its present high level (without a summer decline similar to that which occurred in 2021) and/or higher flows to St Fergus. Such a scenario is plausible, given the forecasts and statements by the Norwegian Ministry of Petroleum and Energy, Norwegian Petroleum Directorate, and Equinor noted earlier. A key point is that with historic record summer gas prices likely in 2022 (and the efforts by European buyers to reduce their purchases of Russian gas), those who produce and market Norwegian gas have every incentive to delay summer maintenance and maximise their production and exports. However, it is important to note that supply flexibility diminishes as output rises towards the daily maximum, as it has done in recent months and is likely to continue doing so through the summer of 2022. The forecast year-on-year increase in summer Norwegian gas production is illustrated in the graph below.

A significant development is set to take place at the end of 2022, when Gassco expects to commission the system exit point that will allow delivery via Denmark to Poland on completion of the Baltic Pipe project. This will help Poland partially replace its Russian gas imports, when the long-term gas supply contract between Gazprom and PGNiG expires at the end of 2022.³¹

³⁰ National Grid, 2022. *Transmission operational data – Data Item Explorer. Supplies – Daily Actuals – Volume – Easington (Langeled)*. <https://mip-prd-web.azurewebsites.net/DataItemExplorer/Index>

³¹ Gassco, 2022. Record year for Norwegian gas exports. *Press Release*, 13 January. <https://www.gassco.no/en/media/news-archive/record-year-for-norwegian-gas-exports/>

Figure 8: Daily gas flows from Norway to the UK at St Fergus (mmcm/d)



Source: Norwegian Petroleum Directorate³²

Overall, the data for 2021 showed that Norway had spare pipeline capacity for additional deliveries to the EU and UK on an annual basis. However, the pipelines to the EU and the Langede pipeline to the UK have been operating close to effective full daily capacity since early October 2021, and especially since January 2022. Therefore, if the forecasts made in recent months for additional Norwegian production and exports are to be realised, it will certainly require higher utilization of export pipelines during the summer months, while the year-on-year increase in Q4-2022 is likely to be much more limited. The implication is that higher Norwegian supply volumes could help displace Russian pipeline supplies year-on-year in Q2 and Q3 2022, but may have a limited ability to do so in Q4-2022. The caveat here is that while nominal capacity is available on export pipelines during summer months, the utilisation of that capacity may require the deferral of maintenance on both offshore pipelines and at offshore production infrastructure.

Pipeline imports from North Africa

Pipeline imports to the EU from North Africa arrive via three pipelines: The Medgaz pipeline from Algeria to Spain, the Transmed pipeline (which carries Algerian gas from Tunisia to Italy), and the Green Stream pipeline, from Libya to Italy. A fourth pipeline, the Gas Pipeline Maghreb-Europe (GME), runs from Algeria to Spain via Morocco, but has not been used since 1 November 2021. The contract for gas transit via Morocco expired and was not renewed. Since then, Algeria has been delivering gas to Spain via Medgaz and in the form of LNG.³³

In 2021, Algeria delivered 6.1 bcm to Spain via the GME and 8.2 bcm via Medgaz – a total of 14.3 bcm.³⁴ Until December 2021, the capacity of Medgaz was 8.5 bcm per year, before it was raised to the

³² Norwegian Petroleum Directorate, 2022. Production figures January 2022. See 'Background data (excel)'. *Press Release*, 22 February. <https://www.npd.no/en/facts/news/production-figures/2022/production-figures-january-2022/>

³³ Elliott, S., and Baratti, G., 2021. Algerian gas supply via Morocco to Spain to end on contract non-renewal. *S&P Global Commodity Insights*, 1 November, <https://www.spglobal.com/commodity-insights/en/market-insights/latest-news/natural-gas/110121-algerian-gas-supply-via-morocco-to-spain-to-end-on-contract-non-renewal>

³⁴ Data from ENTSOG Transparency Platform

present level of 10.5 bcm per year.³⁵ Indeed, the daily flows in February 2022 averaged 29.4 mmcm/d, which would equate to 10.7 bcm per year.³⁶ Also in 2021, Algeria delivered 20.2 bcm by pipeline to Italy via the Transmed pipeline, while Libya supplied 3.2 bcm to Italy via the Green Stream pipeline. The capacity of the Transmed pipeline is reportedly 32 bcm per year (88 mmcm/d). Speaking to *La Liberté* on 28 February, the CEO of Sonatrach, Toufik Hakkar, stated that “The company has unused capacity on the trans-Mediterranean gas pipeline, which could be used to increase supplies to the European market”.³⁷

Between October 2021 and February 2022, flows via Transmed averaged 60 mmcm/d. This is broadly similar to winter flows in winter 2020/21 and implies 28 mmcm/d of spare capacity. Flows of an extra 28 mmcm/d would offer an additional 10.2 bcm per year to the European market. Given that flows on Transmed usually decline in the summer, the spare capacity – and, therefore, ability to provide additional volumes to Europe – would be even higher. The main constraint on Sonatrach delivering additional volumes to Italy is its ability to produce more gas. Although the US was reportedly in discussion with foreign producers in Algeria over the potential for increased output just over two weeks before the Russian invasion of Ukraine began,³⁸ recent analysis suggests that Algeria will struggle to offer substantial additional gas export in the near term, given that it is already producing at capacity and domestic demand is growing.³⁹ In his interview with *La Liberté*, Toufik Hakkar stated that, with regard to Sonatrach’s aims in 2022, “In terms of exports, we will continue to honour our commitments to our customers, particularly for natural gas, and we will place any surplus on the spot market, which is currently showing favourable conditions in terms of prices”.⁴⁰ The tone of these comments suggests that any such surplus will be limited.

Exports from Libya to Italy fluctuated between 4.3 bcm and 5.5 bcm per year between 2017 and 2020, before declining to 3.2 bcm in 2021.⁴¹ While a recovery to the levels of recent years could add 1-2 bcm to Libya’s gas exports, the recent political instability that has led to a drop in oil production suggests that gas production could also be at risk, and a cautious outlook would warn against forecasting an increase in Libyan gas exports.⁴²

Pipeline imports from Azerbaijan

From January 2021, a new source of supply reached the EU market: pipeline imports from Azerbaijan delivered to Greece and Italy via the Trans-Anatolian Pipeline (TANAP – on Turkish territory) and the Trans-Adriatic Pipeline (TAP – from the Turkey-Greece border to Italy). The capacity of TAP is around

³⁵ Elliott, S., and Baratti, G., 2021. Algerian gas supply via Morocco to Spain to end on contract non-renewal. *S&P Global Commodity Insights*, 1 November, <https://www.spglobal.com/commodity-insights/en/market-insights/latest-news/natural-gas/110121-algerian-gas-supply-via-morocco-to-spain-to-end-on-contract-non-renewal>

³⁶ ENTSOG, 2022. *Transparency Platform*. <https://transparency.entsog.eu/#/map>

³⁷ Salami, Y., 2022. Toufik Hakkar, Président-Directeur Général De Sonatrach: "Nous prévoyons d'investir 8 milliards de dollars en 2022". *La Liberté*, 27 February. <https://www.liberte-algerie.com/actualite/nous-prevoyons-dinvestir-8-milliards-de-dollars-en-2022-374011>

³⁸ Jewkes, S., Rashad, M., and Chikhi, L., 2022. U.S. reaches out to foreign producers in Algeria on gas options -sources. *Reuters*, 9 February. <https://www.reuters.com/business/energy/us-reaches-out-foreign-producers-algeria-gas-options-sources-2022-02-09/>

³⁹ Fakir, I., 2022. Given capacity constraints, Algeria is no quick fix for Europe’s Russian gas concerns. *Middle East Institute (MEI)*, 8 March. <https://www.mei.edu/publications/given-capacity-constraints-algeria-no-quick-fix-europes-russian-gas-concerns>

⁴⁰ Salami, Y., 2022. Toufik Hakkar, Président-Directeur Général De Sonatrach: "Nous prévoyons d'investir 8 milliards de dollars en 2022". *La Liberté*, 27 February. <https://www.liberte-algerie.com/actualite/nous-prevoyons-dinvestir-8-milliards-de-dollars-en-2022-374011>

⁴¹ Data from ENTSOG Transparency Platform

⁴² Mohareb, H., and El Wardany, S., 2022. Libya’s biggest oilfield halts production as crisis deepens. *Al Jazeera*, 3 March. <https://www.aljazeera.com/economy/2022/3/3/libyas-biggest-oil-field-halts-producing-as-crisis-deepens>

10 bcm per year, of which 8 bcm is intended for Italy and 1 bcm each for Greece and Bulgaria.⁴³ Bulgaria has yet to receive gas via TAP, due to delays in completing the Interconnector Greece-Bulgaria. That cross-border interconnection was due for completion in July 2022, but reports suggest that it could be delayed to the autumn of 2022.⁴⁴

According to ENTSOG, the capacity of TAP at Kipoi on the Turkey-Greece border is 31.5 mmcm/d, which equates to 11.5 bcm per year. Following the pipeline launch in January 2021, the ramp-up lasted for much of the first half of the year. Between June 2021 and February 2022, the monthly average flows at Kipoi were between 24 and 29 mmcm/d. Between 15 February and 9 March 2022, flows averaged 30 mmcm/d (equivalent to 10.95 bcm per year).⁴⁵ In 2021, flows at Kipoi totalled 8.1 bcm.⁴⁶ If the present rate of flow is maintained, EU imports from Azerbaijan could be 2.85 bcm higher year-on-year.

Total non-Russian pipeline supplies to Europe in 2022

Overall, it seems possible that Norwegian pipeline exports to the EU could increase by up to 8 bcm year-on-year if present export rates are maintained, although this appears to be ambitious in terms of total Norwegian gas production. Pipeline exports from Libya appear unlikely to increase, and if such an increase were to occur it would likely be limited to around 1 bcm. Algeria has spare capacity on its export pipeline to Italy, but statements by the Sonatrach CEO appear to suggest that any increase in exports (sold on the spot market) would be limited. Finally, an increase in imports from Azerbaijan appears likely, and could add almost 3 bcm to European supply. Overall, a 10 bcm year-on-year increase in non-Russian pipeline imports to the EU could possibly be achieved through a combination of around 3 bcm of additional supply from Azerbaijan, 2-3 bcm from Algeria, and 4-5 bcm from Norway, with the caveat that although the spare capacity on pipeline infrastructure is available, the increase depends on domestic production increases in each of those countries.

3. Step 3 - Can the EU increase biomethane production by 3.5 bcm in 2022?

Europe had about 20,000 biogas and biomethane plants in operation in early 2022 for a production of about 200 TWh in 2021 (18.2 bcm).⁴⁷ ⁴⁸ Biogas is essentially used locally for heat and power, but biomethane can be injected directly into the existing grids, and therefore, can be treated as indigenous production for the purpose of finding alternative sources to Russian gas.

There are increasing amounts of biogas being upgraded to biomethane but compared to the biogas sector, biomethane production is still in its infancy. According to the European Biogas Association (EBA)/Gas Infrastructure Europe (GIE) Biomethane Map,⁴⁹ there were 1,023 biomethane plants in Europe (including the UK and Switzerland) at the end of October 2021, of which, the EBA estimates 87 per cent are likely to be connected to the grid. This represented a 40 per cent growth year-on-year in capacity. France, Italy and Denmark registered the largest increase in the number of plants.

Thanks to the numerous plants installed in 2020, which would have been fully operational by 2021, biomethane production is likely to have reached record-breaking production levels in 2021, although the final figures were not yet fully consolidated at the time of writing. For instance, in France, one of the most dynamic markets for biomethane production in Europe, production reached 4.3 TWh in 2021, an

⁴³ Favasuli, S., and Hornby, G., et al, 2020. Turning on TAP: a shift in the European gas landscape. *S&P Global*, September. <https://www.spglobal.com/commodity-insights/plattscontent/assets/files/en/specialreports/naturalgas/turning-on-tap-a-shift-in-the-european-gas-landscape.pdf>

⁴⁴ Petrova, A., 2022. Bulgaria-Greece gas link launch could be delayed until autumn – report. *SeeNews*, 10 March. <https://seenews.com/news/bulgaria-greece-gas-link-launch-could-be-delayed-until-autumn-report-776536>

⁴⁵ ENTSOG, 2022. *Transparency Platform*. <https://transparency.entsog.eu/#/map>

⁴⁶ Ibid.

⁴⁷ Data from European Biogas Association (EBA)

⁴⁸ Conversion factor: 11 TWh = 1 bcm

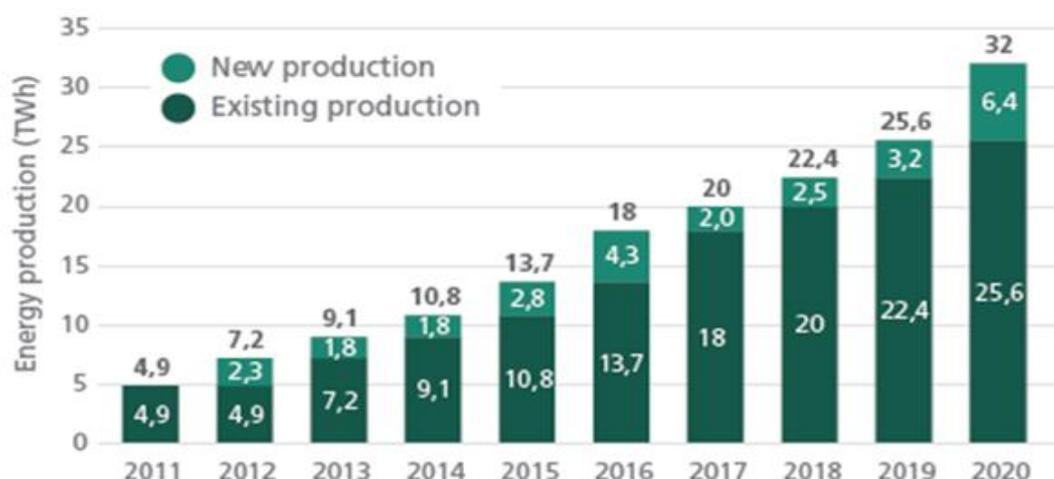
⁴⁹ European Biogas Association (EBA), 2021. *European Biomethane Map 2021*. <https://www.europeanbiogas.eu/biomethane-map-2021/>

increase of 96% year-on-year.⁵⁰ In 2020, biomethane production in Europe (including the UK and Switzerland) reached 32 TWh (2.9 bcm) [Figure 9 below].⁵¹ This was a 25 per cent growth from 2019 and the biggest year-on-year increase in biomethane production at the time, despite the pandemic.

Looking at the EU-27 and considering a similar increase, estimates would place biomethane production at about 29.6 TWh (2.8 bcm) in 2021, or about +0.5 bcm year on year. By contrast, the European Commission REPowerEU strategy aims for an additional 3.5 bcm by end 2022.⁵² In other words, biomethane production would need to increase by over 37 TWh and reach 67 TWh by the end of 2022 in the EU-27 alone – this would be a year-on-year increase of over 120 per cent.

Record high natural gas prices improve biomethane economics and one can expect government support to continue in countries where measures are already in place and even increase in countries not yet focusing on biomethane to help diversify gas supply options away from Russian gas and increase indigenous production, but additional growth of 3.5 bcm seems extremely optimistic.

Figure 9: Biomethane production in Europe, 2011-2020 (TWh)



Source: European Biogas Association⁵³

4. Steps 4–7 - Can the EU reduce gas demand by 38 bcm in 2022?

Overview

The REPowerEU communication proposes to reduce gas demand by 38 bcm in 2022, presumably taking 2021 as a base case.

Energy efficiency is listed as the first principle that should be applied across all policies and sectors (homes, buildings, industry and in the power system). Specific measures for demand reduction are described in two headings: “electrify Europe” & “transform industry”.

1/ For the latter (industrial sector), the main measures include gas savings and renewables targets, but there are no specifics regarding demand reduction by the end of 2022.

⁵⁰ Ministry of Energy Transition of France, 2022. Tableau de bord: biométhane injecté dans les réseaux de gaz - Quatrième trimestre 2021. *Press Release*, 25 February. <https://www.statistiques.developpement-durable.gouv.fr/tableau-de-bord-biomethane-injecte-dans-les-reseaux-de-gaz-quatrieme-trimestre-2021>

⁵¹ Data from EBA, Statistical Report 2021. Europe includes EU27 + UK, Switzerland, Norway, Serbia, Ukraine and Iceland. The two most important biomethane producers in non-EU27 countries were the UK and Switzerland

⁵² European Commission, 2022. REPowerEU: Joint European action for more affordable, secure and sustainable energy. *Press Release*, 8 March. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_1511 - table page 6

⁵³ European Biogas Association (EBA), 2021. *European Biomethane Map 2021*. <https://www.europeanbiogas.eu/biomethane-map-2021/>

2/ For “electrify Europe”, there are a few more details, which focus on “homes” and the “power sector”.

2.1. Homes

- Energy efficiency measures and savings. The proposal gives the example of saving 10 bcm by turning down thermostats for heating buildings by 1°C, however there is no indication whether this is an expected saving by end of 2022 or a target for 2030. The general objective is for 14 bcm to be replaced by end of 2022. (This seems to include any reduction from thermostat adjustments by consumers – a potential of 10 bcm – plus the impacts of additional energy efficiency measures and savings).
- Solar rooftops “front loading”: up to 15 TWh more to be installed within a year. Objective: 2.5 bcm to be replaced by end of 2022.
- Heat pump installations to be increased (“roll out front loading”) by “doubling deployment rate” (presumably taking the deployment rate in 2021 as a base case) resulting in a cumulative 10 million units over the next 5 years. Objective: 1.5 bcm to be replaced by end of 2022.

2.2/ Power sector

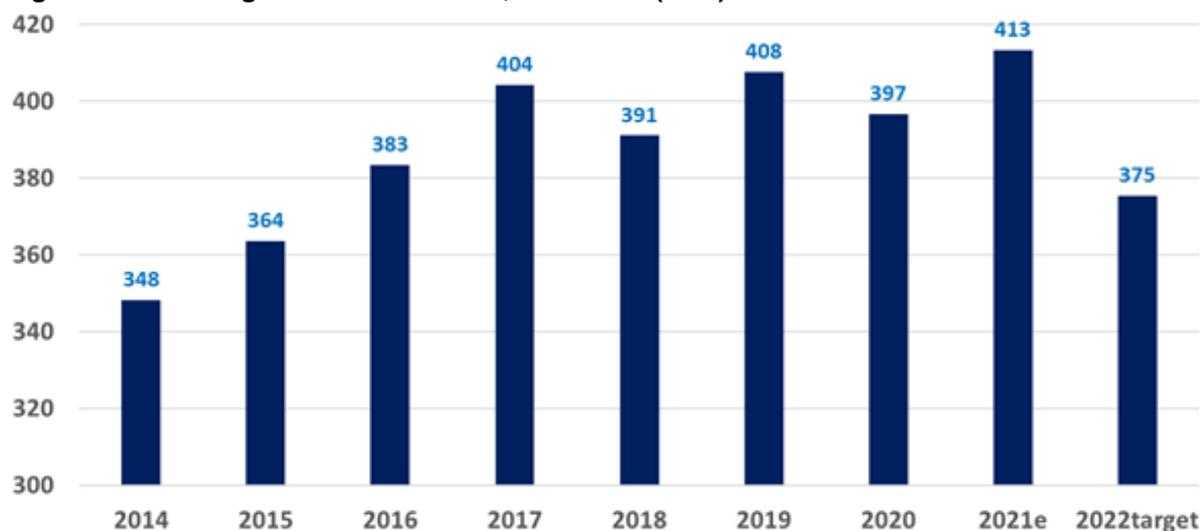
- Wind and solar “front loading” by increasing the “average deployment rate” by 20%, saving 3 bcm of gas. There are no details regarding what “average deployment rate” means and whether the 3 bcm saved can be achieved by the end of 2022 or 2030.
- The overall target for this sector is 20 bcm replaced by end of 2022.

The aim of this section is to look at these targets and consider what is practically possible by the end of 2022. There are several caveats:

- Even though an objective is practically possible on paper, that does not mean it will necessarily happen or that it could be done easily. A combination of market drivers and specific measures may be needed for any target to be met. External conditions will also be relevant, such as good availability of wind or hydro power and a warm winter. These circumstances are not analysed in the paragraphs below. They will be addressed in a subsequent paper.
- Likewise, this section provides an overall assessment of what could work at the regional level by the end of 2022. Because of the wide diversity among Member States, a country-by-country analysis will be necessary, and this will also be addressed in a subsequent paper with further analysis.
- The targets on gas demand reduction by the end of 2022 are likely to be based on the level of gas consumption in 2021. While provisional data for total demand is now available for most EU countries, consolidated data of gas use by sectors will not be available for a few months. The analysis is therefore based on estimates for 2021.

It is important to note that gas demand varies year on year due to a multitude of factors. For instance, temperatures influence the volume of gas used for heating in the winter, prices impact the competitiveness of gas used for industrial purposes and the place of gas in the generation mix, meanwhile, the availability of renewables and other fuels determines the need for gas (and coal) plants in electricity generation. There is no reason for all these drivers to be similar from one year to another, and gas demand fluctuates year on year as illustrated in Figure 10. In other words, all the measures listed in the EC proposal (energy efficiency, replacement of gas boilers by other sources and additional wind and solar capacity) will have an impact on how much gas is consumed in the EU in the coming years and maybe even months, but in the short term (certainly by the end of 2022), other, more important, factors are likely to be driving the level of gas demand in 2022. These drivers include external temperatures; the availability of wind and solar -especially at times of peak electricity demand-, of hydro and of nuclear in the power generation mix; the level of gas prices (and the degree of exposure to these prices) and consumers’ behaviours.

Figure 10: Annual gas demand in EU27, 2014-2022 (bcm)



Source: Data from Eurostat, author's estimate for 2021, 2022 calculated based on the EU proposal (-38 bcm in 2022)

In 2021, gas demand in the EU-27 reached 412.5 bcm.⁵⁴ It was 4.2 per cent higher than in 2020 and 1.4 per cent more than in 2019, the last pre-COVID year. Estimates⁵⁵ show that consumption increased in all three of the main sectors, which include the building sector (especially for residential heating),⁵⁶ the power sector (especially for electricity generation), and the industrial sector (especially manufacturing production).⁵⁷

The EU target is to reduce gas demand by 38 bcm by the end of 2022 (a reduction of 9 per cent). To put things in perspective, the decline in gas consumption in 2020 due to the impacts of the COVID-19 pandemic was only 11 bcm, and since then gas demand grew by almost 17 bcm year-on-year in 2021, reflecting the cold winter, economic recovery, and the importance of the gas-fired power plants in the EU mix last year.⁵⁸

A reduction of 38 bcm will therefore be very challenging. As seen in Figure 10, EU gas demand was even lower in 2014 and in 2015 than the 2022 target due to relatively warm winter months, high gas prices, and strong gas to coal switching in the power sector. The energy landscape has changed since 2014, especially the flexibility linked to gas/coal switching in electricity generation, suggesting that it may not necessarily be easy to reduce gas demand by the end of 2022 to levels seen just eight years ago. However, continued high gas prices will create an economic incentive for consumers (industrials, power generators and even end-consumers) to reduce their gas use and/or switch to other fuels.

⁵⁴ Data from Eurostat and author's estimates for some data in December 2021 that were not available at the time of writing.

⁵⁵ Author's estimates. Up-to-date data on gas use by sector is not easily available. Harmonized data at the regional level showing gas demand by country and by sector are made available with a time lag of several months. Some national data provided by TSOs show gas demand with only a few days or a few weeks' time lag. Some even provide a split by sector, however different (and often unclear) definitions and methodologies make it very difficult, if not impossible, to compare the evolution in 27 countries in a timely way.

⁵⁶ For more details on gas in the heating sector, see: Honoré A., 2018. Decarbonization of heat in Europe: implications for natural gas demand, *OIES Paper (NG 130)*. <https://www.oxfordenergy.org/publications/decarbonisation-heat-europe-implications-natural-gas-demand/>

⁵⁷ For more details on gas in industrial sector, see Honoré A., 2019. Decarbonization and industrial demand for gas in Europe, *OIES Paper (NG 146)*. <https://www.oxfordenergy.org/publications/decarbonization-and-industrial-demand-for-gas-in-europe/>

⁵⁸ For an overview of gas demand in Europe in 2021, see Honoré A. (forthcoming March 2022), A Series of Unfortunate Events' trilogy Demand-side factors in the European gas price rally in 2021

Expectations of economic recovery are also being revised down in Europe for 2022,⁵⁹ which will lower energy – including gas – consumption in the coming months.

Power sector

The European Commission REPowerEU strategy aims for a 20 bcm reduction in gas consumption in the power sector by the end of the year. Energy efficiency is encouraged in all sectors, and the document also refers more specifically to the deployment of additional solar and wind as the main measure to reach this target. Though not mentioned in the document, other options seem to also be considered. For instance, Frans Timmermans, who is leading the EC's work on the EU Green Deal, said that countries could 'stay longer with coal' before switching to renewables to avoid relying on gas.⁶⁰

In 2021, 432 TWh of electricity was produced from gas-fired power plants in the EU-27, entailing the consumption of about 100 bcm of natural gas.^{61 62} Following on from this, reducing gas used in power generation by 20 bcm would mean reducing gas-fired electricity output by about one-fifth (keeping the same conversion factor used for 2021), which is equivalent to 86 TWh. In other words, the EU needs to produce about 86 TWh of electricity from other sources in 2022 (or reduce its total electricity demand).

Could the EU-27 replace 20 per cent of its electricity from gas by the end of 2022, and if so, how? To be in line with the Green Deal and its emission targets, the replacements should essentially be in the form of renewables, as proposed in the REPowerEU strategy, but could also come from nuclear power (although this source is not specifically mentioned in the document). Finally, as proposed by Mr Timmermans, some electricity generation from gas may also be replaced by coal-fired power plants as most of the short-term response in this sector comes from coal/gas switching.

The best way to replace 20 per cent of electricity generation from gas by the end of 2022 will come from a combination of options, but the following paragraphs focus on renewables, nuclear and coal. As mentioned before, the objective is simply to look at the potential from the existing installed capacity in the EU, without advocating any specific source of replacement, calculating the impact on emissions or considering the wide diversity of existing capacity (and therefore different options available) and the various challenges (technical, physical, legal or regulatory) at the national level. This analysis also does not estimate the economic impact of these measures on producers or consumers, nor does it include an assessment of the potential reduction in electricity demand linked to high prices and the potential for slower economic growth in 2022 due to such high prices.

Could electricity generation from renewables increase by 86 TWh in 2022?

In 2021, 852 TWh of electricity were produced from hydro, wind and solar in the EU.⁶³ These three sources combined ran at an average 22 per cent load factor. The REPowerEU document suggests increasing the "average deployment rate" by 20 per cent. Without additional information, it is not possible to translate this into GW of expected increased capacity in 2022. So we used alternative scenarios for wind and solar. (We do not anticipate any significant increase in hydro capacity).

⁵⁹ The European Central Bank estimated before the invasion that the energy price shocks will reduce GDP growth by around 0.5 percentage points in 2022. See: European Commission, 2022. Questions and Answers on REPowerEU: Joint European action for more affordable, secure and sustainable energy. *Press Release*, 8 March. https://ec.europa.eu/commission/presscorner/detail/en/qanda_22_1512

⁶⁰ Mathiesen, K., Wanat Z., and Weise, Z., 2022. Coal not 'taboo' as EU seeks Russian gas exit. *Politico*, 3 March. <https://www.politico.eu/article/coal-not-taboo-as-eu-seeks-russian-gas-exit-says-green-deal-chief/>

⁶¹ 432 TWh: calculated from ENTSO-E data

⁶² 100 bcm: author's estimates using conversion factors calculated using IEA data. Eurostat data seems to use a different conversion and 432 TWh of electricity produced would entail more than 100 bcm of natural gas input in the gas-fired plants. Following up from this, 20 bcm of gas to be replaced in the power sector would mean that less electricity from gas needs to be replaced in 2022 compared to what we have used in the text, which is 86 TWh (and therefore the target would be potentially easier to reach).

⁶³ Calculated from ENTSO-E data

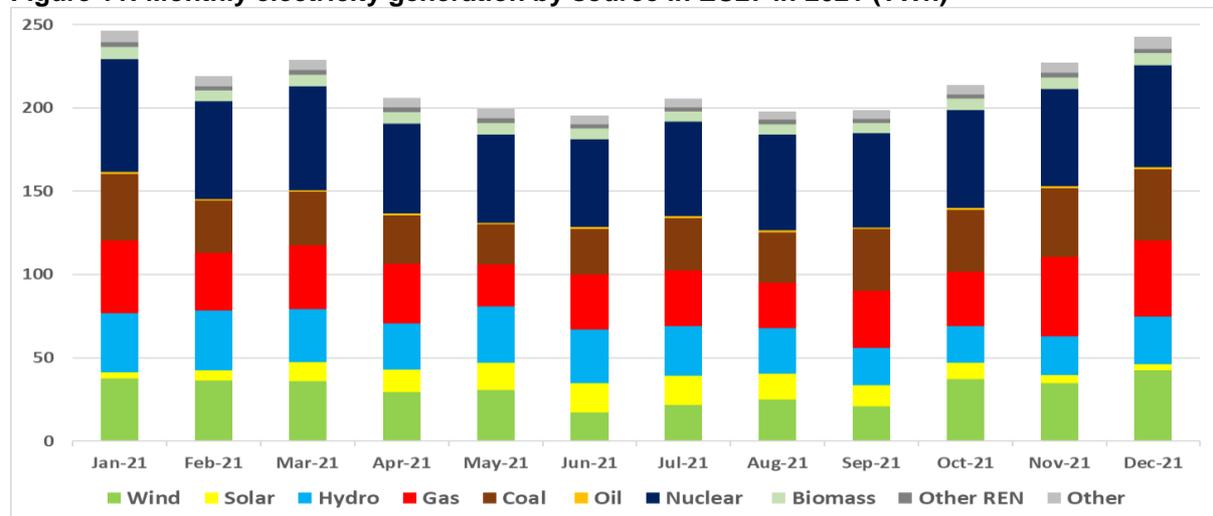


Wind Europe expects on average 18 GW per year of new wind farms between 2022-26⁶⁴ and Solar Power Europe envisages a medium scenario of about 30 GW of additional solar power in 2022.⁶⁵ If these additions happen, and the load factor remains roughly the same, these sources could cover the 86 TWh of additional generation in 2022 needed to replace 20 bcm of gas use in power

However, electricity generation from wind and solar is non-dispatchable, unlike gas-based generation.⁶⁶ Because of the nature of wind and solar resources, which vary according to environmental drivers, generation will fluctuate, as illustrated in 2021 in Figure 11. In other words, in some months wind and solar will be able to replace a large share of the gas generation, but in other months, they may only make a small contribution. In the short term, and certainly by the end of 2022, additional (dispatchable) sources will be needed to compensate (or better said, fluctuate with) the variations in renewable generation. Gas traditionally plays this role, but both coal and nuclear can also help to some extent.

Hydro generation is also an important source of flexibility, but its availability can vary depending on hydro stocks which, at the time of writing, were low in several parts of Europe (South, North and Central Europe^{67 68 69}). This means that flexibility or any additional generation above 2021 levels may be limited, at least in the first half of 2022.

Figure 11: Monthly electricity generation by source in EU27 in 2021 (TWh)



Source: Author, data from ENSTO-E⁷⁰

The following sections cover coal and nuclear, although they are not explicitly mentioned in the REPowerEU document as options to meet the target by the end of 2022.

⁶⁴ Wind Europe, 2022. *Wind energy in Europe: 2021 Statistics and the outlook for 2022-2026*. <https://windeurope.org/intelligence-platform/product/wind-energy-in-europe-2021-statistics-and-the-outlook-for-2022-2026/#downloads>

⁶⁵ Solar Power Europe, 2022. *EU market outlook for solar power 2021 – 2025*. <https://www.solarpowereurope.org/insights/market-outlooks/market-outlook>

⁶⁶ Dispatchable power generation can adjust their power output supplied to the grid according to the market needs. This is the case for gas-fired power plants for instance. On the contrary, wind and solar power generation depends on external factors (the wind blowing and the sun shining) and it cannot be turned on or off at will in order to meet fluctuating electricity demand. They are non-dispatchable sources of electricity

⁶⁷ Argus, 2022. Nordic hydro stocks continue at 11-year low. *Argus*, 9 March. <https://direct.argusmedia.com/newsandanalysis/article/2309945>

⁶⁸ Argus, 2022. Spanish hydro stock deficit over 30pc. *Argus*, 8 March. <https://direct.argusmedia.com/newsandanalysis/article/2309447>

⁶⁹ Argus, 2022. Romanian hydro stocks at a deficit. *Argus*, 7 March. <https://direct.argusmedia.com/newsandanalysis/article/2309037>

⁷⁰ ENTSO-E, 2021. *Transparency Platform*. <https://transparency.entsoe.eu/dashboard/show>

Could electricity generation from coal increase by 86 TWh in 2022?

In 2021, 403 TWh of electricity were produced from coal-fired power plants in EU-27.⁷¹ These plants ran at about 38 per cent load factor based on 122 GW of installed (and operational) coal-power plant capacity.⁷² If this capacity were to be run at about 46 per cent load factor, this could – in theory – cover the additional 86 TWh.

However, what works on paper is not necessarily as straightforward in reality. First, most of the flexibility comes from conventional plants that generate only electricity (as opposed to Combined Heat and Power Plants [CHPs]) using hard coal (rather than lignite, which traditionally already run baseload⁷³). These conventional plants using hard coal only represented about a third of the 2021 installed capacity. In addition, some plants have closed in the past months and more are expected to close in 2022 as most EU Member States plan to phase out coal in the 2020s (or 2030s). However, several countries and private companies are considering delaying shutting down their coal plants by a few months, using plants in reserve, and even possibly getting recently retired facilities back online in order to fill any potential shortages in the short term. The present high gas prices also create an economic incentive for generators to shift from gas power stations towards coal.

However, a further complication is that Europe also depends on Russia for coal. In 2020, imports accounted for 55 per cent of EU-27 consumption of hard coal, with Russia providing 49 per cent of those imports.^{74 75}

Could electricity generation from nuclear increase by 86 TWh in 2022?

In 2021, almost 700 TWh of electricity were produced from nuclear plants in the EU-27.⁷⁶ Some closures are expected later this year: the final reactors in Germany are to be shut down by the end of 2022, and Belgium is due to begin its nuclear phase-out in October 2022, but the latter might be reconsidered.⁷⁷

On the other hand, after being delayed by more than a decade, the first EPR⁷⁸ in Europe – the 1.7 GW Olkiluoto 3 nuclear reactor in Finland – came on stream in 2022. The 471 MW Mochovce 3 reactor in Slovakia is also expected later this year.

Adding these two plants to the 2021 capacity and increasing the load factor of nuclear reactors to 86 per cent (from 78 per cent in 2021) would – on paper – cover the 86 TWh that need to be replaced from gas in 2022. However, this appears to be challenging as some uncertainties exist regarding the availability of several reactors, especially in France where EDF revised its 2022 nuclear output estimate down,⁷⁹ and regarding the timing for full operation at the new reactors in Finland and Slovakia and the shutdown (or not) in Belgium.

All in all, 20 bcm less natural gas consumption in the power sector in 2022 appears to be challenging but possible. Renewables (wind, solar but also hydro), coal and nuclear would provide the bulk of the

⁷¹ Calculated from ENTSO-E data

⁷² Calculated from ENTSO-E data

⁷³ Their load factor was over 50% in 2021. Author's estimates

⁷⁴ Eurostat, 2022. Supply, transformation and consumption of solid fossil fuels.

https://ec.europa.eu/eurostat/databrowser/view/NRG_CB_SFF_custom_2282985/default/table?lang=en

⁷⁵ Eurostat, 2022. *Energy production and imports*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_production_and_imports#More_than_half_of_EU_energy_needs_are_covered_by_imports

⁷⁶ Calculated from ENTSO-E data

⁷⁷ Strauss, M., 2022. Belgian Greens make U-turn to consider nuclear plants extension. *Reuters*, 7 March.

<https://www.reuters.com/world/belgian-greens-make-u-turn-consider-nuclear-plants-extension-2022-03-07/>

⁷⁸ Originally referred to as either 'European Pressurised Reactor' or 'Evolutionary Pressurised Reactor', and now most often referred to simply as 'EPR'

⁷⁹ EDF, 2022. EDF updates its nuclear output estimate in France for 2022. *Globe News Wire*, 13 January.

<https://www.globenewswire.com/news-release/2022/01/13/2366919/0/en/EDF-updates-its-nuclear-output-estimate-in-France-for-2022.html>

replacement but other sources such as biomass or even oil⁸⁰ could also help to replace some gas generation (although mostly at the margin). In addition to fuel switching, any electricity demand reduction, likely to be driven by high prices, would also make it easier to reduce gas use in power generation, without having to replace it with any fuel.

To conclude, just considering the potential from the existing capacity to replace the equivalent of 20 per cent of gas generation in 2021 by the end of 2022, it seems that the potential exists if the EU wishes, or needs to, reduce its reliance on Russian gas quickly, at least at the regional level. Practicalities (national balances, emissions, regulation – for instance on running hours of coal plants, transmission and costs) will however still need to be examined, and will be in a subsequent paper.

“Homes” (residential) sector

The REPowerEU communication proposes an 18 bcm reduction in gas consumption in the heating sector by the end of 2022, more specifically, in the “homes” (residential) sector, which would include gas used by households for space heating, hot water, and cooking, but exclude gas used for heating purposes in the other sectors and in public buildings.

Energy savings / efficiency plus new installations of solar PV and heat pumps are cited as the main drivers for this reduction. The solar ambition is already covered in the previous section on the power sector. As for heat pumps, REPowerEU expects a faster deployment than was planned in the Fitfor55 proposal with “a cumulative 10 million units over the next 5 years”, This could mean a target of about 2 million additional heat pumps by the end of 2022. Focusing on heat pumps used primarily for heating purposes,⁸¹ there were 14.9 million units in the EU in 2020, the latest data available from EHPA.⁸² This represented an increase of 1.62 million since 2019 and covered about 6 per cent of the residential building stock in 2020. Exactly how much gas will be reduced by these two measures in the coming months is hard to predict, but at least the expected growth in installed capacity seems to be do-able, especially with additional support.

However, by the end of 2022, the main driver of gas demand for heating is still likely to be the external temperatures, and as a result, this 18 bcm target could – maybe – be achieved just with mild weather in the last few months of this year and with some active participation from the consumers (decision to heat less), as in 2014 for instance [Figure 12]. But it is unlikely to be possible if the weather is colder than in 2021.

However, because the first four months of 2021 were rather cold, as well as November and December,⁸³ a likely scenario is that gas demand for heating will not be higher – and indeed is likely to be lower – in 2022 than in 2021, unless another ‘Beast-from-East’ type of event occurs.⁸⁴

⁸⁰ Installed capacity of oil plants is limited but the IEA, in its 10-point program, mentioned the possibility to use alternative fuels, such as oil, within existing gas-fired power plants. See: IEA, 2022. How Europe can cut natural gas imports from Russia significantly within a year. *Press Release*, 3 March. <https://www.iea.org/news/how-europe-can-cut-natural-gas-imports-from-russia-significantly-within-a-year>

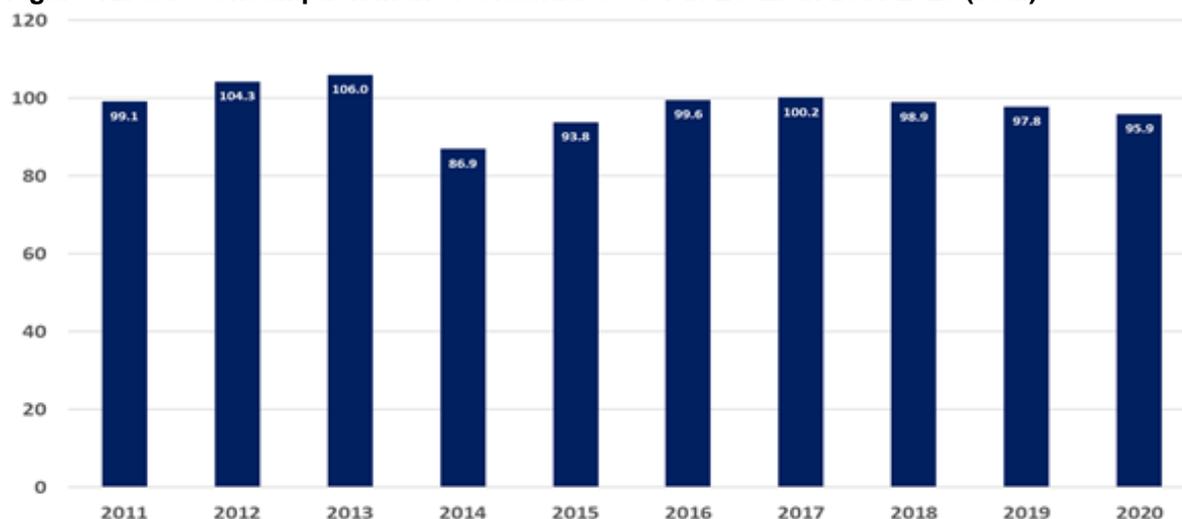
⁸¹ According to the reports on Heat Pumps by Eurobserv'er (<https://www.eurobserv-er.org/category/all-heat-pumps-barometers/>), there were 41.9 million Heat Pumps installed in EU27 in 2020. However, looking primarily at Heat Pumps used for heating, there were only 14.9 million heat pumps in EU27 in 2020 according to the 2021 “European Heat Pump Market and Statistics” report by the EHPA (<https://www.ehpa.org/market-data/market-report-2021/>)

⁸² <https://www.ehpa.org/market-data/market-report-2021/>

⁸³ See Honoré A. (forthcoming March 2022), A Series of Unfortunate Events’ trilogy Demand-side factors in the European gas price rally in 2021

⁸⁴ The ‘Beast from the East’ was a 10-day period of intense cold weather in the UK and Europe between the end of February and beginning of March 2018. See: BBC, 2018. Snow in Europe: Deadly winter storm brings chaos. *BBC News*, 2 March. <https://www.bbc.co.uk/news/world-europe-43251315> and BBC, 2018. Storm Emma: UK snow could reach 50cm as conditions worsen. *BBC News*, 2 March. <https://www.bbc.co.uk/news/uk-43236763>

Figure 12: Gas consumption in the residential sector in EU-27 in 2011-2020 (bcm)



Source: Data from Eurostat

Encouraging change in consumer behaviour (to lower the thermostat, turn off radiators in rooms not in use, and draw curtains to keep the heat in) would certainly help reduce gas demand for heating, but quantifying this impact is complex – not even mentioning the lack of timely data regarding energy used for space heating. The REPowerEU strategy – and the IEA’s 10 Point Plan⁸⁵ – mention the possibility of saving 10 bcm just by turning down the thermostat for buildings’ heating by 1°C. The important question, however, is how to motivate consumers to change their behaviour?

Gas demand for heating is very responsive to fluctuations in temperatures, but short-term price elasticity is relatively non-existent, or at best, limited. The degree to which end-use consumers would be affected by higher gas prices depends on various factors, including the type of contracts they have with their energy supplier, the share of their energy bill relative to their income, their access to alternative options for heating, and of course, government measures to shield small users from high energy prices.

Preliminary analysis between record-high prices in December 2021 and gas demand from smaller consumers in three countries shows diverse reactions and no clear correlation between the two variables. In other words, there was no similar reaction to higher wholesale prices,⁸⁶ confirming that unless consumers switch to other fuels such as solar PV and heat pumps – which is likely to have a limited impact by the end of 2022 – gas demand for space heating will be hard to predict.

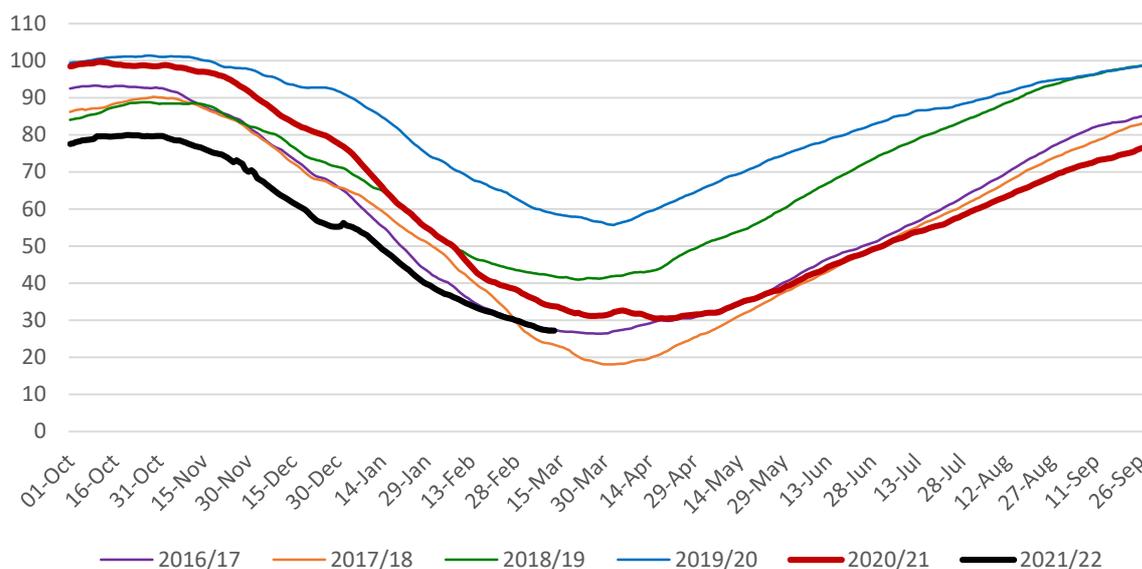
5. Can the EU increase seasonal storage stocks to 90 bcm by 1 October 2022?

In general terms, the European winter heating season lasts from 1 October to 1 April, and the summer season from 1 April to 1 October, with the ‘gas year’ beginning on 1 October. Since the 2016/2017 gas year, European storage stocks have peaked between 9 and 29 October (implying continued storage injections through part, if not most, of October), while minimum stock levels were reached between 20 March and 16 April. In three of the past five years, minimum stocks were reached between 29 March and 2 April. The graph below shows European storage stocks from the start of the gas year (1 October).

⁸⁵ IEA, 2022. How Europe can cut natural gas imports from Russia significantly within a year. *Press Release*, 3 March. <https://www.iea.org/news/how-europe-can-cut-natural-gas-imports-from-russia-significantly-within-a-year>

⁸⁶ See Honoré A. (forthcoming March 2022), A Series of Unfortunate Events’ trilogy Demand-side factors in the European gas price rally in 2021

Figure 11: EU-27 gas storage stocks



Source: Data from Gas Infrastructure Europe, graph by the author.⁸⁷

The EU-27 began the winter of 2021/2022 with seasonal storage stocks of 77.5 bcm on 1 October. By 1 March 2022, the stock level was 29.7 bcm. In the first 15 days of March, 2.9 bcm was withdrawn from European storage. A similar withdrawal in the following 17 days will see stocks of 23.5 bcm on 1 April. To reach 90 bcm of stocks by 1 October 2022 therefore requires around 66.5 bcm of storage injections in the months from April to September. For comparison, summer injections in 2020 (43 bcm) and 2021 (45 bcm) were significantly smaller, while the summers of 2017, 2018, and 2019 saw injections range from 58 bcm (2019) to 66 bcm (2018).

This implies that European summer injections in 2022 need to be around 20-25 bcm higher year-on-year, back to the volume injected between April and September 2018. So, not only does Europe need to combine 63.5 bcm of extra supply and 38 bcm of lower demand to offset 101.5 bcm of lower supply from Russia, but Europe also needs to find an additional 20-25 bcm for higher year-on-year storage injections.

6. Can the EU increase its own gas production in 2022?

It is notable that the Communication from the European Commission does not make any mention of increasing natural gas production in the EU-27, to offset the reduction in imports from Russia. This is an implicit recognition of the ongoing decline in EU gas production.

Dutch gas production in 2021 was 18.75 bcm,⁸⁸ comprising 6.8 bcm from Groningen and 12.0 bcm from the ‘small fields’.⁸⁹ The government is currently reluctant to use its powers to increase production at Groningen, or to extend its life, but in more severe market circumstances it might be persuaded to do so. Without such intervention, total Dutch production is unlikely to exceed 16 bcm in 2022, and could actually be lower. On 14 March 2022, the Dutch economy ministry announced that production at Groningen in the period October 2021-September 2022 would be 4.6 bcm.⁹⁰ Given that production at

⁸⁷ Gas Infrastructure Europe, 2022. *Aggregated Gas Storage Inventory (AGSI+)*. <https://agsi.gie.eu/#/>

⁸⁸ Standard cubic metres

⁸⁹ Argus Direct – Subscription required

⁹⁰ Argus, 2022. Groningen 2021-22 gas output estimated at 4.6bn m³. *Argus Direct*, 14 March. [subscription required]

Groningen between September 2021 and January 2022 was 1.4 bcm, this suggests that production between February and September 2022 will be 3.2 bcm, giving a total for January-September 2022 of 3.66 bcm. Given that production at the small fields is likely to stabilise (at best) or decline further (at worst) from the 2021 level, total Dutch production for 2022 (assuming no Groningen production beyond September 2022) is actually likely to be less than 16 bcm, a year-on-year decline of around 3 bcm.

In the rest of the EU outside the Netherlands, the ongoing gradual decline in gas production continues, with production falling from 39.2 bcm in 2017 to 27.6 bcm in 2020, and a further decline to 25.7 bcm in 2021. A substantial proportion of this decline is accounted for by Germany, Italy, Ireland, alongside smaller declines elsewhere, which are all unlikely to be reversed in the foreseeable future. In Denmark, the Tyra gas processing and export centre (which processes 90 per cent of Danish gas production) was shut down in September 2019 for extended maintenance and is now not expected to restart until June 2023.⁹¹ Moreover, Danish gas production is forecast to rebound only to 2.7 bcm per year by 2025.⁹² If another 2 bcm year-on-year decline occurs in 2022, the total decline in EU-27 gas production could be 5 bcm.

Outside the EU-27, there is no technical or commercial flex in UK gas production, but there is expected to be a modest recovery in 2022. Gross production fell sharply from 39.3 bcm in 2020 to 32.5 bcm in 2021 due to temporary shutdowns related to project-related offshore investment, and is expected to recover to about 35-36 bcm in 2022.⁹³ From an EU perspective, this additional UK production could help to increase the re-export from the UK to the EU of both pipeline imports from Norway and LNG from elsewhere.

Overall, gas production in the EU-27 is likely to decline modestly even if production at Groningen is preserved at its present level, and production is not halted in mid-2022 as planned. Otherwise, the decline may be steeper. In the event that the planned cessation of production at Groningen takes place, even the rebound in UK production will not be sufficient to prevent a modest overall decline in European (EU + UK) production.

7. Can the EU companies reduce their Russian pipeline gas imports?

A significant outstanding issue is how, in practical terms, a reduction of over 100 bcm in combined pipeline gas and LNG imports from Russia be achieved. If Gazprom – as the monopoly supplier of pipeline gas exports from Russia – chooses not to send the contractual quantities, thereby breaching the contracts, then that is clearly one way of reducing the imports. However, it is not clear why Russian suppliers would not reduce them to zero rather than just reduce them by two-thirds. In the absence of that, how does the EU force a two-thirds reduction?

In 2021, the EU imported some 14 bcm of LNG from Russia, none of which was directly contracted into the EU markets, so eliminating Russian LNG goes some way but that leaves an 85 bcm or so reduction in contracted pipeline imports. If achieved, this would leave pipeline imports from Russia of around 55 bcm. OIES estimates that the take-or-pay levels for Russian pipeline contracts to the EU are some 120 bcm in 2022 – over double the level to which the European Commission is seeking to reduce pipeline imports from Russia. While around 15 bcm of Russian gas may be delivered to Europe under contracts between Gazprom and Gazprom-owned subsidiaries (such as Gazprom Marketing & Trading Ltd or Gazprom Germania), that still leaves a substantial gap between the take-or-pay level and the target import level.

⁹¹ Energi Net, 2019. *Gas supply during the redevelopment of the Tyra gas field 2019-2023*. <https://en.energinet.dk/Gas/Tyra>

⁹² Elliott, S., 2022. Denmark hikes proportion of biogas in grid to 25%: grid operator. S&P Global Commodity Insights, 10 January. <https://www.spglobal.com/commodity-insights/en/market-insights/latest-news/natural-gas/011022-denmark-hikes-proportion-of-biogas-in-grid-to-25-grid-operator>

⁹³ UK Government, 2022. *National Statistics: Energy Trends: UK gas - Natural gas production and supply (ET 4.2 - monthly)*. <https://www.gov.uk/government/statistics/gas-section-4-energy-trends>

Could the EU tell the European buyers to nominate well below the take-or-pay levels, leaving them with an obligation to pay for gas not taken? If so, why should the buyers comply unless they were indemnified by the EU or their governments? If one of the intentions is to reduce foreign currency revenues to Russia, how is this achieved if the buyers still have to pay for the minimum take? If the buyers refuse to make the take-or-pay payment, then in any post-conflict legal case, Gazprom would likely win its case easily.

8. Will the reduction in imports from Russia be sustainable over several years?

Finally, it is worth raising the question of whether the reduction in gas imports from Russia will be sustainable over the next several years. Specifically, it appears that a substantial short-term effort to displace Russian supplies in 2022 will be difficult to achieve. However, the timeframe up to 2030 holds more potential for a significant ramp-up of efforts to both reduce final gas consumption (for example, through the roll-out of heat pumps and better insulation) and displace gas in power generation (through increased deployment of renewable sources of power generation). Nevertheless, there remains the question of what may happen in 2023-2025, when the initial effort is over but the long-term plans have yet to come to fruition.

On the supply side, the long-term trend is for decline in European gas production. If production declines more rapidly than demand, greater volumes of imports will be required. The rebound in Danish production in H2-2023 will only offset a quarter of Dutch production at Groningen in 2022, and production elsewhere in the EU will continue to decline. Pipeline imports from non-Russian sources are also unlikely to increase immediately post-2022, with gas production in Norway and Algeria seemingly already at capacity, and a decision yet to be taken on the expansion of the Trans-Adriatic Pipeline. In terms of the global LNG market, the significant scale-up of supply that took place between 2016 and 2022 is likely to slow down, before the next round of supply increase between 2025 and 2028 (being particularly driven by the expansion of Qatari LNG production capacity and the likelihood of FIDs on US export projects in 2022/2023 that could come to fruition in 2026-2028). If non-European (and particularly Asian) LNG demand continues to grow as expected, the global market will become structurally tighter between 2023 and 2025, potentially lessening the supplies available for Europe.

On the demand side, while the European Commission could potentially relax its stance on environmental regulations and facilitate greater coal consumption in 2022, it is unlikely to maintain this relaxed stance for several years, and is instead more likely to put pressure back on companies to deploy renewable sources of power generation.

Overall, therefore, it is less a question of ‘if the EU-27 does not achieve its goal of reducing Russian gas imports by two-thirds in 2022, will it do so in 2023?’ and more a question of ‘will it be even more difficult to meet EU gas demand without Russian supplies in 2023 than in 2022?’

9. How does the EU plan compare with the IEA 10-point plan?

Before drawing conclusions in relation to the feasibility of the European Commission plan, it is also worth briefly comparing the REPowerEU strategy to the ten-point plan for reducing gas imports from Russia published by the International Energy Agency (IEA) on 3 March 2022.^{94 95}

1. While the European Commission aims for an additional 50 bcm of non-Russian LNG, the IEA aims for a more conservative figure of 20 bcm.
2. The Commission and IEA aim for an additional 10 bcm of non-Russian pipeline imports.

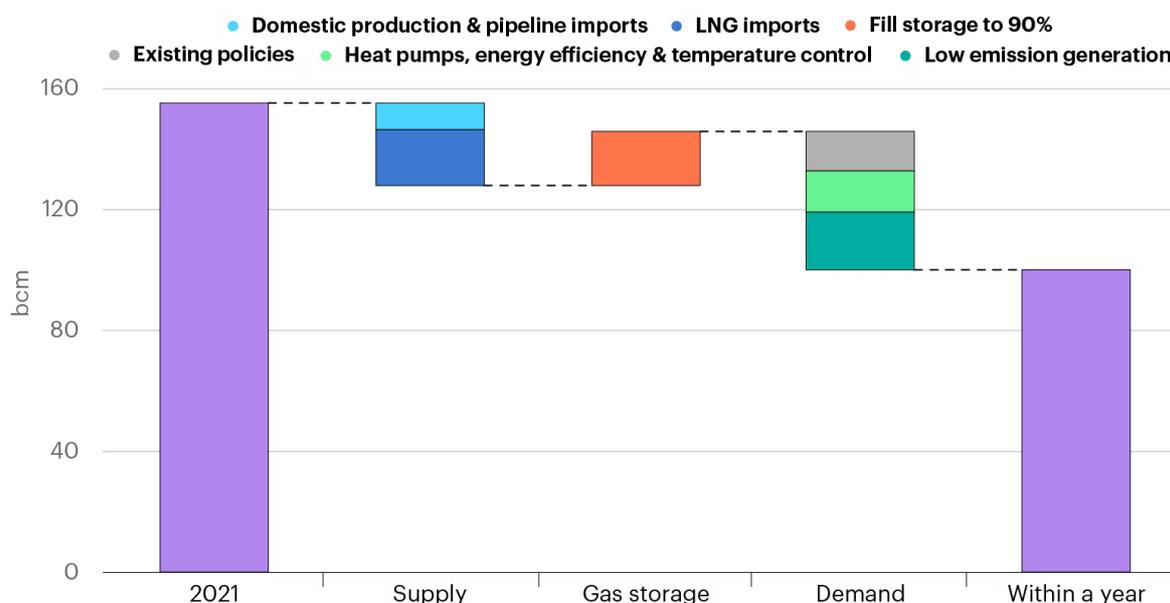
⁹⁴ IEA, 2022. How Europe can cut natural gas imports from Russia significantly within a year. *Press Release*, 3 March. <https://www.iea.org/news/how-europe-can-cut-natural-gas-imports-from-russia-significantly-within-a-year>

⁹⁵ IEA, 2022. *A 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas*. <https://www.iea.org/reports/a-10-point-plan-to-reduce-the-european-unions-reliance-on-russian-natural-gas>

3. The Commission aims for 3.5 bcm of additional biomethane production, while the IEA aims for reducing methane leaks by 2.5 bcm.
4. The Commission aims for 14 bcm of reduction in gas demand through energy efficiency measures, while the IEA aims for a 2 bcm saving through energy efficiency improvements in buildings and industry combined with encouraging “a temporary thermostat reduction of 1 °C by consumers” that would save 10 bcm per year of gas demand, to give a 12 bcm per year saving in gas demand.
5. The Commission aims for a saving of 1.5 bcm of gas demand through the deployment of heat pumps, while the IEA aims for a saving of 2 bcm.
6. The Commission aims for reducing gas demand for power generation by 20 bcm, plus an additional 2.5 bcm reduction in gas demand from the deployment of rooftop solar power generation. The IEA aims for an additional 70 TWh of power generation from existing dispatchable low emissions sources, reducing gas use for electricity by 13 bcm, plus an additional 35 TWh of generation from new renewable projects over the next year, over and above the already anticipated growth from these sources, bringing down gas use by 6 bcm. Therefore, the Commission aims for a 22.5 bcm reduction in gas demand for power generation, while the IEA aims for a reduction of 19 bcm.
7. The Commission and IEA both want storage to be 90 per cent filled by 1 October every year.

The implications of the IEA’s ten-point plan are summarised in the graph below.

Figure 12: The implications of the IEA ten-point plan to reduce EU gas imports from Russia



Source: IEA⁹⁶

In total, the European Commission proposes 63.5 bcm of new supply, compared to 32.5 bcm proposed by the IEA (LNG, pipeline imports, and biomethane/reduction of methane leaks). The European Commission aims to reduce gas demand by 38 bcm, while the IEA aims to reduce demand by 33 bcm. As a result, the European Commission aims to displace 101.5 bcm of Russian gas imports, while the IEA aims to displace 65.5 bcm. In addition, the IEA includes an 18 bcm year-on-year increase in storage injections in their calculations, thus limiting the reduction in imports from Russia to 47.5 bcm (around one-third of imports from Russia). As a result, while the European Commission aims for a two-thirds

⁹⁶ IEA, 2022. How Europe can cut natural gas imports from Russia significantly within a year. *Press Release*, 3 March. <https://www.iea.org/news/how-europe-can-cut-natural-gas-imports-from-russia-significantly-within-a-year>

reduction in EU gas imports from Russia in 2022, the IEA aims for a one-third reduction. The two plans are broadly similar, although the European Commission is significantly more ambitious in terms of EU LNG imports, and the impact of higher storage injections on the ability to meet its aims is not explicitly factored in, compared to the IEA ten-point plan.

Conclusion: How feasible is the seven-point plan?

This paper began from the premise of analysing the seven steps proposed by the European Commission in its REPowerEU strategy, which aims to reduce EU-27 imports of Russian gas by two-thirds by the end of 2022. The strategy notes that the EU imported 155 bcm of Russian gas in 2021, which implies that Russian imports could be reduced by 101.5 bcm. We interpret this as a proposal to reduce imports of Russian gas by 101.5 bcm year-on-year in the calendar year 2022.

Specifically, the first three steps (more non-Russian LNG imports, more non-Russian pipeline imports, and more biomethane production) aim to increase non-Russian gas supply by 63.5 bcm. The next four steps (EU-wide energy saving; rooftop solar; heat pumps; and a reduction of gas demand in the power sector) aim to reduce total gas demand by 38 bcm. Finally, the Commission also announced its intention to make a legislative proposal by April 2022 that would ensure that EU seasonal gas storage stocks reach 90 per cent of storage capacity by 1 October every year. Our conclusions regarding these seven points are summarised below.

1. Increase imports of liquefied natural gas (LNG) by 50 bcm

EU imports of LNG in January-February 2022 were already just over 10 bcm higher year-on-year. To maintain this increase, all capacity outside Iberia and Malta must be used, along with LNG imports into the UK that would be regasified and re-exported by pipeline to Belgium and the Netherlands. On the supply side, if global LNG supply rebounds in 2022 from its temporary disruptions and the new supply ramps up as planned, the strong growth in supply means that potentially LNG might be available. However, a significant volume of LNG would need to be diverted from other markets, Asia in particular. Therefore, even if European prices remain high enough to attract cargoes, it would require reductions in LNG imports in many Asian markets, including China, which may not be realised.

1. Increase pipeline gas imports by 10 bcm

A combination of imports from Azerbaijan (via TAP), North Africa (primarily Algeria), and Norway at the levels of the past several months, uninterrupted by unplanned outages, and sustained by postponing or limiting maintenance work, could just about provide an additional 10 bcm of pipeline supply to the EU, and sustained high prices will certainly motivate such supplies.

2. Increase biomethane production by 3.5 bcm

The scale of the year-on-year increase (120 per cent) in biomethane production necessary to meet this target is daunting, although the small volume of production in 2021 means that growth from a low baseline is easier than high-percentage growth from an already large volume.

4-5-6. EU-wide energy saving, rooftop solar and heat pumps to cut gas demand by 18 bcm in “homes”

Additional capacity of rooftop solar and heat pumps seems on track, but by the end of 2022, the main driver of gas demand for heating is still likely to be the external temperatures, and as a result, this 18 bcm target could – maybe – be achieved just with mild weather in the last few months of this year and with some active participation from the consumers. How to incentivise consumers to turn the thermostat down has not been addressed in this paper but will be of major importance. On the other hand, if the weather in 2022 is colder than in 2021, it is likely to be almost impossible to meet the 18 bcm target.

7. Reduce gas demand in the power sector by 20 bcm

This objective seems possible on paper, and a large share of the reduction could even – in theory – come from the deployment of additional wind and solar capacity. However, it is more than likely that switching to other sources would also be needed, essentially hydro, coal and/or nuclear. In addition, having the physical capacity to switch at the EU level (at least on paper) does not mean it will necessarily

happen unless the right incentives are in place and even so, it may not necessarily be easy considering the different situations in each EU Member State.

To conclude, for any reduction in gas demand, a combination of market drivers and specific measures may be needed for any target to be met. In addition, external conditions may also be required, such as good availability of wind and hydro in the power sector and a warm winter. Finally, we can expect high gas prices to trigger some demand reduction in all the sectors in the coming months, including in the industrial sector, for which no specific target has been set for 2022. This analysis did not estimate the potential reduction in gas demand linked to high prices nor the potential for slower economic growth in 2022 due to such high prices.

In addition to the seven-point plan, the European Commission will soon formally call for **90 bcm of EU gas storage stocks by 1 October 2022**. In physical infrastructure terms, there is no obstacle to such stock accumulation. Between 2011 and 2020, stocks at the end of October average 91 per cent of storage capacity (ranging from 84 per cent to 97 per cent). Between 2016 (when EU storage capacity reached its present level) and 2020, end of October storage stocks were between 88 and 101 bcm, at an average of 94 bcm.⁹⁷ So, stockholding of 90 bcm (90 per cent of storage capacity) at the start of winter is certainly not exceptional.

However, two significant challenges present themselves. Firstly, whether the physical volumes will be available at a time when supply from Russia is being shunned, given that such a stock target implies a 20-25 bcm year-on-year increase in storage injections compared to 2021. Secondly, whether holders of European storage capacity will have the commercial motivation to make substantial storage injections, given the high prices that are likely to prevail over the summer of 2022.

Overall, the achievement of the seven-point plan looks extremely challenging, even if we ignore the issues in relation to the contractual problems of reducing EU imports by two-thirds. While, on the supply side increasing pipeline imports from non-Russian sources by 10 bcm looks feasible, the 50 bcm rise in LNG imports only looks achievable if the strong supply growth we expect is realized, and the rest of the world actually reduces LNG consumption, which seems an unlikely outcome. The increase in bio-methane production also looks optimistic as does the displacement of 20 bcm of gas demand in the power sector solely through more solar and wind. Increased switching to more rooftop solar and heat pumps also seems unlikely before the end of 2022. Finally, the energy savings measures could be achieved relatively easily if the weather is mild at the end of 2021 but virtually impossible if it is colder. Once the requirement to increase the amount of gas in storage is added in, the actual requirement for gas demand reductions and/or increasing alternative sources of supply amount to some 120 to 125 bcm. If all the gas demand reductions were achieved, which we believe is unlikely, the gas supply requirement alone would be some 80 to 85 bcm. Getting halfway towards this through more LNG and pipeline imports might be achievable but much more than this, would require very large diversions of LNG from Asian markets, with significant consequences for global gas prices. Even then, there may simply not be enough supply in the world.

Looking beyond 2022, the prospect of maintaining the reduction, and indeed pushing down the import of Russian gas even further, could be even more challenging on the supply side in 2023 and 2024. EU gas production is likely to continue its decline, while non-Russian pipeline imports are unlikely to increase significantly. If anything, the LNG market is set to be tighter in 2023 and 2024, as non-European demand continues to grow, while the market waits for the next round of substantial supply additions in 2025-2027. The medium-term impact of the efforts to reduce gas imports from Russia will likely be continued higher prices and higher volumes of European LNG imports throughout the 2020s than may otherwise have been the case. The stated aim of the REPowerEU strategy to phase out EU dependence on Russian fossil fuels by 2030 – at least from a gas perspective – will depend strongly on demand-side measures, while the prospect for sustained high gas prices for much of the intervening period strengthens the case for investment in such demand-side measures.

⁹⁷ Gas Infrastructure Europe, 2022. *Aggregated Gas Storage Inventory (AGSI+)*. <https://agsi.gie.eu/#/>