

December 2022

Winter is coming: Can the German industry overcome the looming gas scarcity?

Introduction

Germany has the largest industrial sector in the European Union, and the largest industrial gas consumption in Europe. It is by far the largest European importer of Russian gas, and the interruption of Russian deliveries has forced Germany into the position of having to replace large volumes in a very short time, which is not the case for most other western European countries. Given that households and other smaller consumers are protected by European and German regulation, industrial customers are most likely to have to bear most of the burden of a looming gas tightness this winter.

If Germany fails to replace its Russian imports, cuts in industrial production could occur, which in turn would bring fundamental problems for the German GDP and, given Germany's strong position in the European market, would also affect other European countries. Instability in European energy markets would concern neighbouring countries and, given the important role of Germany's export industry, affect worldwide supplies of chemicals, machines, cars and basic goods such as cement and steel, among others.

The aims of this paper are (i) to discuss the role of gas in the industrial sector in Germany, (ii) to give an outlook on the gas supply situation for winter 2022/2023 and (iii) to provide an overview of the current legal and institutional framework governing the gas emergency plan.

The German gas balance at a glance

Germany has the by far largest gas market in the European Union and is the eight largest gas consumer in the world.¹ German gas consumption was around 93 bcm in 2021,² around 27 percent of total EU27 consumption.

Gas is the second most important energy source in the German energy mix (32 percent); only oil products have a higher share. As in most other countries in Europe (and worldwide), the role of gas has increased over the past 30 years. In 1990, gas accounted for 15 percent of the German energy mix and was exceeded by oil, lignite and hard coal.³

Germany depends greatly on gas imports as domestic recoverable resources are negligible. Domestic production only accounts for around 5 percent of total consumption, and more than 50 percent is

¹ See BP (2022), Statistical Review of World Energy, p. 31.

² According to official figures from the German Ministry of Economic Affairs and Climate Policy. We use 10.8 kWh per cubic metre as the conversion factor in this paper (see BMWK (2022), Energiedaten Gesamtausgabe, p. 0.2. <https://www.bmwk.de/Redaktion/DE/Artikel/Energie/energiedaten-gesamtausgabe.html>).

³ Source: AG Energiebilanzen; <https://ag-energiebilanzen.de/daten-und-fakten/bilanzen-1990-bis-2020/>

imported from Russia, around 30 percent from Norway, and the balance from The Netherlands and some other suppliers with minor shares.⁴

Table 1: German gas balance for 2021 (in bcm)

	Imports (incl. transit)	154.9
-	Exports (incl. transit)	71.2
=	Net Imports	83.7
+	Domestic production	4.6
+	Storage balance	5.6
-	Statistical difference	1.6
=	Total gas consumption	92.5
of which	Industry	34.3
	Households	28.7
	Power plants	11.2
	District heating	6.6
	Other sectors (commercials, transport etc.)	12.1

Source: Author's calculations based on BDEW (<https://www.bdew.de/service/daten-und-grafiken/gasfluss>)

German gas consumption has some specific characteristics. In contrast to other European countries, such as Italy, The Netherlands or the UK, the role of gas-fired power plants (even including CHP plants for district heating) is comparably low (only around 15 percent of electricity generation in 2021). On the other hand, German industrial demand is by far the largest in Europe. As shown in Table 1, industrial consumption accounts for 37 percent of total gas consumption. Also in a European context, the extraordinary role of German industry becomes clear: according to Eurostat, Germany accounts for over 26 percent of the EU27 industrial gas demand while the second largest user is France, which account for 13 percent.⁵ Given this, it is no surprise, that gas is the most important fuel for German industry (32 percent of total industrial energy consumption, followed by electricity with 30 percent).⁶

German gas consumption reached an all-time high in 2021.⁷ While this absolute demand trend is not unusual for many countries (as gas is one of the favourite sources to replace oil and coal), the development of sectoral gas demand differs from that of peer countries. In nearly all other EU countries the power sector was the key driver of gas demand over the last 20-25 years, and industrial consumption fell. According to ACER, gas consumption for electricity generation in the EU rose by 15 percent since 2000, whereas industrial needs decreased by 20 percent.⁸ In Germany, however, gas used for electricity generation increased by some 25 percent, with most of that increase in the first 10 years. After 2010 no further increase in gas could be observed (actually, in most years, gas use in power was lower than 2010) largely due to the rapid development of renewables. In contrast, industrial gas demand remained constant throughout the past two decades.⁹

⁴ Official German statistics show no breakdown to individual suppliers due to data privacy, so import shares have to be estimated. In most sources Russian supplies had a share between 50 and 55 percent. See for example BPB (2022), Deutschlands Abhängigkeit von russischem Gas: <https://www.bpb.de/kurz-knapp/hintergrund-aktuell/507243/deutschlands-abhaengigkeit-von-russischem-gas/>

⁵ Source: Eurostat; <https://ec.europa.eu/eurostat/web/energy/data/database>

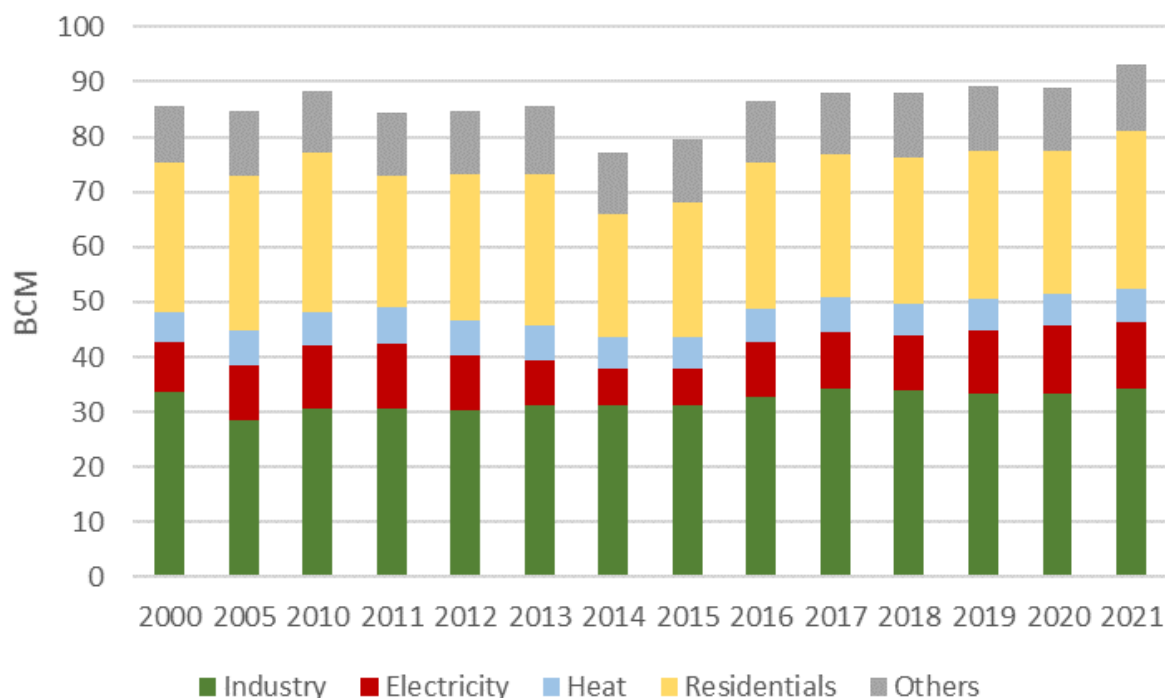
⁶ See AG Energiebilanzen (2022), Auswertungstabellen zur Energiebilanz Deutschland, September 2022, table 6.2.

⁷ See BP (2022), p. 32.

⁸ See ACER (2021), Key Facts about Gas in the EU: <https://www.acer.europa.eu/gas-factsheet>

⁹ All data taken from AGEBA (<https://ag-energiebilanzen.de/daten-und-fakten/bilanzen-1990-bis-2020/>).

Figure 1: German gas consumption by sector



Source: Own calculations, based on various data from BDEW, Destatis and BMWK

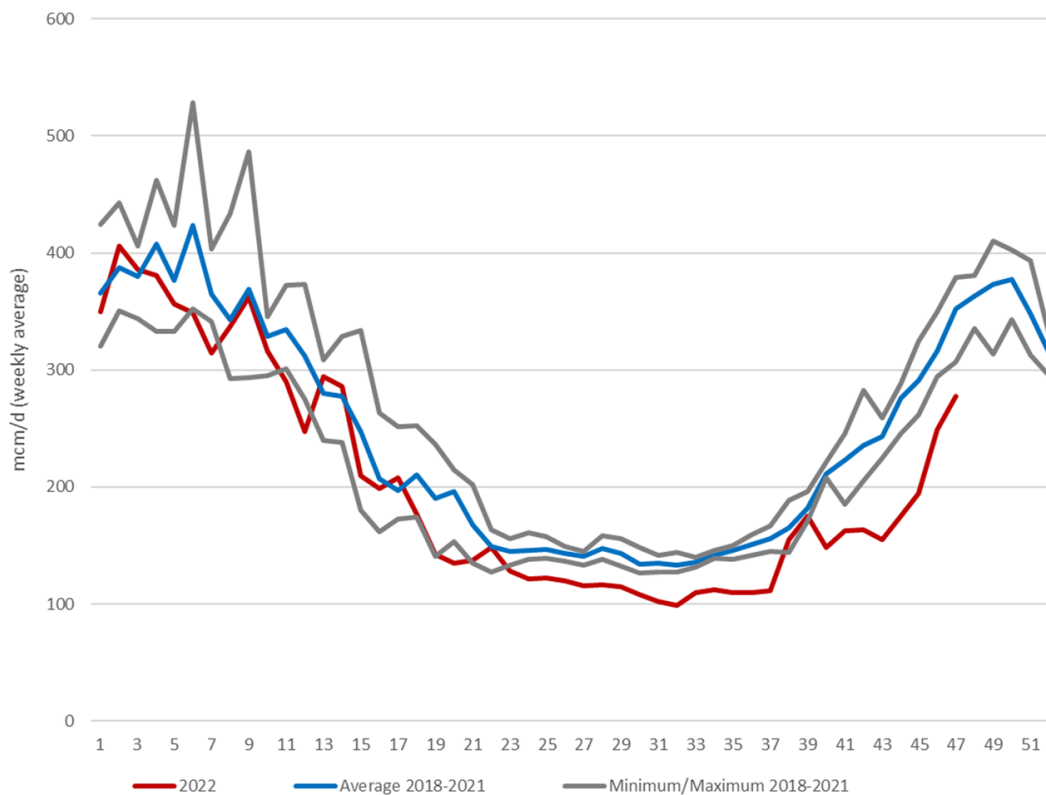
Demand situation at the beginning of the winter 2022/2023

In the first five months of 2022, total gas demand was similar to the average seen over the last five years (see Figure 2). Gas demand in the summer months was at or slightly below the five-year average. However, with the start of the heating season, demand increased significantly and was roughly at the five-year average. Thanks to a very mild autumn and reduction measures (which will be discussed in following sections) in Germany, gas consumption stayed below the average of the previous years. At the beginning of December, gas consumption was exactly 20 percent below the average (and 25 percent below 2021).¹⁰ January-October 2022 data, however, shows that for nine out of ten months, gas demand was below the ten-year-average (minus 23 percent for October 2022 compared to ten-year average for October).¹¹

¹⁰ See https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/aktuelle_gasversorgung/start.html.

¹¹ See BDEW (2022), *Monatlicher Erdgasverbrauch in Deutschland 2022 – Vorjahresvergleich*. <https://www.bdew.de/energie/monatlicher-erdgasverbrauch-deutschland-2022-vorjahresvergleich/>

Figure 2: Gas consumption in Germany in 2022 (weekly averages)



Source: Bundesnetzagentur (https://www.bundesnetzagentur.de/DE/Gasversorgung/aktuelle_gasversorgung/start.html)

When looking at sectoral demand, trends diverge: Industrial gas demand is more or less constantly below the average for 2018 to 2021 and from May onwards also below the lower floor of this reference period (Figure 3). In some weeks, industrial gas demand has been more than 30 percent below average demand.¹²

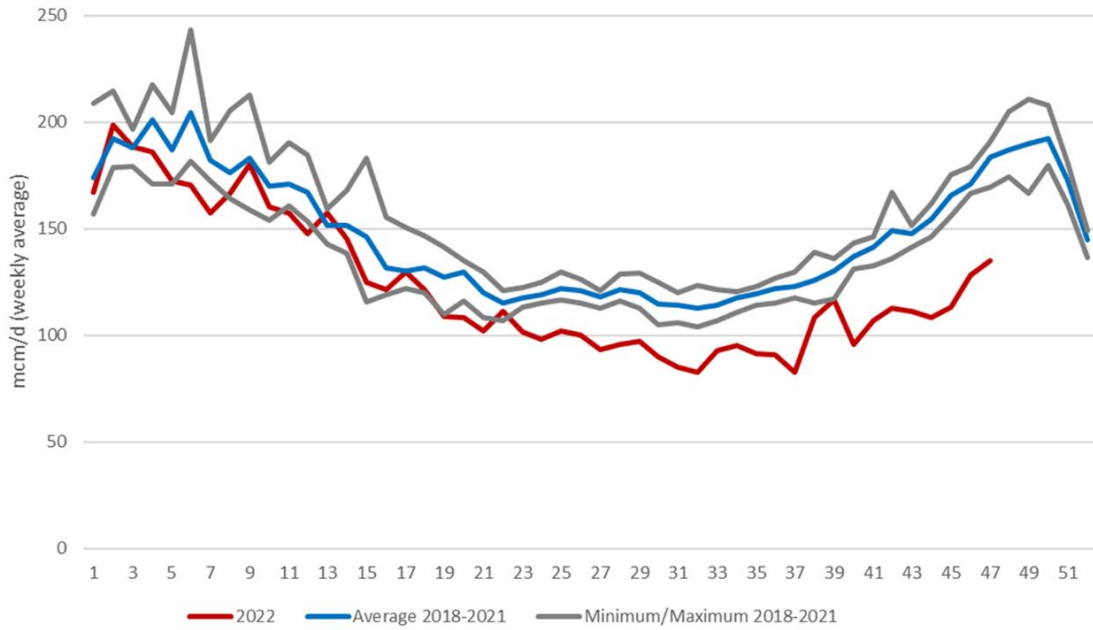
For households and commercials there are nearly no reduction effects visible throughout the year (see Figure 4). Demand fell below historical averages only in some weeks during the autumn. But during the summer, demand was even higher than average. At the beginning of December 2022 consumption increased strongly and is now, once again, above the minimum of 2018 to 2021.¹³

¹² See Bundesnetzagentur (https://www.bundesnetzagentur.de/DE/Gasversorgung/aktuelle_gasversorgung/start.html).

¹³ See Bundesnetzagentur (https://www.bundesnetzagentur.de/DE/Gasversorgung/aktuelle_gasversorgung/start.html).

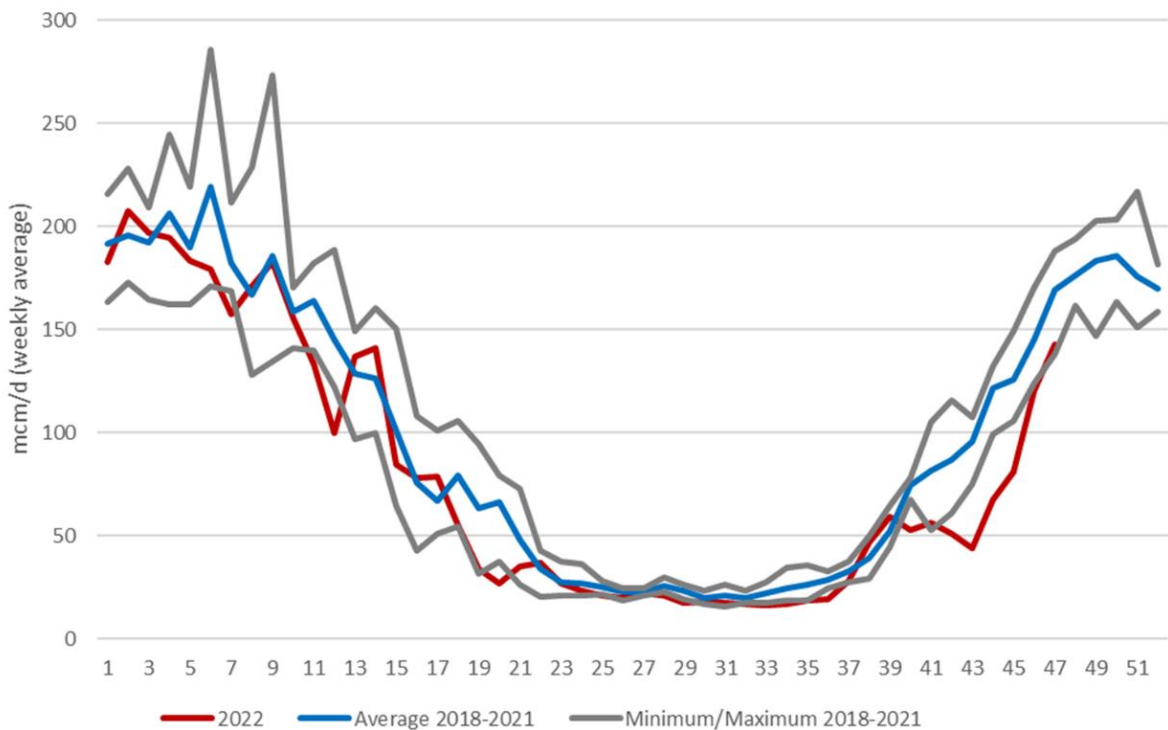


Figure 3: Gas consumption of German industrial sector in 2022 (weekly averages)



Source: Bundesnetzagentur (https://www.bundesnetzagentur.de/DE/Gasversorgung/aktuelle_gasversorgung/start.html)

Figure 4: Gas consumption of residential and commercials in Germany in 2022 (weekly averages)



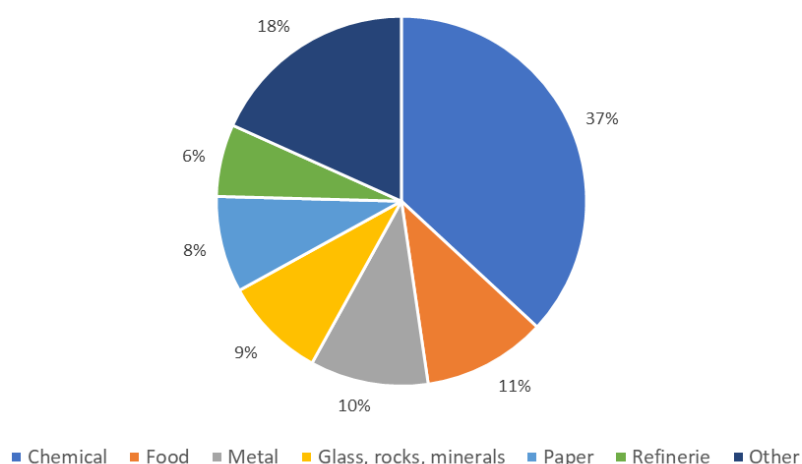
Source: Bundesnetzagentur (https://www.bundesnetzagentur.de/DE/Gasversorgung/aktuelle_gasversorgung/start.html)

Finally, consumption in gas-fired power plants fell by around 13 percent compared to 2021 (January to October). When comparing with the ten-year average, four out of ten months in 2022 are (sometimes significantly) above the corresponding monthly average, suggesting that there were little to no savings in this sector compared to historic generation data.¹⁴

Industrial demand in detail

As stated before, industry is the largest gas consumer in Germany. Within the industrial sector, gas consumption is concentrated in a few industries. As shown in Figure 5, the chemical industry is by far the largest single gas consumer, followed by food and metal industries.

Figure 5: Shares of various sectors in industrial gas consumption in Germany (2020)



Source: Statistisches Bundesamt (2022), Fakten zur Gasversorgung, Press Release Nr. N 044. https://www.destatis.de/DE/Presse/Pressemitteilungen/2022/07/PD22_N044_43.html

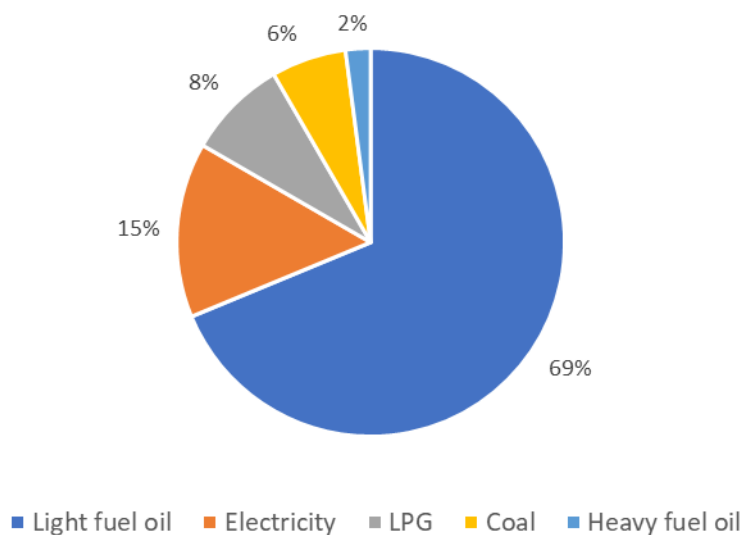
These industries are also significant contributors to Germany's total gross value added (1,774 billion Euro in 2020). Chemicals (incl. pharmacy and synthetics) account for around 15 percent of gross value added, metal and food (incl. beverage and tobacco) each for 11 percent, while glass, paper and refineries each reach around 3 percent. Together, the top five gas consuming industries account for 46 percent of German gross value added.¹⁵

In 2022, the German industry implemented a number of measures that led to demand reductions compared to the previous years. But it is rather unlikely that the German industry will be able to introduce additional reductions over the next few weeks and months without significant cuts in production. A survey carried out in July 2022 by BDI (Bundesverband Deutscher Industrie – the Federation of German Industries) asked if there was further reduction potential. More than 200 companies, representing around one-third of German industrial gas demand submitted their answers – with a disillusioning result of only 8.5 percent reduction potential for this winter (which amounts to only around 3 bcm when using 2021 industrial consumption as the benchmark). Most of these reductions could be achieved by switching to oil products, with only a very limited part of gas demand could be replaced by (preferably green) electricity (see Figure 6).

¹⁴ The related graph does not provide numerical data for the long-term average. See BDEW (2022), Monatliche Stromerzeugung aus Erdgas in Deutschland, Stand 08/22. <https://www.bdew.de/service/daten-und-grafiken/stromerzeugung-erdgas-deutschland/>.

¹⁵ Source: Destatis (2021), Produzierendes Gewerbe 2020, Fachserie 4, Reihe 4.1.2, Wiesbaden, p. 32-42.

Figure 6: Short-term substitution options for gas in the German industrial sector



Beside high costs and technical issues, the industry also highlighted environmental and bureaucratic requirements as key obstacles to a wider switch to renewables. It noted that sizeable switches to renewable sources (green electricity or hydrogen) are not likely before 2025¹⁶. One reason for this low fuel switch potential might be that most of the gas consumption is in complex industrial processes (mostly with very high temperatures) and only in small part in space heating where it is easier to substitute.¹⁷

Another survey was conducted by BVE (Bundesvereinigung der Deutschen Ernährungsindustrie – Federation of German Food and Drink Industries) in August 2022. This survey deals with the same issues as the BDI survey, but is focussed on the food industry, the second largest gas consuming industry in Germany. The results are more or less identical to those of the BDI survey, which covered all industries: industrial users noted only 8 to 10 percent short-term fuel switching potential, with heating oil as the only available substitute and no noticeable switch to green energy before 2025, citing similar reasons as the BDI survey respondents. In addition, the BVE survey identified that procurement problems in the markets for machines and heating systems, as well as costs and bureaucratic factors, slowed down further substitution measures.¹⁸

Even if the situation in some industries might look better, it seems fair to state that industrial demand will not be reduced much further. With respect to the data shown in Figure 3, it can be assumed that most of the reduction potential indicated in the summer 2022 surveys has already been realised and further reductions in gas usage might therefore have significant impacts on industrial production.

It is difficult to assess the extent to which increased fuel efficiency, fuel switching and production cuts have contributed to lower gas use. Anecdotal evidence from industry representatives¹⁹ suggests that at least in the first half of 2022, most reductions in gas demand were due to fuel switching to heating oil. Given changes in the gas/oil price differential in the second half of 2022, some industrial customers might have returned to gas. With the start of the heating season, various industry representatives said

¹⁶ See BDI (2022), Erdgas-Umfrage unter BDI Mitgliedern. <https://bdi.eu/>

¹⁷ See Zukunft Gas (2022), Erdgas in Deutschland, p. 7. <https://gas.info/fileadmin/Public/PDF-Download/Faktenblatt-Erdgas.pdf>

¹⁸ See BVE (2022), Erdgasumfrage unter Unternehmen der Ernährungsindustrie. <https://www.bve-online.de/>

¹⁹ All statements in this paragraph are based on personal information from industry experts and are not backed by any official data.

that efficiency measures increased, e.g. by reducing flow temperature in processes as well as space heating. The exact impacts of efficiency improvements are not easy to isolate, as very mild temperatures distort the outcome. Meanwhile, it seems probably that production shutdowns have not taken place so far. On the other hand, some companies seem to have shifted some production jobs from 2023 to the end of 2022, because many industrial consumers procure their gas on a yearly fixed price base. This means that some companies still benefit from low prices deriving from a supply contract or a hub procurement fixed in 2020 or 2021. Given this, one could assume, that production (and industrial gas demand) might be lower in January. In addition, some companies seem to have preferred to sell their low-priced gas on the market instead of using it in their core business. Presumably margins from such trades would be higher for these companies than for producing their usual goods and services. However, these seem to be individual cases.

Outlook for winter 22/23

Russian gas imports strongly declined after the beginning of the war in the Ukraine in February 2022 and were completely disrupted by the end of August.²⁰ As Germany had no LNG regasification plant in operation before December 2022, additional imports had to be imported by pipeline during most of the year. Given limited surplus production capacity in Norway and the Netherlands as well as scarce booking options for LNG terminals in neighbouring countries, imports fell dramatically. Total imports fell from around 400 to 500 mcm/d in the first half of the year to below 250 mcm /d in July. With the cessation of Russian deliveries via Nord Stream (some minor deliveries were observable over the Czech border point during September), gas imports have not recovered and by early December amounted to only around 300 mcm/d (see Figure 7).²¹

It is highly likely that no Russian gas imports will reach Germany directly this winter.²² Given that gas demand in winter is about four times higher than summer levels, gas import levels seen at the beginning of winter will not be sufficient to cover seasonal demand. Some of the missing volumes could be drawn from storage sites, which were completely filled by the beginning of November. This is a remarkable success for the German gas industry, as storage levels had hit a historic low level by the end of the 2021/22 winter.

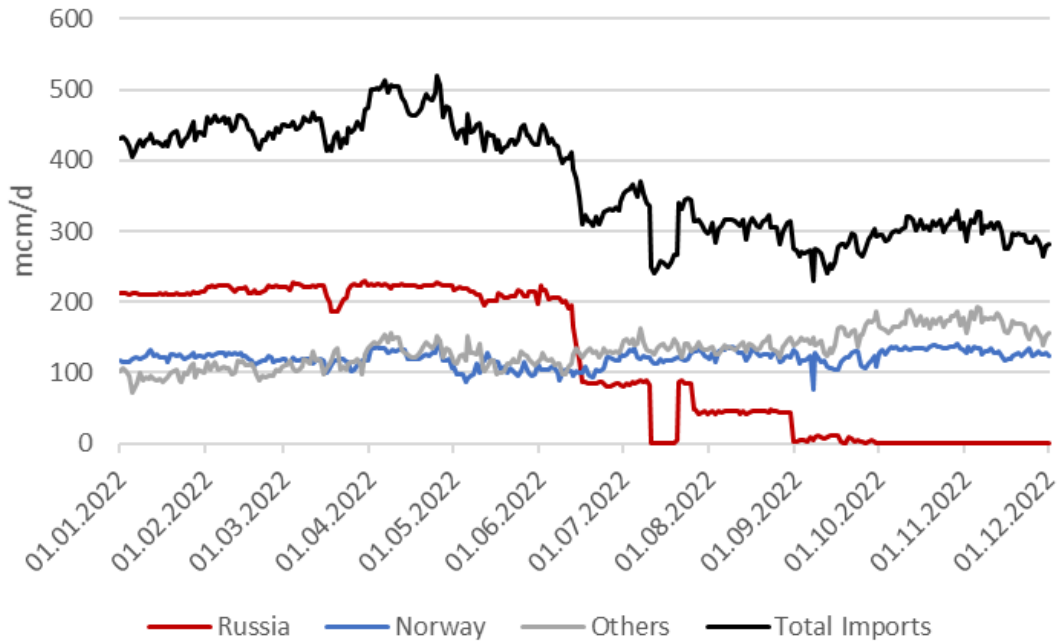
²⁰ These developments not only apply to Germany, but also to nearly all of Gazorm's European counterparts Gazprom (except for Turkey and Hungary). Even in January, before the invasion of Ukraine started, total gas deliveries from Russia to Europe only reached around half of what one could observe in some years before. See Sharples, J. (2022), *Falling Like Dominos: The Impact of Nord Stream on Russian Gas Flows to Europe*. Oxford Institute of Energy Studies - Insight 120.

²¹ Daily updated gas import data can be found on the website of the German energy regulator Bundesnetzagentur: https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/aktuelle_gasversorgung/start.html.

²² See Fulwood, M./Sharples, J./Meidan, M. (2022), *Short and Medium Term Outlook for Gas Markets*, Oxford Institute of Energy Studies – Quarterly Gas Review Nr. 18, for a further discussion.

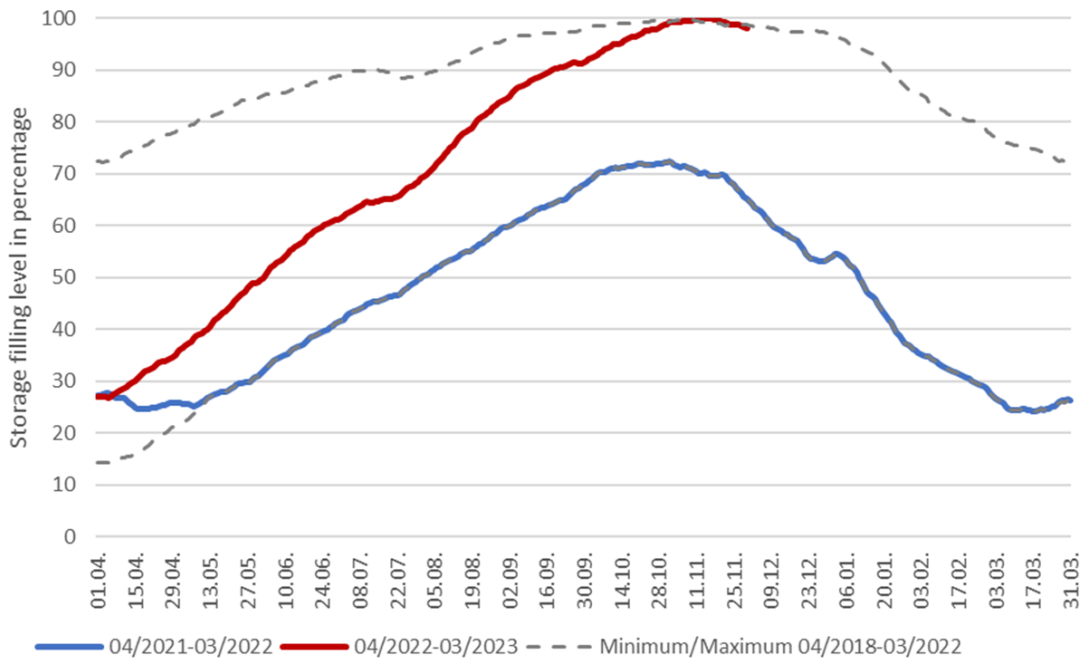


Figure 7: German gas imports 2022



Source: Bundesnetzagentur (https://www.bundesnetzagentur.de/DE/Gasversorgung/aktuelle_gasversorgung/start.html)

Figure 8: German gas storages levels



Source: Bundesnetzagentur (https://www.bundesnetzagentur.de/DE/Gasversorgung/aktuelle_gasversorgung/start.html)

These low levels in 2021/2022 are due to Gazprom's strategic actions²³ as the company owned the largest storage facility at Rehden. Gazprom neglected to fill this storage in summer 2021, but since April 2022 the facility has been under German state control.²⁴ Additional relief could come from LNG import terminals, which are under construction at the time of writing (beginning of December). At least two of the four planned projects are likely to start operations by the end of December 2022, increasing import capacity by 8 bcm each. Beside these two terminals, at Brunsbüttel (German LNG - RWE and Gasunie) and at Wilhelmshaven (Uniper), the terminal at Lubmin (Deutsche ReGas) has a realistic chance to come on stream this winter (possibly January 2023) and would increase import capacity by another 5 bcm. So, in total, LNG could add 21 bcm of import capacity, around 23 percent of German gas consumption in 2021 (but still less than half of Nord Stream 1 flows).²⁵

The absence of Russian gas leaves a large gap, which cannot be closed by supply side measures only. German regulator Bundesnetzagentur has published a scenario analysis of gas demand and supply balance from July 2022 to June 2023. The scenarios include assumptions about gas demand, availability of supply sources, temperatures, storage filling levels and other factors. Two key parameters are the success rate of demand reduction measures and the degree of utilisation of Nord Stream 1. Bundesnetzagentur uses variations in Nord Stream 1 flows ranging from 40 percent of average yearly flows and 0 percent.

Table 2: Selected assumptions and results from gas scenario calculations by Bundesnetzagentur (in bcm)

Scenario name	Demand	Export	Import	Gas shortage (volume)	Gas shortage (start)
1	87	72	101	34	11/2022
1.1	87	68	101	30	11/2022
1.1.1	87	47	101	11	01/2023
1.2	73	72	101	21	12/2022
1.2.1	73	58	101	7	01/2023
1.2.2	73	47	101	-	-
1.3	73	58	110	1	04/2023
1.3.1	73	58	114	-	-

Source: Bundesnetzagentur (2022), Gasszenarien von Juli 2022 bis Juni 2023.

https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/aktuelle_gasversorgungsstart.html, p. 6 and 9.

The scenarios were published in August and did not take into account the complete shutdown of Nord Stream by Gazprom at the end of August and the explosions that resulted in massive leaks in September. Therefore, the 0 percent variation is the only realistic view for the winter. Given this and

²³ This is at least the position of BMWK and most statements from energy insiders in German papers. In contrast, Gazprom argued that reasons for low storage levels are mainly due to "technical problems" or to the booking behaviour of storage customers, who have to be kept confidential. However, according to market insiders, Rehden was fully booked by Gazprom Export or other subsidiaries of Gazprom such as Wingas. See comments from Lohmann, H./Czechanowsky, T. (2022), Speicher Rehden wird kräftig befüllt, and Bathke, R. (2022), Krischer: Gazprom hat Speicher bewusst leerlaufen lassen. Both comments are available on <https://www.energate-messenger.de>.

²⁴ See BMWK (2022), Weitere Stärkung der Vorsorge: Ministerverordnung ermöglicht Füllung des Gasspeichers Rehden. Press release by Federal Ministry of Economic Affairs and Climate Action, June 6, 2022.

²⁵ See project websites for further details: <https://germanlng.com>, <https://deutsche-regas.de> and <https://www.uniper.energy/de/projekte/lng-terminal-wilhelmshaven>.

assuming only limited demand reduction (5 percent), the gas gap could reach up to 34 bcm (“base scenario”), with first gas shortages hitting Germany in November, even with a maximum contribution of 22 bcm from storage. If gas demand could be squeezed by 20 per cent there would still be shortages of 21 bcm from December onwards. Only if imports from other sources could be increased and exports reduced, would the gap be closed, more or less. And one should note that the base scenario, a 90 percent utilisation of planned LNG plants (which accounts in the scenario for around 12 bcm) is already included, and it is doubtful if the needed imports could be procured. Table 2 summarises the key assumptions and results from the relevant scenarios (i.e. all with no Nord Stream 1 during the winter).²⁶

Finally, it is important to note that all of these scenario calculations assume an average winter, so there is definitely an upside risk for the gas gap. But even if a mild winter arises, the base scenario gap is roughly equivalent to Germany’s total industrial gas demand (roughly 34 bcm)! However, the scenarios were published in August and are mainly driven by the vague situation of Nord Stream supplies and other unclear parameters such as storage, LNG and the beginning of the heating season. Since August, all parameters have developed better than expected (except for Nord Stream 1 which is assumed to be as in the worst case): storage has been filled faster and with more working gas volume, temperatures have been very mild during the autumn and most likely the realised LNG capacity will be more than calculated. Also, imports from other sources have met expectations and exports have been lower. This was all taken into account in an updated paper by Bundesnetzagentur, published at the end of October.²⁷ The key message of this updated position is that a gas shortage has become rather unlikely - but not impossible. In particular, a very cold winter in combination with lower imports could lead to a tight supply situation by the end of February 2023. If, as a result, storage levels at the end of winter 2022/2023 are low, the outlook for winter 2023/2024 becomes increasingly insecure.

Throughout this latest energy crisis, the German government has stepped in to regulate market activities (alongside EU directives). The next section provides an overview of the institutions involved and the legal framework.

Relevant Institutions

Germany has never had a typical ministry of energy. Actually, the label “energy” appeared for the first time in the name of a ministry in the year 2013 when the Ministry of Economic Affairs and Technology was renamed to Ministry of Economic Affairs and Energy. However, this remained a short intermezzo, as in 2021 the new minister Robert Habeck (Green Party) gave his administration once again a new name: Ministry of Economic Affairs and Climate Action (BMWK). This relabelling had a programmatic intention, to align the focus of the ministry more towards climate policy instead of traditional energy issues such as liberalisation or security of supply. Given the Russian invasion of the Ukraine, the traditional focus was brought back on the political agenda of the ministry.

Energy issues are nowadays concentrated on the BMWK, which has gathered several competences from other Federal Ministries (such as the Ministries of Environment, Transport or Building). Nevertheless, some Ministries still have some competences in the field of energy, but they are restricted to specific issues (such as energy taxation in the Ministry of Finance or nuclear safety in the Ministry for the Environment).²⁸ As we will see in the next section, all newly introduced laws driven by the Ukraine war are therefore under the area of responsibility of the BMWK.

On the federal level, there are two more institutions of relevance. First, the cartel office (Bundeskartellamt) and the national regulation authority (Bundesnetzagentur), which is primarily

²⁶ See Bundesnetzagentur (2022), Gasszenarien von Juli 2022 bis Juni 2023. https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/aktuelle_gasversorgung/start.html.

²⁷ See Bundesnetzagentur (2022), Neuberechnung: Wie lange halten die Speicher. https://www.bundesnetzagentur.de/DE/Gasversorgung/Hintergrund/221020_gas_szenarien_neu.pdf

²⁸ In addition to ministries and other federal authorities each of the states has ministries with energy-related competences (mainly incorporated in ministries of economic affairs or environment).

responsible for all issues concerning network access and transport fees (not only for electricity and gas but also for railways, postal services and telecommunication). In addition, the authority oversees net stability with a set of instruments (such as the right to refuse applications of powerplant closures if net stability is not guaranteed). In times when security of supply is endangered, BMWK can hand over further competences to Bundesnetzagentur. The central instrument is the gas emergency plan (Notfallplan Gas), which we will discuss after the next section, where all recently released laws and decrees concerning gas markets will be briefly introduced.

Legal framework

The German energy sector is one of the most regulated sectors. At the federal level alone there are around 80 laws exclusively for the energy sector, accompanied by various action plans and other relevant framework documents, as well as numerous laws, decrees or standard codes at state or municipal level.²⁹ The central law is the Energy Industry Act (Energiewirtschaftsgesetz, EnWG), first introduced in 1935 and last amended in October 2022. The current Energy Industry Act is the national implementation of the EU directives on common rules for the internal market in natural gas and electricity. Furthermore, this law also defines the targets for energy policy which are, as in most other European countries, economic efficiency, environmental sustainability and security of supply (§ 1 EnWG). Even if the law demands a more or less equalised weight of the three targets, German policy is strongly focussed on environmental, particularly climate policy actions.³⁰

While only limited activity has taken place in the field of security of supply, this target has forcefully returned to the political agenda, driven by the Russian invasion of Ukraine. In total, 20 new or amended laws and 10 decrees or orders on energy issues has been released since February 2022. As shown in Table 3, most of them aim directly or indirectly at security of supply issues for gas and electricity markets.

Table 3: Overview of German laws, decrees and orders on energy issues introduced since February 2022 (as of 2nd December 2022)³¹

Name	Category	Decision Date	Key elements
Gesetz zur Absenkung der Kostenbelastung durch die EEG-Umlage und zur Weitergabe an die Letztverbraucher	Law	09.03.22	Cost reduction for households and industry by reduction of renewable contribution
Anordnung gemäß § 6 des Außenwirtschaftsgesetzes bzgl. Der Anteile an Gazprom Germania	Order	04.04.22	Implementation of Bundesnetzagentur as trustee of Gazprom Germania
Gesetz zur Änderung des Energiewirtschaftsrechts im Zusammenhang mit dem Klimaschutz-Sofortprogramm und zu Anpassungen im Recht der Endkundenbelieferung	Law	06.04.22	Extension of period of cancellation for supply contracts to protect household customers; Increase of speed and extent of power transmission line expansion projects

²⁹ For further details see Seeliger et al. (2019), Bürokratiekosten der Energiewende. In: Wirtschaft und Statistik, Vol. 71, Nr. 6, pp. 59-72.

³⁰ Seeliger (2022), Energiepolitik, 2nd edition, Vahlen (Munich), pp. 12-14, for an overview over historic development of EnWG and its target weighting.

³¹ See BMWK (2022), Überblick Gesetzesvorhaben BMWK Januar bis September 2022.

<https://www.bmwk.de/Redaktion/DE/Meldung/2022/20220923-ueberblick-gesetzesvorhaben-bmwk-januar-bis-september-2022.html>.

Zweites Gesetz zur Änderung des Windenergie-auf-See-Gesetzes und anderer Vorschriften	Law	06.04.22	Expansion of offshore wind project capacities
Gesetz zu Sofortmaßnahmen für einen beschleunigten Ausbau der erneuerbaren Energien und weiteren Maßnahmen im Stromsektor	Law	06.04.22	More ambitious target for renewable electricity supply (80 percent by 2030)
Gesetz zur Änderung des Energiesicherungsgesetzes 1975 und anderer energiewirtschaftlicher Vorschriften (EnSiG)	Law	25.04.22	Update of a more than 45 years old energy security law; Enhanced rights for government for socialisation of critical infrastructure (such as gas storages)
Gesetz zur Änderung des Energiewirtschaftsgesetzes zur Einführung von Füllstandsvorgaben für Gasspeicheranlagen	Law	30.04.22	Obligations for gas storage operators on filling levels (e.g. 80 percent by October)
Gesetz zur Beschleunigung des Einsatzes verflüssigten Erdgases	Law	10.05.22	Easing of expansion plans for LNG regasification plants
Gesetz zur Änderung des Energiesicherungsgesetzes (Novelle 2)	Law	12.05.22	Another update of energy security law; Enhanced rights for government for interventions in pricing mechanism for power and gas; More state grant for energy companies possible (especially gas import companies)
Gesetz zur Aufteilung der Kohlendioxidkosten	Law	25.05.22	Cost reduction for households by reduction of carbon pricing
Verordnung zur Zurverfügungstellung unterbrechbarer Speicherkapazitäten zur Gewährleistung der Versorgungssicherheit	Decree	01.06.22	Further guidelines for gas storage operators; Empowerment of market area manager THE to procure gas for storages with low filling level
Gesetz zur Bereithaltung von Ersatzkraftwerken zur Reduzierung des Gasverbrauchs im Stromsektor im Fall einer drohenden Gasmangellage durch Änderungen des Energiewirtschaftsgesetzes und weiterer energiewirtschaftlicher Vorschriften	Law	08.06.22	Guidelines for reduction of gas input in the electricity sector and temporary return of abandoned coal-fired power plants
Gesetz zur Erhöhung und Beschleunigung des Ausbaus von Windenergieanlagen an Land,	Law	15.06.22	Expansion of onshore wind project capacities respectively guidelines for minimum surface

Windenergieflächenbedarfsgesetz und Baugesetzbuch			reservation for wind power for each state
Anordnung gemäß § 17 EnSiG bzgl. Der Anteile an Gazprom Germania	Order	17.06.22	Some legal and operational changes on the trustee for Gazprom Germania
Gesetz zur Bereithaltung von Ersatzkraftwerken zur Reduzierung des Gasverbrauchs im Stromsektor im Fall einer drohenden Gasmangellage durch Änderungen des Energiewirtschaftsgesetzes und weiterer energiewirtschaftlicher Vorschriften	Law	08.07.22	Another law to reactivate coal-fired power plants which had been displaced to emergency reserve
Novelle Brennstoffemissionshandelsgesetz	Law	13.07.22	Some minor changes in carbon taxation
Verordnung zur befristeten Ausweitung des Stromerzeugungsangebots durch Anlagen aus der Netzreserve	Decree	13.07.22	Additional measures for reactivation of abandoned power plants
Ministerverordnung Fernwärme	Decree	18.07.22	Enhanced rights for government for interventions in pricing mechanism for district heating
Gebäudeenergie-Gesetz	Law	28.07.22	Increased energy saving standards for new building
Verordnung zur Anpassung von Füllstandsvorgaben für Gasspeicheranlagen	Decree	28.07.22	Tightening of obligations for gas storage operators (e.g. new filling requirements for October at 85 percent)
Befristete Einführung einer saldierten Preisanpassung nach § 26 EnSiG	Decree	04.08.22	Cost allocation mechanism for additional costs according to Decree from 1.6.22
Verordnung zur Sicherung der Energieversorgung durch kurzfristig wirksame Maßnahmen	Decree	24.08.22	Guidelines for demand reductions (short-term, i.e. from September 2022 onwards)
Verordnung zur Sicherung der Energieversorgung über mittelfristig wirksame Maßnahmen	Decree	24.08.22	Guidelines for demand reduction (medium-term, i.e. winter 22/23 and beyond)
Verordnung zur priorisierten Abwicklung von schienengebundenen Energieträgertransporten zur Sicherung der Energieversorgung	Decree	24.08.22	Prioritisation rules for coal and oil transport on railways
Formulierungshilfe für einen Gesetzentwurf zur Änderung des Energiesicherungsgesetzes und	Law	14.09.22	The third update of energy security law from 1975; Specification of legal framework for LNG plants and another plan

anderer energiewirtschaftlicher Vorschriften			for expansion of renewables and transmission lines
Gesetz zur temporären Senkung des Umsatzsteuersatzes auf Gaslieferungen über das Erdgasnetz	Law	26.10.2022	Reduction of VAT on gas supplies from October 2022 to March 2023 (from 19 to 7 percent)
Neunzehntes Gesetz zur Änderung des Atomgesetzes	Law	11.11.2022	Delay of phase-out for the remaining three nuclear power plants from December 2022 to April 2023
Entwurf eines Gesetzes zur Einführung einer Strompreisbremse	Law	25.11.2022 (draft)	Introduction of a price-cap for electricity (retail)
Entwurf eines Gesetzes zur Einführung einer Preisbremse für leitungsgebundenes Erdgas und Fernwärme	Law	25.11.2022 (draft)	Introduction of a price cap for gas and district heating
Gesetz zur Beschleunigung des Braunkohleausstiegs im Rheinischen Revier	Law	01.12.2022	Phase-out date for lignite production in western Germany will be advanced from 2038 to 2030 but in exchange two lignite power plants, which initially had to be abandoned by end of 2022, are now allowed to work until March 2024

Even though the above list is quite comprehensive, further laws and decrees are likely forthcoming. Some of the agreed laws require further clarification or discussion on practical implementation. As of December 2022, political discussions are underway about a lifetime extension of the last three nuclear power plants. Initially, all of these plants were due to be closed by the end of 2022. Given a likely gas and/or power shortage, most political players (and also a majority of voters) favoured extending the definite close-down - which was realised by a law in November delaying the end of lifetime until April 2023. However, some market participants and political parties (mainly some representatives of the liberal party FDP, which is part of the governing coalition, and the main opposition party CDU/CSU) are lobbying for another extension beyond April 2023. Taking into account the strong position of the Green Party in the Federal Government and in many states, this attempt seems to be very unpromising.³²

A further area of discussion is another legal package, which would give additional financial relief for households and industry. Beside the reduction of VAT on gas which has already been implemented, a price cap on gas (as well as for power and district heating) and a payment of all December gas bills by the state have been agreed. In total, Chancellor Olaf Scholz has announced a total subsidy package of 200 billion Euro.³³ The exact starting month of the gas price cap is still under discussion, as well as some other details on the financial relief measures.

³² The Federal Ministry for the Environment, Natural Conservation, Nuclear Security and Consumer Protection (BMUV) summarises the, for some observers from abroad difficult to understand, discussion on nuclear power: <https://www.base.bund.de/DE/themen/kt/ausstieg-atomkraft/laufzeitverlaengerung-faq.html>.

³³ Scholz called this package a „Doppel-Wumms“ (“double ka-boom”). However, most European partner countries did not show the same enthusiasm for these plans. For a critical review see Financial Times (4th October 2022), Germany’s divisive ‘double ka-boom’ on energy, <https://www.ft.com/content/d1569e6d-6599-417b-95aa-5f3348393354>.

Although the financial package is quite extensive and some supply side measures have been taken, the German government has not implemented comparable demand side measures. It is unlikely that existing laws and decrees are suitable to fully meet the announced demand reduction target of 20 percent (compared to the average of 2018 to 2021).³⁴ Even if some measures are formulated in the Decree on short-term demand reduction (see Table 3, first Decree from 24th August), it is doubtful if measures like reduction of temperature in some public buildings (e.g. schools are not included), switching off lights on historic monuments or prohibition of gas heated private pools are sufficient. Furthermore, the German government is facing a difficult trade-off: On one hand, gas consumers (and voters) need to be appeased about their energy costs. So, one element implemented in the context of the 200 billion Euro package, is that the state will pay the full December gas bill for all customers. On the other hand, even if the actual payment is fixed to the advance payment made in September and not the actual demand, demand reduction incentives might be undermined.

If these compulsory actions (accomplished by voluntary reductions) do not match the supply reductions, a gas shortage might occur during winter. The legal framework for such a situation is regulated by the national emergency plan.

Gas emergency plan and role of Bundesnetzagentur

The national emergency plan was released in September 2019 and is the implementation of measures as required by the European Regulation 2017/1938 concerning measures to safeguard the security of gas supply from October 2017.³⁵ The prime responsibility for the emergency plan is delegated to the Ministry of Economic Affairs (BMWK). Additionally, the regulator Bundesnetzagentur is named for a number of operational duties.

According to the EU Regulation (Article 11), the emergency plan consists of three levels:

- Early warning: “where there is concrete, serious and reliable information that an event which is likely to result in significant deterioration of the gas supply situation may occur and is likely to lead to the alert or the emergency level being triggered”. This level was activated on 30th March 2022.
- Alert: “where a disruption of gas supply or exceptionally high gas demand which results in significant deterioration of the gas supply situation occurs but the market is still able to manage that disruption or demand without the need to resort to non-market-based measures”. This level was activated on 23th June 2022 after a significant cut of Russian supply.
- Emergency: “where there is exceptionally high gas demand, significant disruption of gas supply or other significant deterioration of the gas supply situation and all relevant market-based measures have been implemented but the gas supply is insufficient to meet the remaining gas demand so that non-market-based measures have to be additionally introduced with a view, in particular, to safeguarding gas supplies to protected customers”. Until the beginning of December 2022, this level had not yet been put into force. Other than the two lower levels, where activation can be announced by the minister of economic affairs by a common press release, an emergency plan needs to be implemented by a federal decree.

The requirements of the EU regulations are transmitted in a number of laws and decrees. Most important are two existing laws, namely the energy act (EnWG) and the 1975 energy security law (EnSiG). The energy act lays out the competences for various institutions and also defines some

³⁴ The 20 percent target is not directly implemented in any law. It is a reaction of minister Robert Habeck to the voluntary 15 percent reduction target of the EU, considering the fact that Germany has the highest share of Russian gas supplies to the EU. It is somehow unclear to which time period the 20 percent refers (year 2022, winter 22/23 or 2022 to 2024). See a press release of BMWK on this subject: <https://www.bmwk.de/Redaktion/DE/Pressemitteilungen/2022/08/20220824-habeck-treiben-energieeinsparung-weiter-voran-bundeskabinett-billigt-energieeinspar-verordnungen.html>.

³⁵ See BMWK (2019), Notfallplan Gas für die Bundesrepublik Deutschland. <https://www.bmwk.de/Redaktion/DE/Downloads/M-O/notfallplan-gas-bundesrepublik-deutschland.html>.

market-based measures, which correspond to the alert level of the emergency plan. The more non-market-based instruments are defined in the energy security law and, based upon this law, a gas specific decree called Gassicherungsverordnung (GasSV; gas security decree), of which the first version was introduced in 1982.

After the first level (early warning) is activated, a crisis squad is set up. The squad is headed by a representative of the ministry for economic affairs and includes a core team as well as some facultative members. The core team consists of crisis managers from all transport operators (12 companies), the market area coordinator (Trading Hub Europe) as well as representatives from all states (16 states). This core team is in close communication with other players who could be included in team meetings on occasion (such as distribution net operators or members of local crisis teams). The facultative members include gas storage operators (more than 15 companies), electricity transmission operators (4 companies) and some energy industry associations and federations.³⁶

When market-based measures (such as reallocation of gas flows, extended use of balancing energy or interruptible contracts)³⁷ fail to stabilise the markets and serious supply gaps are likely, the emergency level must be activated. This last level includes a number of non-market-based measures, which allow a central coordinator (so-called “Bundeslastverteiler”) to intervene in market processes if it seems appropriate. Nevertheless, the coordinator should also encourage relevant market players (such as transport operators) to continue to use market-based instruments. Energy regulator Bundesnetzagentur is nominated in the gas security decree as central coordinator, supported by the crisis squad, which will have a consultatory role.

The gas security decree sets out the possible instruments from which Bundesnetzagentur can choose: In principle, all parts of the gas value chain (from production to final consumption) are subject to possible state intervention. So, for example, Bundesnetzagentur could order the substitution of gas in industrial processes by other fuels, generation of electricity with fuels other than gas or an increase in domestic production. However, most of these supply side measures are, as discussed before, more or less exhausted. Of course, Bundesnetzagentur could order an increase in domestic production, but in practice, this will have no effect as all domestic gas fields are operating on their limit (especially in winter months). Also, nearly all of the fields are in a decade-long decline, which does not allow increases in production either in the short or long term.

The option to command the use of alternative electricity generation sources sounds good in theory, but in practice is more or less a paper tiger given

- low solar input in winter (in particular, nearly all renewable facilities are working at their limit due to subsidies),
- nuclear phase-out and legal limitations on coal and lignite, (where what could be done has already been implemented).

Given this, attention needs to be paid mostly to the demand side measures. As the low hanging fruit instruments (such as reduction of temperature in public buildings or appeals to customers) have already been implemented in recently released decrees, harder measures have to be taken into account by the Bundesnetzagentur. The “hardest sword” will be the switching-off of certain consumers in the case of a gas supply gap. As households and other smaller consumers are protected (or privileged) by EU regulation as well as by the German energy act, industrial customers would have to take this burden.

As discussed earlier, if temperatures are low in winter and German gas import companies and the government fail to secure sufficient additional imports, a supply gap will hit German industry. The central coordinator Bundesnetzagentur will then have to decide which individual customers or complete

³⁶ For details see BMWK (2019), section 6.

³⁷ For details see BMWK (2019), section 7.

industry sectors will be cut off from the gas network. Understandably, industry has asked for a transparent and projectable plan for these shutdowns so they can prepare accordingly. This happened directly after the beginning of the war when first market observers raised concerns that Russia could use gas deliveries to Europe as a political weapon. Industry associations and large industrial customers tried to influence Bundesnetzagentur as well as political players and public opinion.³⁸

However, these attempts failed, as Bundesnetzagentur responded comparably fast, that it did not intend to publish any “conceptual shutdown merit order” or any other guidelines on the importance of specific industries or companies.³⁹ Any decisions will be taken when the shortage finally occurs, not before. Bundesnetzagentur claimed, that all decisions will be made on a daily and case by case basis. This approach seems pragmatic from the regulator’s point of view, but also leaves great insecurity for the companies involved (which in principle could mean nearly all companies). While Bundesnetzagentur announced in March the development of a criteria catalogue, at the beginning of December it had still not been made public.

One reason for the vague status quo might be a lack of data on the actual gas flows and demand figures on a short-term basis. Therefore, Bundesnetzagentur assigned the market area coordinator Trading Hub Europe to implement an online platform, where all distribution net operators (more than 700) and large industrial customers (around 2,500) must submit their up-to-date gas flows.⁴⁰

Conclusion

To sum up, much legislative action has taken place so far and additional measures are likely to be adopted. However, some decisions (or in some cases no decisions) appear somehow half-hearted. The ongoing and actually incomprehensible discussions on a delay of nuclear phase-out or the still too high gas input in the power sector are only two examples. At the same time, thanks to government support, storage was full at the beginning of winter and there is no insecurity about Russian gas deliveries (as they are already down to zero and at least from that respect, there is no downside impact on the market). The (quasi) fact that Russia will not return to the German gas market leaves of course a huge supply gap, but as this was already clear in the summer, it allowed market players to prepare (as far as possible) for this situation. Nevertheless, demand reduction programs are not fully sufficient to reduce consumption in an adequate manner. Actually, measures such as state subsidies for the December gas bill could even undermine the reduction plans.

This might lead to a gas supply gap, which in turn could lead to a cut-off of industrial customers (even if the possibility of this is lower from a December perspective than it was during summer). The legal framework and the responsibilities are set out in the federal emergency plan, but this plan remains very vague in central questions. At present, there are no precise plans or rules concerning shutdown of individual industrial customers or sectors and according to Bundesnetzagentur there is no intention to publish any such “cut-off order”. Finally, industry especially may face a critical winter, even if enough gas is in the system, as prices are far from a level that keeps German energy-intensive industry sectors competitive with their rivals in China or other countries (e.g. because of regulated prices).

³⁸ For example, the head of the Federation of the Chemical Industry (VCI) asked in an interview to rethink the status of households as protected consumers. In his opinion, in an emergency case it is more important to avoid shut down of industrial plants (because otherwise, households would not earn money to pay their gas supplies as their employer might go insolvent). See <https://www.sueddeutsche.de/wirtschaft/gas-preis-haushalte-chemie-industrie-krise-1.5618791>. However, most other industry representatives constrain their arguments on the importance of their specific industry for customers and other companies, rather than advocate for household cut-offs, e.g. the food industry (<https://www.handelsblatt.com/politik/deutschland/nahrungsmittel-wie-systemrelevant-sind-bonbons-bier-und-oel-die-sorge-der-lebensmittelindustrie-vor-einem-gasembargo/28260892.html>).

³⁹ See Bundesnetzagentur (2022), Die Rolle der Bundesnetzagentur in der Gasmangellage, p. 2.

https://www.bundesnetzagentur.de/DE/Fachthemen/ElektrizitaetundGas/Versorgungssicherheit/Krisenmanagement_Krisenvorsorge/start.html

⁴⁰ See Bundesnetzagentur (2022), Sicherheitsplattform Gas ist heute gestartet. Press release from 29 September 2022, and <https://www.sicherheitsplattform-gas.de>.

It is maybe a cold comfort for some companies, but there is light at the end of the tunnel. Even without any Russian deliveries, gas supplies look much better for Germany in 2023/2024 than in 2022. First, there will be at least two, maybe even more, LNG regasification terminals in place. Second, there will be no strategic limitations on filling storage facilities as was in the case this year (Gazprom ownership of Rehden storage). And third, over time more renewable power plants will be built, gas replacing processes could be implemented and more sophisticated demand reduction plans could be developed. Another factor could be the development of GDP growth. If the German economy falls into a recession, then a decline in energy consumption might be the consequence. However (beside the case that this in turn could lead to a rebound effect on GDP, which will lead to a rebound of energy demand), the recent forecasts by institutions, banks and the government all see only a minor recession. The German government estimates a decline of minus 0.4 percent, whereas the EU Commission sees minus 0.6 percent. This is in line with estimates by the OECD and IMF (both minus 0.3 percent).⁴¹

But until the end of the winter and over the course of next summer (to prepare for the next winter), massive efforts including more subsidies and other help measures by the Government are needed to bring as many companies as possible through the winter. These include further campaigns or other measures addressing private households. Even if the demand reduction is remarkable compared to last year, gas demand is still high in this sector - and the real load test has not started yet due to mild autumn temperatures. As temperatures fall to zero at the beginning of December, time will tell, how much of the demand reduction was really sustainable. It might be a fallacy of various customer groups to trust that German government will do everything to protect them. Of course, the government demonstrated last year, that it is willing and financially able to do so, but it is rather unlikely, that the government will buy expensive LNG on the world market or spend a 200 billion Euro package every winter.

⁴¹ Otte, R. (2022), Am Beginn der Rezession (<https://www.businessinsider.de/wirtschaft/konjunktur-prognosen-fuer-deutschland-2022-und-2023-rezession-institute-iwf-oecd-bundesregierung-sachverstaendigenrat-c/>) provides a summary table of 16 different GDP forecasts for Germany.