L-Gas Market Conversion Review

Summer Briefing 2024

Task Force Monitoring L-Gas Market Conversion

Ministry of Climate Policy and Green Growth

Foreword

This is the tenth and final edition of the report monitoring the conversion of the low calorific gas markets in Belgium, France, Germany and the Netherlands in order to reduce demand for Groningen gas. This report looks back on the market developments of the previous years, starting at gas year[1] (GY) 2019/20. At the same time, it looks forward to the coming gas years with regard to the expected demand for Dutch low calorific gas and the conversion progress of the gas installations.

The report is compiled by the Task Force Monitoring L-gas Market Conversion, consisting of government representatives, representatives of transmission system operators (TSO's) and energy market regulators from Belgium, France, Germany and the Netherlands, and an observer from the European Commission. The activities of the Task Force are supported by the General Secretariat of the Benelux Union.

At the initiative of the Netherlands, the Task Force was established by the directors-general for energy of the afore mentioned countries following a request from the Dutch Parliament to be regularly informed about the reduction of the demand for Groningen gas as a result of the conversions in Germany, Belgium and France. It was formally founded at 11 October 2019 with the acceptance of the Terms of Reference by the four countries. During the existence of the Task Force, 27 meetings were organised and 21 parties were involved. The efforts of Belgium, France and Germany as reported in the briefings resulted in a steep decline of the usage of low calorific gas.

On 19 April 2024 the Groningen gas field was closed by law, ending the production of low calorific gas from this field. This was done for the safety of the inhabitants of Groningen. The conversions in Belgium, France and Germany have been of very significant importance in the efforts to close down the Groningen gas field while maintaining security of supply. Although this is the final report, the efforts of the market conversion will continue until L-gas dependency in Belgium, France and Germany is brought down to (almost) 0. This report therefore covers not only the past efforts but will also contain an outlook to the scheduled efforts till 2030.

[1] A gas year starts on 1 October and ends on 30 September.

Executive summary

In March 2018, the government of the Netherlands announced its decision to terminate natural gas production from the Groningen field as soon as possible, in order to guarantee safety in the area of Groningen against the risk of earthquakes resulting from natural gas extraction.

Household appliances in the Netherlands depend on gas with the same quality as the gas originating from the Groningen field (G-gas, max. Wobbe 44.4 MJ/m^3), while households in Germany, France and Belgium depend on gas with a slightly higher quality (low calorific gas, or L-gas, max. Wobbe 46.5 MJ/m^3). Without a natural low calorific source such as the Groningen field, so called "pseudo L-gas" is needed to secure supply in the L-gas market region. Pseudo L-gas can be produced by either adding nitrogen to high calorific gas (H-gas) in order to bring down the Wobbe-value until it meets the upper Wobbe-limits of the L-gas specifications or by adding H-gas to pseudo Groningen-gas[2] until the same upper Wobbe-limit of the L-gas specifications is reached.

Pseudo L-gas is exported to neighboring markets in Belgium, France and Germany, where it serves dedicated L-gas consumers. As a result of the intended Groningen phase out, the transmission system operators of Belgium, France and Germany have made arrangements to undertake extensive conversion programmes to reduce L-gas supply from the Netherlands, starting in GY 2019/2020. The current report aims to monitor the progress in the L-gas conversion programmes in Belgium, France and Germany and the activities in the Netherlands to reduce the consumption of pseudo G/L-gas.

Overall, it can be concluded that the L-gas market conversion is progressing well. Since the start of the conversion programme at 2019/20, the conversions has led to an approximate decline in L-gas demand of 105.9 TWh[3] from GY 2019/20 to GY 2022/23. Of this total, a decline of 73.7 TWh is due to the conversions in Germany, 20.4 TWh due to the conversions in Belgium and 11.8 TWh due to the conversions in France.

Under the current market conditions, the Task Force does not foresee any possibilities to further accelerate the conversion process. In the upcoming years until GY 2029/30, combined L-gas exports from the Netherlands to Belgium, France and Germany are expected to decrease to (almost) zero due to the conversion programmes. Consequently, L-gas demand met with imports from the Netherlands is expected to fall to 0 in Belgium by GY 2024/25, to 0 in France by GY 2027/28 and to 0.3 TWh in Germany[4] by GY 2029/30 both in an average and cold GY[5].

With the permanent closure of the Groningen field as required by a law which was adopted by the Dutch Parliament in April 2024[6] the field is no longer available for the security of supply. GTS had the legal task to advice the State Secretary on the needed Groningen capacity and volume for the security of supply for the upcoming gas year. The January 2024 analysis of GTS shows that without the Groningen field, the Netherlands does not comply with the European infrastructure norm for GY 2024/25, which means that there is not sufficient capacity available to satisfy total gas demand in the event of a disruption of the single largest gas infrastructure during a day of exceptionally high gas demand. After the next gas year this potential shortage is projected to be minimal. Furthermore the analysis shows that after an exceptionally cold winter the seasonal storages cannot be refilled to the required filling level of 90% due to an assumed limited availability of gas . The adequate refilling is necessary to ensure security of supply for the next gas year in case of a subsequent exceptionally cold winter. GTS concluded that without the Groningen field there are a no additional short-term supply solutions available. These risks will however decline with each subsequent gas year as L-gas demand will continue to be reduced. Furthermore, the Dutch government worked on measures to minimize the capacity risk identified by GTS for GY 2024/25. Measures will be taken in the very unlikely situation of a capacity failure (of a size comparable to the output capacity of UGS Norg) combined with the simultaneous occurrence of average effective day temperatures[7] of -11°Celsius or lower. During such a time households and small businesses will be asked to spread their demand during peak hours. Specifically these groups are addressed because of their large share in peak demand.[8]

The declining L-gas demand contributed to a decreasing Groningen production. Another important factor is the production capacity of pseudo G/L-gas. The Netherlands increased the production of pseudo G/L-gas by expanding the nitrogen blending capacity at the Wieringermeer conversion facility from 215,000 to 295,000 m^3/h starting from December 2019. This resulted into an additional 48.9 TWh of pseudo G/L-gas production

[2] Pseudo Groningen-gas (or pseudo G-gas) is obtained via enrichment: nitrogen is added to high calorific gas (H-gas) in order to bring down the Wobbe-value until it meets the upper Wobbe-limits of the G-gas specifications (44.4 MJ/m3). This gas quality is stored in the Dutch G/L-gas storages.
[3] Source are the Winter report 2021 and the Winter briefing 2024 of the task force.
[4] Please note that the remaining demand in GY 2029/30 (0.3 TWh / 100.000 kWh/h) is given by a regional grid in Germany, that can only be supplied via the Netherlands (Haanrade / Thyssengas).
[5] In the case of Belgium and France, the demand profile for a cold GY has been calculated based on 1995-96 temperature profile by GTS as stated in the Dutch Gas Act for the L-gas supply-demand balance of this briefing. In the case of Belgium, the preferred national approach is to consider the year 1962-63 as a cold year profile. The French regulation approach is requiring to work with a 2% risk cold GY (using Lille weather data); leading to a demand profile national reference shared with the French stakeholders, about 2% above the GTS's figures.
[6] https://zoek.officielebekendmakingen.nl/stb-2024-95.html
[7] The average effective day temperature can be calculated as follows: Teff = T – (V/1.5). Teff is the effective temperature, T the daily average temperature and V the day average wind speed in meters per second, both at weather station De Bilt.
[8] Dutch parliamentary paper II 2024-2025, 29023 nr. 519. https://zoek.officielebekendmakingen.nl/kst-29023-519.html

capability. Moreover, a new nitrogen plant at Zuidbroek with a capacity of 180,000 m^3/h N_2, which results into an additional pseudo L-gas production with a maximum of 97 TWh, became operational at the start of the GY 2023/24.

Due to the crucial role of the production of pseudo G/L-gas, the security of L-gas supply is intimately linked to the deliverability of H-gas into the Netherlands. During GY 2021/2022, the supply of H-gas from Russia to Northwest-Europe diminished. The main source for H-gas is currently LNG, supplied through existing terminals in the United Kingdom, Belgium and the Netherlands. Since these terminals do not have enough capacity to replace the former Russian supply, additional LNG-import facilities have been and are being developed in the Netherlands[9], Germany and France. An extension of the re-gas capacity at the LNG terminal of Zeebrugge in Belgium is ongoing. While on the one hand the supply is increasing, the high gas prices created a drop in demand, of which part seems permanent. Therefore, the demand-supply balance seem to be (delicately) balanced. However, there is still a risk of H-gas shortages.

[9] https://www.gasunietransportservices.nl/gasmarkt/investeringsplan/investeringsplan-2022

1. Introduction

In March 2018, the government of the Netherlands announced its decision to terminate natural gas production from the Groningen field as soon as possible, in order to guarantee safety in the area of Groningen against the risk of earthquakes resulting from natural gas extraction.

The initial schedule for production phase-out - which aimed for termination in 2030 at the latest - was revised in 2019 following the adjusted advice of the Dutch State Supervision of the Mines after an earthquake occurred on 22 May 2019. The termination of gas production from the field was brought forward to result in a ban on the production of gas from the Groningen field from 19th April 2024 onwards.

Groningen-gas (G-gas) is consumed in the Netherlands and L-gas is exported to neighboring markets in Belgium, France and Germany, where it serves dedicated L-gas consumers. As a result of the phase-out and closure of the Groningen field, these consumers will be converted to other sources of energy, mostly H-gas.

Hence, the decision to terminate Groningen production has consequences in terms of adaptation for the Dutch domestic gas market, but also for import markets in Belgium, France and Germany. The four countries have been working together on the phasing-out of G/L-gas consumption since 2012, which was initially motivated by the natural decline of the Groningen field. Belgium, France and Germany have developed and are implementing concrete plans to have their consumers of L-gas converted to other sources of energy, most notably H-gas, at the latest by 2030.

The Dutch Parliament adopted a resolution which requires the Ministry of Economic Affairs and Climate Policy to report twice a year on concrete measures to reduce the demand for Groningen gas and their foreseen impact[10]. In these reports, explicit attention has to be given to measures within and with regard to neighboring countries. Moreover, the claimed reductions should be substantiated with actual data and options should be investigated to accelerate demand reduction. In order to fulfil this requirement, the Netherlands proposed to establish a Task Force on L-Gas Market Conversion Monitoring within the framework of the Pentalateral Gas Platform. The authorities of Belgium, France and Germany concurred with this proposal.

The current report aims to monitor the progress in L-gas conversion in Belgium, France and Germany and the activities in the Netherlands to reduce the consumption of G/L-gas. It also creates a dedicated platform through the Task Force to further improve transparency and mutual understanding among the involved countries, and enables to share options to accelerate the conversion without prejudice to national operators and end users. During the previous years, it has also served as a platform to monitor and discuss developments related to COVID-19 and its impact on the market conversion planning. The Netherlands has used the information received during these meetings to inform their Parliament on 21 February, 8 April, 19 June and 21 September in 2020, on 11 February, 16 April, and 25 June in 2021, on 14 March and 26 September in 2022, on 6 March and 27 October in 2023, and most recently on 27 February in 2024.

[10] The Parliament's resolution followed the decision made by the Dutch Council of State on July 3, 2019, which annulled the Ministry of Economic Affairs and Climate Policy's decision on the allowed Groningen production in the GY 2018/19. The Council of State concluded that it was not sufficiently motivated why the demand for Groningen gas could not be reduced faster than foreseen. The Council of State not only referred to Dutch demand but also to exports. According to the Council of State it was not sufficiently clear what the Minister meant with his statement that he is in dialogue with neighboring countries to reduce their demand and what actions he undertakes to accelerate the reduction of exports of Groningen gas.

2. L-gas demand

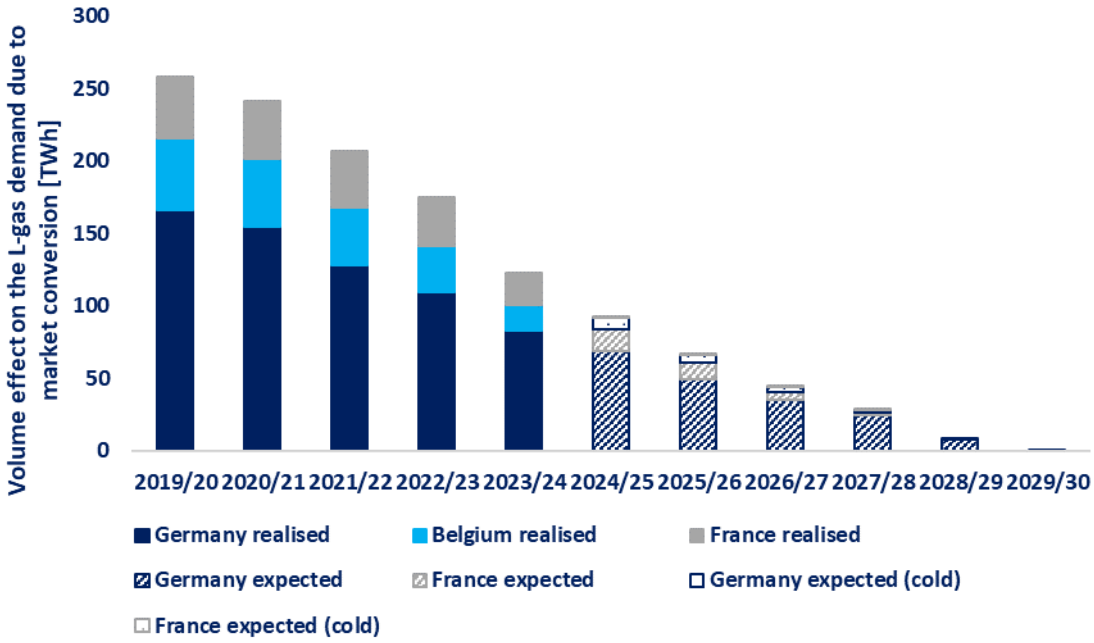
L-gas is predominantly consumed in the residential and commercial sectors for space heating purposes. Consequently, L-gas demand shows a significant seasonal profile.

There is a particular strong correlation between the number of heating degree days (HDD) and L-gas consumption, given its predominant use for space heating purposes.

Mainly due to L-gas market conversions in Germany, France and Belgium, L-gas demand from the Netherlands decreased by ~45% in the previous years, from 233.4 TWh in GY 2019/20 to 127.5 TWh in GY 2022/23. Of this difference in L-gas demand due to market conversion, 73.7 TWh was realised in Germany, 20.4 TWh in Belgium and 11.8 TWh in France.

In the upcoming years until GY 2029/30, combined L-gas exports from the Netherlands to Belgium, France and Germany are expected to decrease due to the conversion programmes. Consequently, L-gas demand met with imports from the Netherlands is expected to fall to 0 in Belgium by GY 2024/25, to 0 in France by GY 2027/28 and to 0.3 TWh in Germany[11] by GY 2029/30 both in an average and cold GY[12].

Figure 2.0.1 Volume effect on the L-gas demand of actual[13] and planned conversions between GY 2019/20 and GY 2029/30 (TWh, based on average temperatures in the GY's up till 2023/24 and based on average and cold GY's in the years after)



[11] Please note that the remaining demand in GY 2029/30 (0.3 TWh / 100.000 kWh/h) is given by a regional grid in Germany, that can only be supplied via the Netherlands (Haanrade / Thyssengas).
[12] In the case of Belgium and France, the demand profile for a cold GY has been calculated based on the 1995/96 temperature profile by GTS as stated in the Dutch Gas Act for the L-gas supply-demand balance of this briefing. In the case of Belgium, the preferred national approach is to consider the year 1962/63 as a cold year profile. The French regulation approach is requiring to work with a 2% risk cold GY (using Lille weather data), leading to a demand profile national reference shared with the French stakeholders, about 2% above the GTS's figures.
[13] Contains solely the expected effect due to market conversion.

3. L-gas market conversion volume

The gas infrastructure operators of Belgium, France and Germany have made arrangements to undertake extensive conversion programmes, mainly switching L-gas consumers to H-gas, to reduce the L-gas supply from the Netherlands: by GY 2029/30, their imports of L-gas will be reduced to close to zero.

Both the realised number of gas installations or consumers that are converted and the corresponding volumes are important to consider. In this report, countries supply data for each.

Figure 3.0.1. Volume effect of actual and planned conversions between GY 2019/20 and GY 2029/30 (TWh, based on average temperatures)

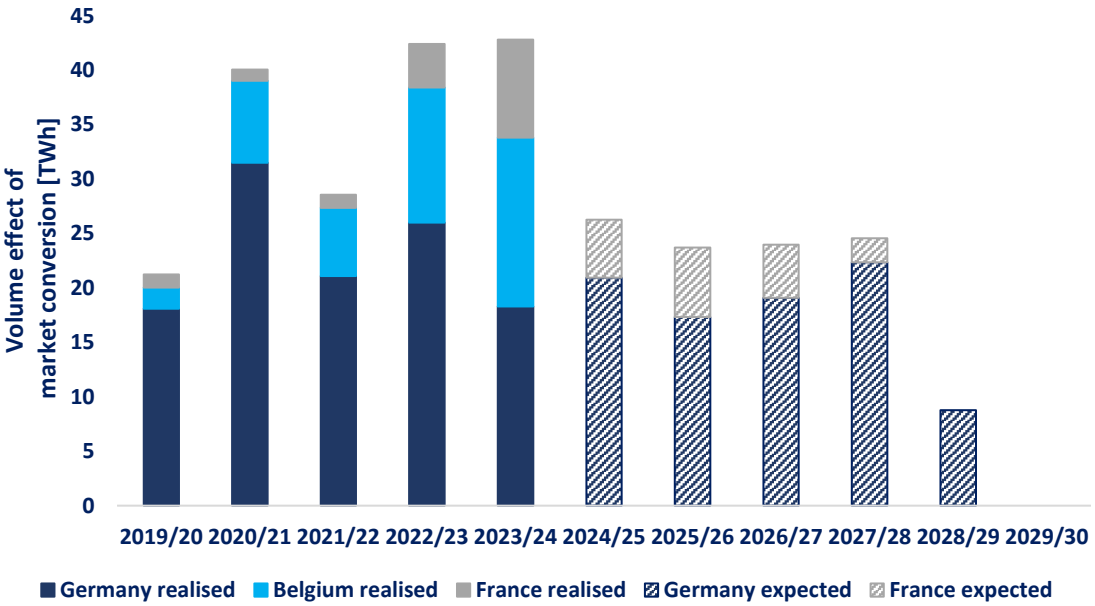
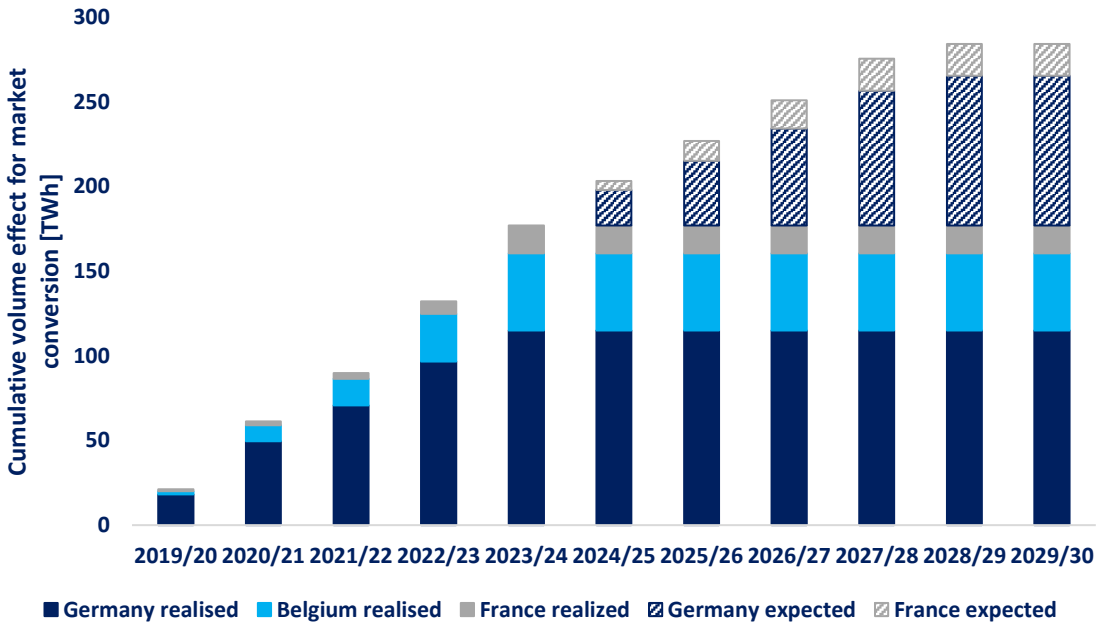


Figure 3.0.2. Cumulative volume effect of actual and planned conversions between GY 2019/20 and GY 2029/30 (TWh, based on average temperatures)



3.1 Germany

In 2015, 5.5 million gas installations in Germany were supplied with L-gas, for a total volume of approx. 250 TWh/y. All these installations have to be converted to H-gas before GY 2029/30.

Legislative changes and conversion costs

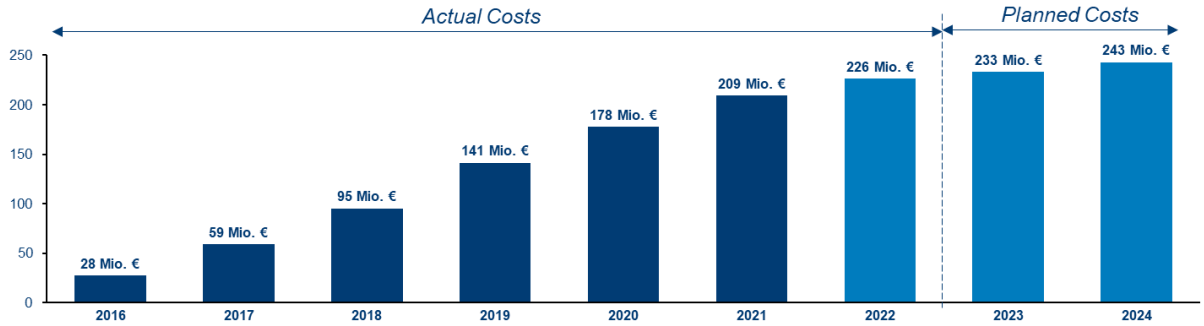
In order to implement the market conversion in Germany, some 5.5 million gas appliances need a physical adaptation. A sophisticated timetable for the conversion process was put into place in 2014 and legal changes have been introduced. As of 2017, the Energy Industry Act (EnWG) had been revised substantially in order to serve as the basis for the market conversion from L- to H-gas. § 19a of the Energy Industry Act clarifies that the legal responsibility for the process lies with the transmission system operators and that the necessary costs of adaptation of gas appliances are socialised (as an integral part of the gas grid fee). In addition, at a later stage the Energy Industry Act was amended concerning access to the German L-gas grid in order not to provide substantial amounts of L-gas to new customers.

The total costs for the conversion from L- to H-gas in Germany are estimated at approximately €4.3 billion. The conversion costs can be split into two different cost categories: (1) costs for adapting the customers' appliances from L- to H-gas and (2) costs for grid expansion.

The costs for adapting the customers appliances from L- to H-gas are reimbursed. The reimbursement only refers to the adaption and not the replacement of appliances. Customers with installations that cannot be adapted from L- to H-gas and have to be replaced are entitled to receive a lump sum of up to € 600 under certain circumstances.

The actual costs for the adaption of appliances from the years 2016 – 2022 and the planned costs for the years 2023 – 2024 are displayed in the illustration below, altogether totaling to approximately € 1.4 billion.

Figure 3.1.1. Actual and planned costs for the adaption of appliances, 2016-23 (€ million)



The respective costs are financed by a "market conversion levy" that is paid on top of the TSO transport tariffs. Estimates for the cumulated market conversion levy until 2029 see costs of roughly € 2.3 billion.

Costs for grid expansion on TSO and DSO level are not included in the market conversion levy described above. TSO costs for grid expansion related to L- to H-gas conversion amount to another € 2 billion and are financed by the regular transport fees.

Conversions from 2015 to 2023

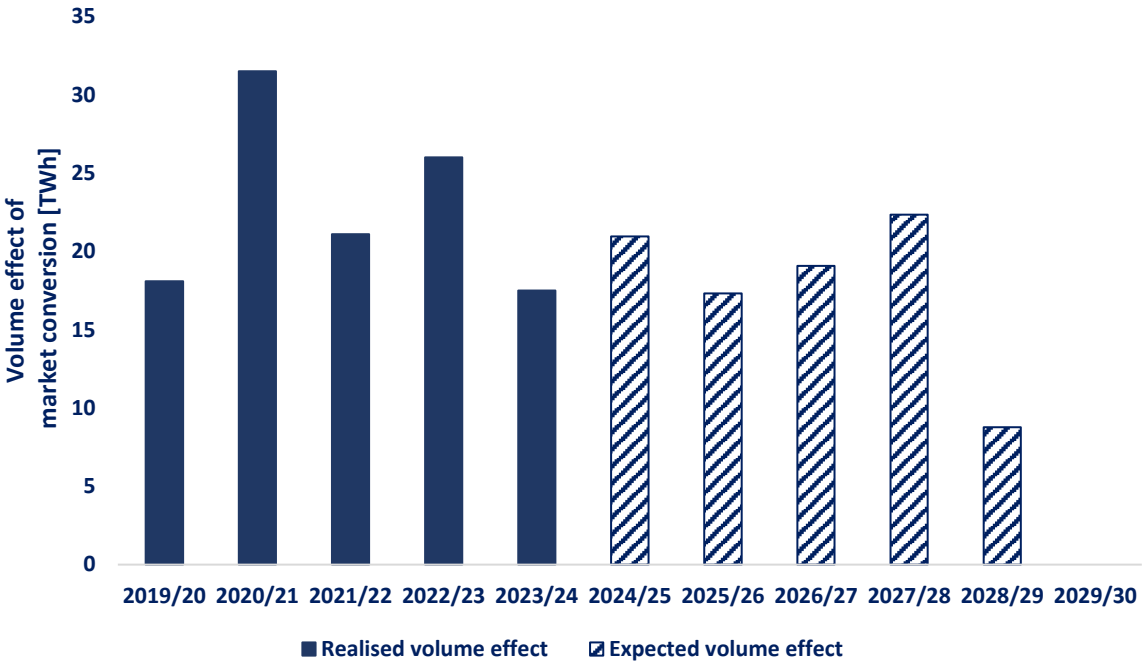
Approximately 2,600,000 appliances have been converted from L- to H-gas in the years 2015 – 2023, which amounts to almost 50% of the overall conversions.

During the years 2015 – 2018, several early conversions have been implemented ahead of the scheduled dates for conversion. Furthermore, the German TSOs have accelerated the planning for the consecutive years repeatedly. The conversions realised between 2015 and 2018 account for a capacity of 4.6 GWh/h and a yearly volume of 28 TWh. More than half of this volume accounted to conversions ahead of schedule, which served to bring down demand for Groningen gas earlier. As the advanced changes had been made years before the due date, they continue to be a relief for the Groningen production in the years to come.

In 2023, 552,000 installations were converted with an estimated volume effect of 26 TWh (average year). Concerning L-gas storages, two conversions took place in 2023:

- In April 2023, one of the L-gas storages in Epe has been partially converted to H-gas. A working gas volume of approximately 2 TWh has been shifted towards the H-gas system.
- The storage Huntorf is now totally converted to H-gas. This is the reason for the decrease of working gas at the UGS EWE-Zone L down to approx. 6 TWh. The storage zone UGS EWE-Zone L formerly included the storage of Nüttermoor L and Huntorf.

Figure 3.1.2. Realised and estimated volume effect of market conversion for GY 2019/20 up to GY 2029/30 (TWh, based on an average temperature profile)



Conversions in 2024

In 2024, 516,000 installations are to be converted leading to an estimated volume effect of 17.5 TWh. The 2024 conversions are located in North Rhine-Westphalia and Lower Saxony and include major cities such as Cologne and Hannover, that are partially converted in 2024. As of June 2024, the annual conversion scheme proceeds as planned without delay.

Figure 3.1.3. Conversion areas in 2024

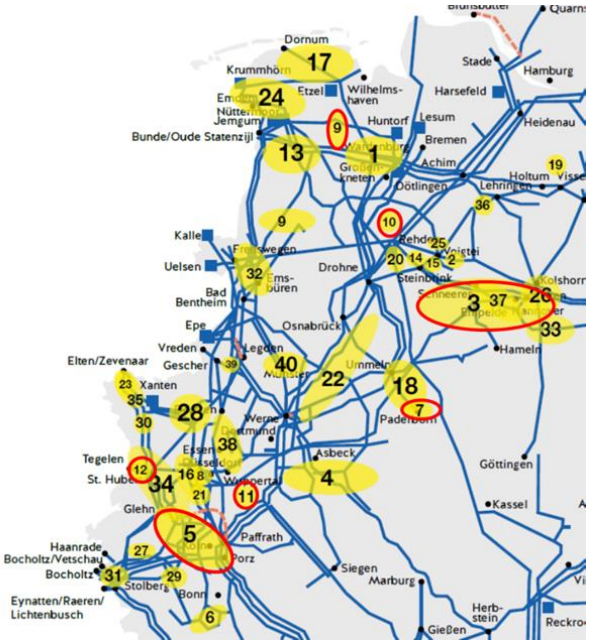


Table 3.1.1 Market conversion in Germany in 2024

Nr.	Conversion Area	TSO	# of installations
7	Paderborn	Gascade / OGE	7,000
9	EWE-Zone Teil V	GTG	122,000
10	Rehden - Bassum	Nowega	7,000
11	Bergisches Land	OGE	67,000
3	Drohne - Ahlten	OGE	166,000
12	Kaldenkirchen	OGE	25,000
5	Köln – Dormagen	OGE / TG	122,000

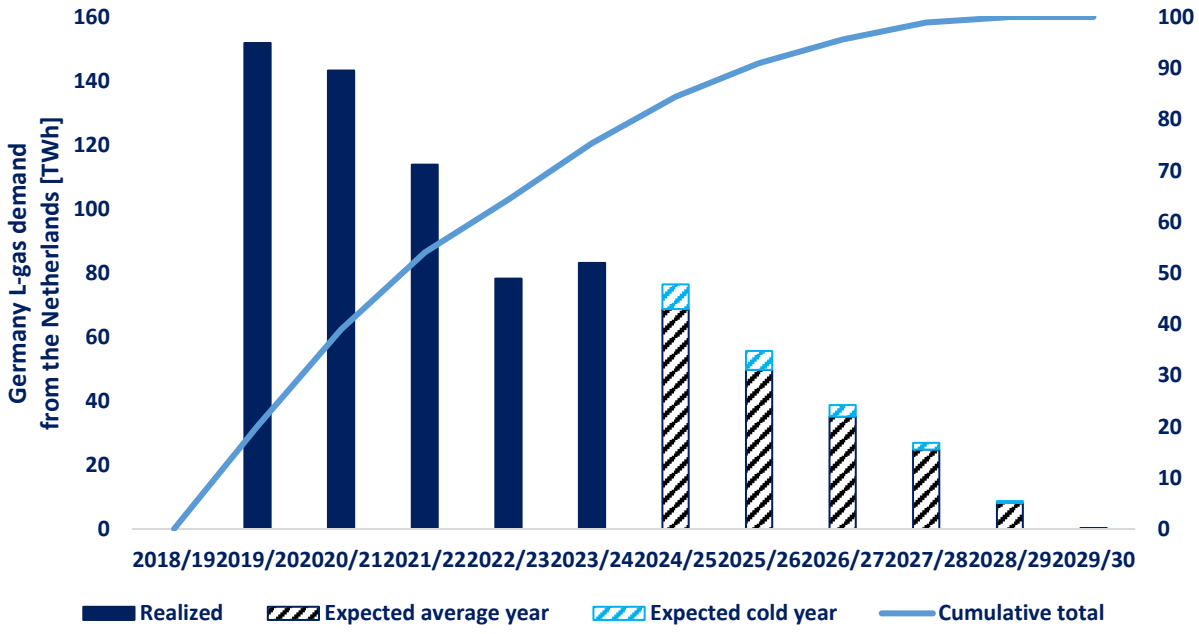
Conversions until GY 2029/30

In Germany, approximately 2.2 million gas appliances will still need to be converted between GY 2024/25 and GY 2028/29, translating into a total volume of 89 TWh for years with an average temperature profile.

Consequently, L-gas imports from the Netherlands to Germany are expected to fall to 0.3 TWh by GY 2029/30, both in an average and cold GY.

The conversion planning in this summer briefing is identical compared to the previous planning presented in the winter briefing 2024.

Figure 3.1.4. Realised and expected Germany's L-gas imports from the Netherlands (GY 2018/19 - GY 2029/30) where the years 2018/19 up till 2023/24 contain realisations[14] and the years further contain expectations for average and cold GYs



[14] Contains effects due to market conversion, price effects and temperature.

3.2 France

Conversion of the French L-gas network[15]

In 2018, almost 1.3 million French gas consumers were supplied with L-gas, for a total volume of 43.4 TWh/y. All these consumers have to be converted to H-gas before GY 2029/30.

Since 2015, the French legal and regulatory framework has been adapted to carry out the conversion of the L-gas network. Costs incurred by the TSO and the DSOs for the conversion of the L-gas networks are covered through transmission and distribution tariffs and are estimated to amount to approximately € 800 million.

Conversions from 2018 to 2024

A pilot project was carried out between 2018 and 2020 to test the conversion process of the gas network. Approximately 68,000 customers were converted from L- to H-gas during this period accounting for an annual volume of 1 TWh/y.

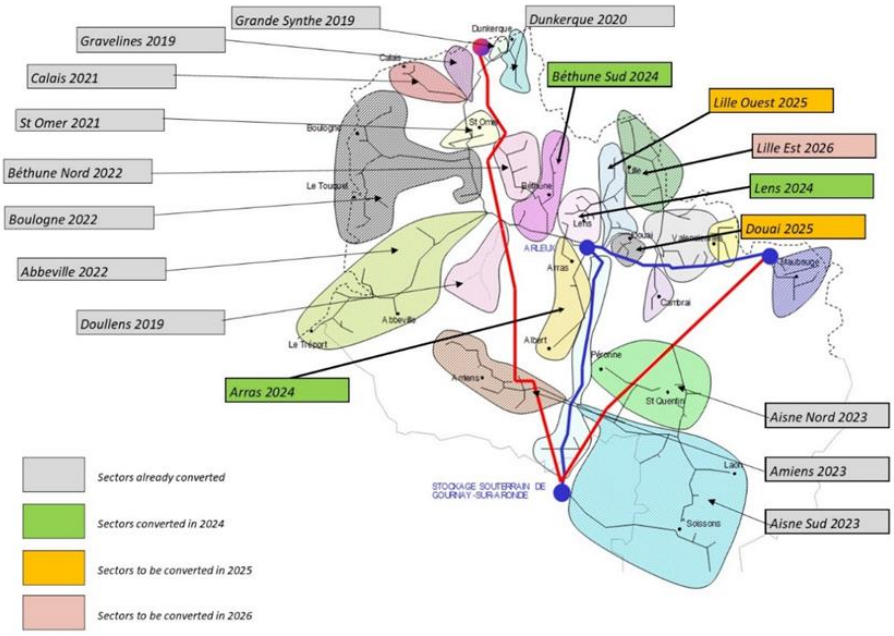
Between 2021 and 2023, eight sectors with a total of 353,000 customers have been converted accounting for an estimated volume of 14.2 TWh/y.

In 2024, the conversion concerned three sectors for a total amount of 212,000 customers and an estimated annual volume of 5.5 TWh/y.

Conversions in 2025

In 2025, two sectors with 279,000 customers are to be converted accounting for an annual volume of 5.3 TWh/y under average weather conditions. All conversion activities are on track.

Map 3.2.1. Market conversions in France in 2019-2026

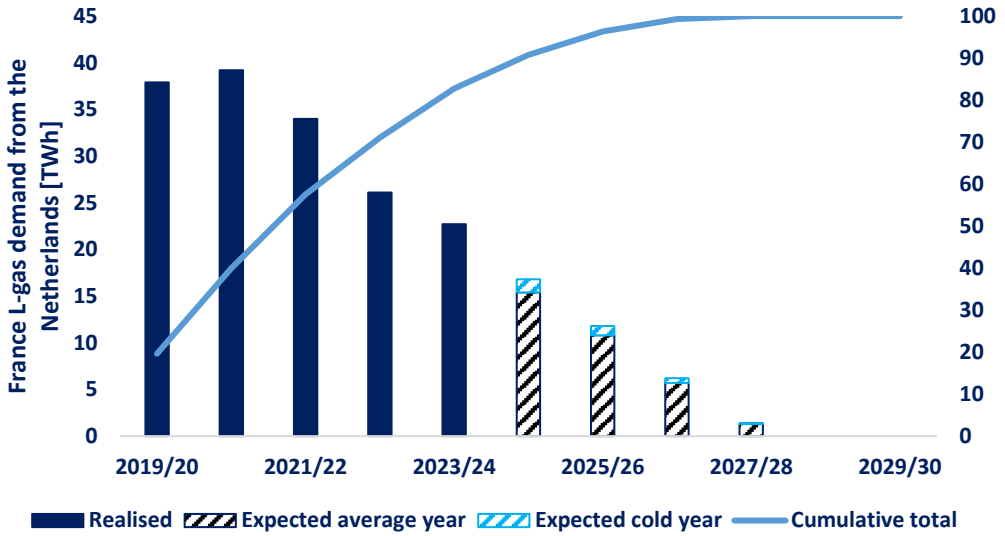


Conversions until GY 2028/29

In France, over 696,000 of gas consumers will need to be converted between GY 2024/25 and GY 2028/29. Consequently, L-gas imports from the Netherlands to France are expected to fall to 0 by GY 2028/29.

[15] For further details see previous winter and summer reports of the Task Force Monitoring L-Gas Market Conversion.

Figure 3.2.1. Realised and expected France L-gas imports from the Netherlands (GY 2018/19 - GY 2029/30) where the years 2018/19 up till 2023/24 contain realisations[16] and the years further contain expectations for average and cold GYs



3.3 Belgium

Conversions until GY 2029/30

In Belgium, approximately 1.5 million gas connections had to be converted between GY 2020/21 and GY 2029/30, translating into a total volume of 47.4 TWh.

As a consequence of the market conversion, L-gas imports to Belgium from the Netherlands were originally expected to fall to 0 by GY 2029/30. Due to efforts to speed up the conversion in Belgium, its conversion was finalised on 2 September 2024, 5 years ahead of the original planning.

Conversion in GY 2023/24

In GY 2023/24, around 475,000 connections are to be converted on June 1st and September 1st, 2024, respectively 100.000 and 375.000 connections, translating into a volume of 15,5 TWh under average weather conditions.

This will finalize the L- to H-conversion in Belgium.

Figure 3.3.1. Realised migrations on June 1st, 2024

[16] Contains effects due to market conversion, price effects and temperature.

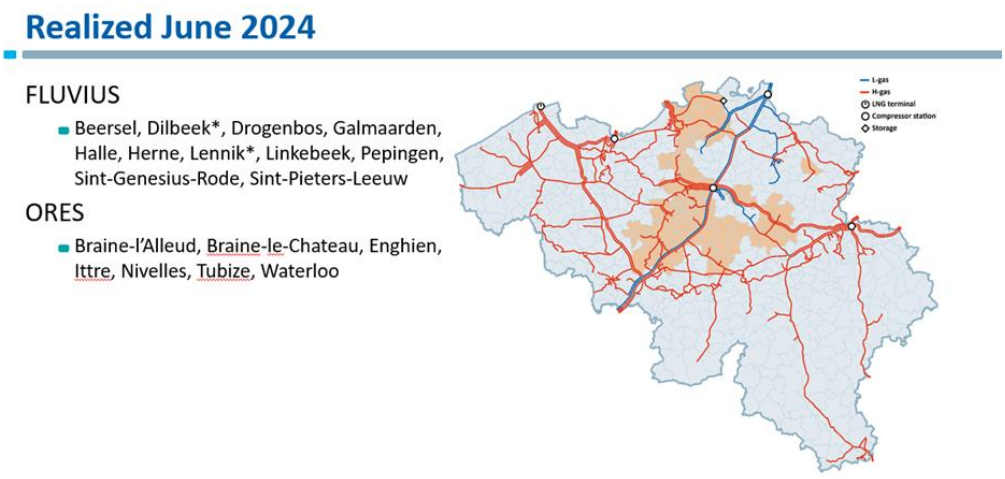
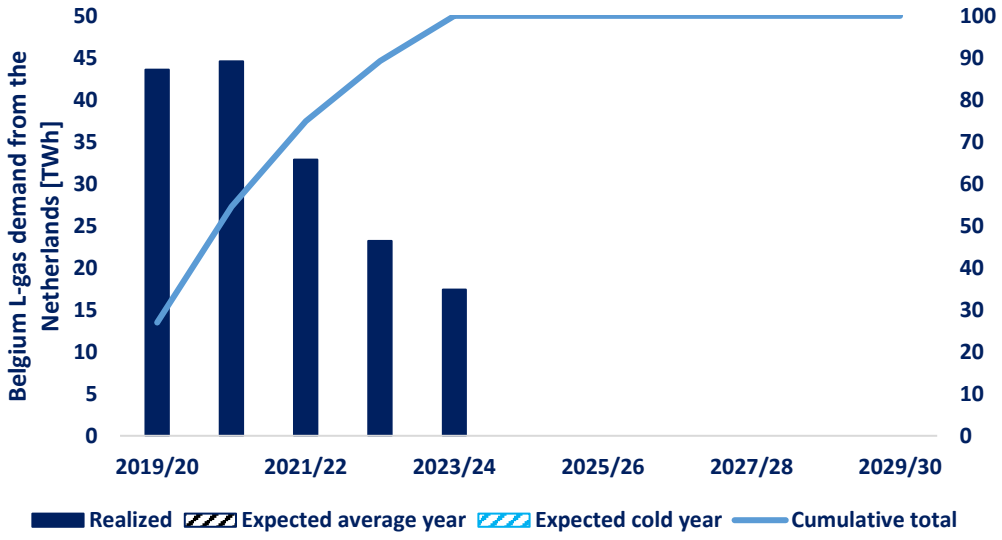


Figure 3.3.2. Scheduled migration on September 1st, 2024

Figure 3.3.3. Realised and expected Belgium L-gas imports from the Netherlands (GY 2018/19 - GY 2029/30) where the years 2018/19 up till 2023/24 contain realisations[17] and the years further contain expectations for average and cold GYs



[17] Contains effects due to market conversion, price effects and temperature.

3.4 The Netherlands

Contrary to the L-gas consuming countries, the Netherlands have decided not to enter into a large scale conversion operation. Instead, a new nitrogen facility was built which, together with the already existing nitrogen facilities and some underground storage facilities, is able to provide enough G/L-gas (volume and capacity) to meet Dutch and foreign L-gas demand in the years to come. For more details, please refer to Chapter 4 of the Report.

The legislative framework has been adapted in order to limit future G/L-gas consumption. The Dutch Gas Act has already been adapted to prevent future G/L-gas consumption growth by prohibiting the connection of newly built houses and buildings to the gas grid.
The legislation concerning the conversion of industrial customers (adopted on 20 June 2020) specifies that industrial customers who are connected to the L-gas network may not consume more than 100 million m3 of G/L-gas per gas year. Moreover, the nine industrial consumers who consumed more than 100 million m3 of G/L-gas annually for at least two years in GY 2016/17, 2017/18 or 2019/20 are not allowed to use L-gas anymore after October 2022. Therefore, Dutch demand for G/L-gas is expected to decrease by approximately ~30 TWh (compared to L-gas demand in 2020), equating to the consumption of these nine largest users. Seven of these nine users have already stopped their offtake of G/L-gas and have converted to other sources of energy. The remaining two industrial users have been and will be granted a temporary exemption from the ban by the Ministry of Climate Affairs and Green Growth. This exemption holds until their planned conversion, respectively in 2025 and the last conversion in the upcoming years.

In addition, steps are being taken to phase-out natural gas from the Dutch energy system between now and 2050. This follows the Paris Agreement on Climate Change and the Dutch Climate Agreement.

4. L-gas production

4.1. L-gas production in the Netherlands in the period GY 2015/16 – GY 2023/24

Following an increasing number of earthquakes linked to the natural gas extraction in the province of Groningen, the Dutch authorities have imposed successive caps on Groningen's gas production starting from GY 2014/15. This resulted in the decision for the previous heating season to use the Groningen field only as a back-up. Analyses from GTS[18] showed the capacity might only be needed on very cold days, with effective temperature of -6,5 and below, should capacity similar in size to the largest single piece of infrastructure fail. This advice led to the decision by the Minster of Economic and Climate Affairs that the Groningen field should only be available in these situation as a means for back up, and therefore produce a minimum flow.

Both houses of the Dutch Parliament passed the law prohibiting gas extraction from the Groningen field with supermajorities on 12 March in the House of Representatives, and 16 April in the Senate respectively[19,20]. From 19 April 2024 onwards gas extraction from the Groningen field was prohibited after 60 years of production[21]. Due to the removal of the Groningen field as a means for back up, there is a small residual risk in GY 2024/25. The Ministry of Economic Affairs and Climate Policy addressed this risk in the letter on the residual risks of the closure of the Groningen field[22].

As stated earlier in this report, Groningen gas has a notably lower calorific value compared to the average European natural gas fields, which means that it cannot simply be replaced by other (imported) natural gas sources. These need to be converted to G/L-gas referred in the current report as "pseudo L-gas" or "pseudo G-gas", as production from the Groningen field has permanently ceased. Pseudo L-gas can be produced either via nitrogen blending or via enrichment[23]. Due to the decision of the deputy Minister of Groningen and Mining (for the Ministry of Economic and Climate Affairs) to only allow production from the Groningen field when the

[18] https://www.gasunietransportservices.nl/en/gasmarket/market-development/advice-production-groningen-field
[19] Draft bill overview Dutch Parliament: Wijziging van de Gaswet en Mijnbouwwet in verband met de beëindiging van de gaswinning uit het Groningenveld | Tweede Kamer der Staten-Generaal
[20] Draft bill overview Dutch Senate Beëindiging gaswinning Groningenveld (36.441) - Eerste Kamer der Staten-Generaal
[21] Dutch Bulletin of Acts and Decrees. 2024, no. 95. Staatsblad 2024, 95 | Overheid.nl > Officiële bekendmakingen (officielebekendmakingen.nl)
[22] Dutch Parliamentary Paper II, 33529, no. 1211. Kamerbrief over mitigerende maatregelen restrisico sluiting Groningenveld | Kamerstuk | Rijksoverheid.nl
[23] In the process of nitrogen blending is added to H-gas in order to bring down the Wobbe-value until it meets the upper Wobbe-limits of the L-gas specifications. Enrichment refers to the process adding H-gas to pseudo Groningen-gas until the upper Wobbe limit of the L-gas specifications.

expected daily average effective temperature is below -6,5 degrees[24], the G-gas market in the Netherlands and the L-gas market in Germany, France and Belgium were fully supplied by pseudo-gas. Sufficient H-gas and nitrogen are therefore needed.

With the termination of H-gas supply from Russia, 30% of H-gas demand needs to be supplied from other sources. The main source for H-gas is currently LNG, supplied through existing terminals in the United Kingdom, Belgium and the Netherlands. Since these terminals do not have enough capacity to replace former Russian supply, additional LNG-import facilities have been and are being developed in the Netherlands[25], Germany and France. An extension of the re-gas capacity at the LNG terminal of Zeebrugge in Belgium is ongoing. Although some of these projects are operational already (expansion of the GATE LNG-terminal and the realization of the EemsEnergyTerminal in the Netherlands), most of them are still under development and will contribute mainly to the mid-term solution. In the short term, the demand supply balance is being kept by a decline in the European gas demand due to high prices. However, there is still a risk of H-gas shortages.

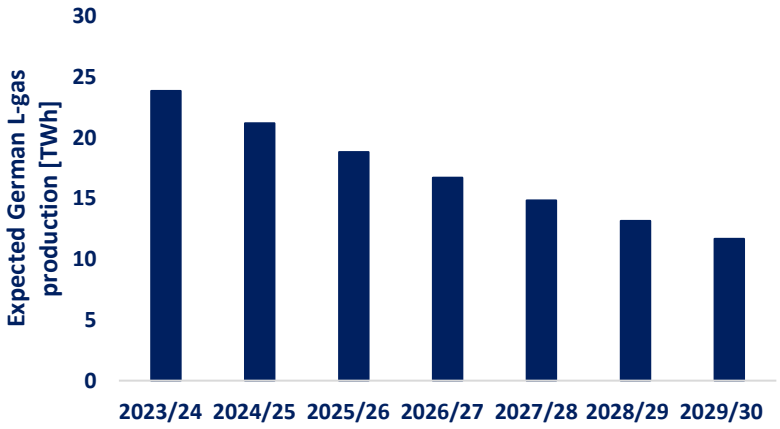
4.2 Expected L-gas production outside Netherlands for the period GY 2023/24 – 2029/30

In Germany, L-gas production is expected to decrease at an annual average rate of ~7% from 24.3 TWh in GY 2023/24 to 13.2 TWh by GY 2029/30. There is one peak nitrogen/H-gas blending facility in Germany, in Rehden, supplying only limited volumes of converted L-gas. In 2021, the blending facility in Rehden was extended with a local nitrogen plant for backing of the local supply demand balance.

In addition, the German TSO GTG Nord built a blending facility at the Dutch border. This facility allows for blending Dutch Groningen gas with H-gas. This blending facility is in operation since April 2021 and allows for an annual decrease of L-gas deliveries from the Netherlands of up to 30% (5-6 TWh/y approx.) of the demand of GTG's cross border point Oude Statenzijl, depending on, inter alia, the actual amount of gas imports. Thus, the facility is a further relief to the Groningen production. The building costs of the facility and its operational costs are borne by network users.

There is no L-gas production in Belgium and France. The French nitrogen/H-gas blending facility located at Loon Plage (near Dunkerque) designed for peak-load needs only was abandoned in 2021 as this area of the GRTgaz network was converted. There is one peak nitrogen/H-gas blending facility in Lillo, Belgium, supplying only limited volumes of converted L-gas.

Figure 4.2.1. Indication of the L-gas production in Germany for GY 2023/24 to GY 2029/30 [TWh]



[24] Which resulted in a total production of 8 million Nm^3 from the Groningen field in GY 2023/24 according to the NAM website
[25] https://www.gasunietransportservices.nl/gasmarkt/investeringsplan/investeringsplan-2024

Annex

Annex I: Consumers demand for L-gas from the Netherlands through the heating seasons of GY 2022/23 and 2023/24

1.1 Consumers demand for L-gas from the Netherlands[26] through the heating season of GY 2022/23 [TWh]

Heating season GY 2022/23	Germany	France	Belgium	Netherlands
October 2022	7.0	1.8	1.4	9.5
November 2022	8.5	2.9	2.4	15.7
December 2022	11.4	4.2	3.6	24.8
January 2023	11.0	3.9	3.5	23.4
February 2023	8.6	3.2	3.0	19.9
March 2023	10.0	3.1	3.0	20.0
Total	56.5	19.1	16.9	113.3

1.2 Consumers demand for L-gas from the Netherlands[27] through the heating season of GY 2023/24 [TWh]

Heating season GY 2023/24	Germany	France	Belgium[28]	Netherlands
October 2023	4.5	1.2	1.1	10.3
November 2023	7.9	2.3	1.7	17.4
December 2023	9.2	2.6	2.0	21.2
January 2024	9.8	3.3	2.5	26.4
February 2024	7.3	2.2	1.8	18.2
March 2024	7.3	2.0	1.6	15.8
Total	46.0	13.6	10.7	109.3

Annex II: Indication of the demand for L-gas from the Netherlands until GY 2029/30

2.1 Indication of the demand for L-gas from the Netherlands in Germany until GY 2029/30 [TWh]

	Cold		Average
Gas Year	**TWh**	**GWh/d**	**TWh**
2024/25	76.4	574	68.7
2025/26	55.6	458	49.7
2026/27	38.7	343	35.1
2027/28	26.9	228	24.8
2028/29	8.7	115	8.1
2029/30	0.3[29]	2	0.3

2.2 Indication of the demand for L-gas from the Netherlands in Belgium until GY 2029/30 [TWh]

	Cold		Average
Gas Year	**TWh**	**GWh/d**	**TWh**
2024/25	0	0	0

[26] For Germany and Belgium, this accounts for imports of L-gas from the Netherlands and not total domestic demand. For France, this accounts for final consumers demand per month, not taking into account L-gas injections/withdrawals in/from Gournay storage, and L/H blending. For the Netherlands, it accounts for domestic demand.
[27] For Germany and Belgium, this accounts for imports of L-gas from the Netherlands and not total domestic demand. For France, this accounts for final consumers demand per month, not taking into account L-gas injections/withdrawals in/from Gournay storage, and L/H blending. For the Netherlands, it accounts for domestic demand.
[28] Not considered DSO supplying Baarle-Hertog and one consumer at Veldwezelt directly supplied by Dutch DSO (60-70 GWh/year).
[29] Please note that the remaining demand in the gas year 2029/30 (0.3 TWh / 100.000 kWh/h) is given by a regional grid in Germany, that can only supplied via the Netherlands (Haanrade / Thyssengas).

2.3 Indication of the demand for L-gas from the Netherlands in France until GY 2029/30 [TWh]

	Cold		Average
Gas Year	**TWh**	**GWh/d**	**TWh**
2024/25	16.8	153.5	15.4
2025/26	11.5	104.1	10.8
2026/27	6.2	50.6	5.7
2027/28	1.4	10.9	1.3
2028/29	0	0	0
2029/30	0	0	0

2.4 Indication of the demand for L-gas in the Netherlands until GY 2029/30 [TWh]

	Cold		Average
Gas Year	**TWh**	**GWh/d**	**TWh**
2024/25	230.4	2732	197.9
2025/26	221.4	2677	189.5
2026/27	216.7	2637	185.5
2027/28	212.1	2601	181.5
2028/29	207.5	2565	177.5
2029/30	202.9	2529	173.5

Annex III: Expected market conversion volume until GY 2029/30

3.1 Expected market conversion volume in Germany until GY 2029/30 [TWh]

Gas year	Volume converted [TWh]	Number of installations [thousands]
2023/24	17.5	516
2024/25	21.0	520
2025/26	17.3	516
2026/27	19.1	540
2027/28	22.3	440
2028/29	8.8	202
2029/30	0	0

3.2 Expected market conversion volume in Belgium until GY 2029/30 [TWh][30]

Gas year	Volume converted [TWh]	Number of installations [thousands]
2023/24	15.5	475
2024/25	0	0

3.3 Expected market conversion volume in France until GY 2029/30 [TWh]

Gas year	Volume converted [TWh]	Number of installations [thousands]
2023/24	5.5	212
2024/25	5.3	279
2025/26	6.4	197
2026/27	4.9	183
2027/28	2.2	37
2028/29	0	0
2029/30	0	0

[30] Not considered DSO supplying Baarle-Hertog, one consumer at Veldwezelt directly supplied by the Dutch DSO (60-70 GWh/year) and fuel gas necessary for the transmission service to remaining French L-gas market.

Annex IV: Expected L-gas production

4.1 Indication of the L-gas production in the Netherlands from Groningen until GY 2023/24 [TWh]

Gas year	Cold	Average
2023/24	0	0

4.2 Indication of the L-gas production in Germany until GY 2029/30 [TWh]

Gas year	Cold	Average
2023/24	27.6	27.6
2024/25	26.3	26.3
2025/26	24.8	24.8
2026/27	22.8	22.8
2027/28	18.5	18.5
2028/29	17.1	17.1
2029/30	15.5	15.5

Annex V: L-gas storage in northwest Europe

5.1 Working gas volume and daily withdrawal capacity of L-gas storage sites in Germany, France and the Netherlands

	Working gas [TWh]	Withdrawal rate (GWh/d)
Germany[31]		
Speicherzone L-gas (EWE)[32]	4.4	141.1
Empelde	2.2	73.9
Epe L-Gas (RWE)	2.0	97.5
Epe L-Gas (UES)	1.5	120
France		
Gournay	13.4	215
the Netherlands		
EnergyStock	3.0	252
Norg (Langelo)	49.0	742
Alkmaar	5.0	357
Epe Nuon	3.0	117
Epe Eneco	1.0	95
Epe RWE Gas Storage West GmbH	3.0	119
Peakshaver	1.0	312
Grijpskerk	12.0	620

5.2 Net withdrawals of L-gas storage sites in Germany, France and the Netherlands through the heating seasons of GY 2021/22, GY 2022/23 and GY 2023/24 [TWh]

	2021/22	2022/23	2023/24
The Netherlands	35	34	41.8
France	9.2	8.4	8.3
Germany	5.7	6.6	4.0

[31] Source: https://agsi.gie.eu/, 13.06.2024
[32] This includes the storage UGS Nüttermoor.

Annex VI: Climatological context

L-gas is predominantly used in the residential sector for space heating, therefore L-gas gas demand is strongly correlated with the temperature and wind. This is also the reason why the allowed Groningen production is determined by the number of degree days in a year. The definition of the degree days is given in the Dutch Gas Act. As stated in the Dutch Gas Act, both the temperature and wind are measured at weather station the Bilt.

The number of degree days can be calculated by

$D = \Sigma \max[(14 - Teff),0]$

Where:

D = the number of degree days

14 = heating limit (the so-called "stookgrens")

Teff = daily average effective temperature

$Teff = T - (V/1,5)$

Where:

T = daily average temperature

V = daily average wind speed

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