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Direct line

Our reference
L 22.0743

Your reference

Subject
Report: resources and methods used in gas year 2021/2022

Excellency,

We present our report on how L-gas resources and methods have been used over the past gas year (1 October 2021 to 30 September 2022). This report fulfils our statutory obligation[1].

Our report compares planning assumptions and actual results for gas market supply and demand, evaluating whether it is necessary to adjust the projections for gas year 2023/2024.

During the last gas year, our planning assumption on the availability of sufficient H-gas for the production of pseudo G-gas proved to be doubtful. This issue was already identified by DNV as a vulnerability in its evaluation of the projection for the current gas year[2]. As Russian gas supplies to Northwest Europe fall away, it is possible to envisage scenarios in which insufficient H-gas is available. We are currently examining how to factor this into Groningen production projections for the next gas year.

Looking back on the gas year

In January 2021, GTS advised[3] that a Groningen volume of 3.9 billion (n)m^3 was necessary for security of supply if gas year 2021/2022 had an average temperature profile. For colder years, the production required was higher. GTS' recommendation was adopted by your predecessor in the decree prior to the start of the gas year[4].
Several unexpected events took place during the gas year that led to changes in our planning assumptions and had an impact on the production from the Groningen field. In accordance with our statutory task, we have informed you of these[5]. The first event was the delay in the new nitrogen installation Zuidbroek II[6].

[1] Dutch Gas Act, article 10a, paragraph 13
[2] https://www.eerstekamer.nl/nonav/overig/20220421/validatie_van_gts_advies_van_31/document3/f=/vlsgp0c07az3.pdf
[3] Advies leveringszekerheid voor benodigde Groningenvolumes en -capaciteiten gasjaar 2021/2002 en verder, dated 29 January 2021, our reference L 21.0042
[4] Decree on Groningen gas field 2021-2022, dated 24 September 2021, reference DGKE-PDG / 21207065
[5] Dutch Gas Act, article 10A, paragraph 11
[6] Rapportage inzet middelen en methoden in gasjaar 2020/2022, dated 29 October 2021, our reference L 21.0501

The COVID-19 outbreak and ensuing lockdowns caused delays in the progress of work and delivery of materials. As a result, the date of completion was moved to summer 2022[7] and then later to the start of the new gas year[8].
Secondly, there was your decision to use gas storage facility Grijpskerk for storing low-calorific gas. When it was filled during the summer of gas year 2021/2022, some gas supplies from the Groningen field had to be used. Filling the storage facility to its maximum was, however, essential in order to keep an eye on the first possible date for closing the Groningen field. A third event impacting on Groningen production for gas year 2021/2022, among other things, was Russia's invasion of Ukraine. This resulted in low supplies of Russian gas and extremely high prices leading to demand destruction. LNG supplies to Europe increased sharply. Measures by the European Commission to reduce dependence on Russian gas also had their impact on the gas market. These include obligatory filling levels for the seasonal storages and incentives to make this possible.

Taking the above points into account, in March 2022 GTS recommended a required Groningen production of 4.5 billion (n)m^3 for a year where temperatures continued to be average[9]. You adopted this recommendation by means of an amendment decree[10]. In the run-up to the summer, you decided that the permitted Groningen production for gas year 2021/2022 was to be 4.5 billion (n)m^3, regardless of temperatures for the rest of the gas year[11].

Evaluation conclusion
During the gas year we monitored, evaluated and, if necessary, adjusted our planning assumptions. We have informed you of this in different letters [12,13,14], in compliance with our statutory task.
You can find our full report on how L-gas resources and methods have been used in the annex. Our findings, as shown in this report, will serve as a basis for a market consultation in November 2022. In that market consultation we will explain the planning assumptions for our projections for gas year 2023/2024 and beyond. We will take any views from market parties into account when determining the final planning assumptions. These will ultimately lead to the Groningen volume projection for gas year 2023/2024, which we will send to you by 1 February 2023.

Yours faithfully,

B.J. Hoevers
CEO

[7] Rapportage over wijzigingen in vraag naar en aanbod van laagcalorisch gas in gasjaar 2021/2022, dated 3 January 2022, our reference L 22.0001
[8] Vertraging oplevering stikstofinstallatie Zuidbroek, dated 17 May 2022, our reference L 22.0303
[9] Aanvullend advies Groningenproductie gasjaar 2021/2022, dated 31 March 2022, our reference L 22.0196
[10] Wijziging Operationele Strategie Groningen gasveld gasjaar 2021-2022, dated 1 April 2022, DGKE-PDG / 22027373
[11] Wijziging Operationele Strategie Groningen gasveld gasjaar 2021-2022, dated 26 July 2022, DGKE / 22271044
[12] Rapportage over wijzigingen in vraag naar een aanbod van laagcalorisch gas in gasjaar 2021/2022, dated 3 January 2022, our reference L 22.0001
[13] Bijlage bij Aanvullend advies leveringszekerheid gasjaar 2021/2022, dated 14 March 2022, our reference L 22.0142
[14] Aanvullend advies Groningenproductie gasjaar 2021/2022, dated 31 March 2022, our reference L 22.0196

Annexes

Annex: Evaluation of gas year 2021/2022

In this annex we evaluate different aspects of the previous gas year. We consider, one by one, gas balance demand and supply, the use of nitrogen, and the use of G-gas storage facilities and LNG installations. The evaluation concludes with a summary of the status of a number of measures contributing to the final closure of the Groningen field.

1. G-gas/L-gas market demand

Demand for G-gas and L-gas comes from distribution network operators, industry and electric power stations and small-scale consumers, or households, both at home and abroad. Gas consumption is predicted for all these categories, with small-scale gas user consumption correlating to temperature. Table 1 compares actual gas demand values with model results, using the actual temperature profile for gas year 2021/2022.

	Distribution network operators	Industry and power stations	Germany	Belgium and France	Total market
Actual	15.5	4.3	11.5	6.8	38.1
Model	16.7	5.2	12.1	7.7	41.7

Table 1: Market estimates and actual values for the different submarkets in gas year 2021/2022 in billions (n)m^3.

Models always involve a certain degree of inaccuracy but this year we see a significant deviation between the actual values and the model. At total annual average level this is ~9%. Model and actual values were close to each other during the first six months of the gas year, the deviation became apparent in the last six months[15]. The most likely reason for this is high gas prices. Based on these findings, we have reduced market demand in our updated recommendation for the current gas year[16]. When drawing up projections for gas year 2023/2024, we will examine how the Climate and Energy Exploration (KEV) and the Task Force Monitoring L-gas Market Conversion, which we use to estimate domestic and foreign market demand, deal with this demand destruction.

2. G-gas/L-gas market supply

Minimum Groningen production is calculated by meeting market demand for G-gas/L-gas with as much pseudo G-gas as possible. Minimum Groningen production consists, in addition to minimum flow, of the difference between the gas demand and the pseudo G-gas production. By performing this sum for thirty different temperature profiles, the Groningen production required is established by means of degree-day comparison.
When determining minimum Groningen production for gas year 2021/2022, pseudo G-gas production was maximised.

[15] Vertraging oplevering stikstofinstallatie Zuidbroek, dated 17 May 2022, our reference L 22.0303
[16] Aanvullend advies leveringszekerheid voor benodigde Groningencapaciteiten en -volumes gasjaar 2022/2023, dated 16 September 2022, our reference L 22.0478

A. Pseudo G-gas supply via H-gas and nitrogen[17]

Our models are based on nitrogen capacity available that corresponds to the total quantity that can be supplied via blending stations Ommen and Wieringermeer. In the January prior to the start of the gas year, the model assumed that Zuidbroek II would be completed on 1 April 2022[18]. The recommendation that led to an amendment decree assumed availability for the market of two-thirds of the capacity at the beginning of July and the remaining one-third in mid-August[19]. That the further delay in Zuidbroek II has not resulted in a higher production requirement from the Groningen field is because of the deviation in planning assumptions in the H-gas Wobbe value and market demand[20]. These two deviations have a similar but opposite impact on Groningen production.

In order to achieve the planned 100% nitrogen use in practice, we need blending station Pernis, Zuidbroek I and nitrogen cavern Heiligerlee as backup resources. As, in practice, our backup resources are available to the market, actual nitrogen utilisation may exceed 100%. Heiligerlee storage facility has a volume restriction: it can only be used when full. Based on the information on our website, the market has ongoing insight into the nitrogen capacity available and any fluctuations[21]. In this way, market parties can make maximum use of the nitrogen available.
Mismatches between nitrogen supply and demand may lead to intensive use of the Heiligerlee nitrogen cavern and occasionally the market will be instructed to restore the G/H balance. One such instruction was given in gas year 2021/2022.

Table 2 shows actual monthly average nitrogen use[22].

Month	**Nitrogen use [%]**
October	110
November	89
December	100
January	102
February	109
March	106
April	107
May	108
June	105
July	95
August	95
September	94
Annual average	**102**

Table 2: actual nitrogen use per month

The actual annual average comes to 102% nitrogen use. This is higher than the 100% utilisation of the nitrogen installations used to determine the latest degree-day line[23].

[17] Dutch Gas Act article 10a, paragraph 9, section b, first point.
[18] Advies leveringszekerheid voor benodigde Groningenvolumes en -capaciteiten gasjaar 2021/2002 en verder, dated 29 January 2021, our reference L 21.0042
[19] Aanvullend advies Groningenproductie gasjaar 2021/2022, dated 31 March 2022, our reference L 22.0196
[20] Vertraging oplevering stikstofinstallatie Zuidbroek, dated 17 May 2022, our reference L 22.0303
[21] https://www.gasunietransportservices.nl/netwerk-operations/transportinformatie/stikstof-overzicht-2
[22] For more information on how the nitrogen percentage is calculated, please refer to our website: https://www.gasunietransportservices.nl/netwerk-operations/transportinformatie/stikstof-overzicht
[23] Aanvullend advies Groningenproductie gasjaar 2021/2022, dated 31 March 2022, our reference L 22.0196

In addition to the deployment of nitrogen, the H-gas Wobbe index determines how much pseudo G-gas can be produced with our conversion installations. The following applies in this regard: the lower the Wobbe index of the H-gas flowing towards the blending stations, the more pseudo G-gas can be produced given the available quantity of nitrogen.

The model-based H-gas Wobbe index is a combination of small fields gas, which has a relatively low Wobbe index, and imported (gaseous or liquid) H-gas, which has a relatively high Wobbe index. This produces a weighted Wobbe index that is used in the modelling calculations to determine the amount of pseudo G gas that can be made. Prior to the gas year, the model assumed a Wobbe index of 51.99 MJ/m^3 [24].

At an interim evaluation halfway through the gas year[25], we identified that the H-gas had a lower Wobbe index than the original planning assumption. We took account of this in our recommendation to arrive at the minimum Groningen volume required for security of supply. However, Russia's invasion of Ukraine meant that imports of high-calorific Russian gas were replaced by LNG, which has a relatively higher Wobbe index. As a result, the average H-gas Wobbe index rose in the second half of the gas year, reaching an annual average of 51.97 MJ/m^3. In previous gas years there was always a difference of around 0.2 MJ/m^3, the forecast being higher than the result. In the last gas year, this difference has almost completely disappeared due to (in particular) the greater use of LNG (with a higher Wobbe). The total pseudo G-gas production from nitrogen and H-gas is shown in figure 2, where it can be seen that the absolute pseudo G-gas production has fallen compared to previous years. This is due to the relatively low demand this gas year.

A. Pseudo G-gas supply via enrichment[26]

Enrichment is the scope available for G-gas or L-gas, respectively, in the Wobbe index for blending H-gas with the Groningen gas. Pure Groningen gas has a Wobbe index of 43.8 MJ/m^3. This can be supplemented with H-gas to 44.4 MJ/m^3 for the domestic G-gas market. A maximum Wobbe index of 46.5 MJ/m^3 applies to some exports abroad (L-gas), so an additional quantity of H-gas can be added for these exports. Maximum enrichment will be used to minimise Groningen production.

Figure 2 shows pseudo G-gas production via enrichment, both G-gas and L-gas enrichment showing a downward trend. G-gas enrichment is decreasing due to declining Groningen production. The decreasing L-gas enrichment is caused by the market conversion from L-gas to H-gas in neighbouring countries (Germany, Belgium, France).

[24] Advies leveringszekerheid voor benodigde Groningenvolumes en -capaciteiten gasjaar 2020/2021 en verder, dated 29 January 2021, our reference L 21.0042
[25] Bijlage bij Aanvullend advies leveringszekerheid gasjaar 2021/2022, dated 14 March 2022, our reference L 22.0142
[26] Dutch Gas Act article 10a, paragraph 9, section b, second point.

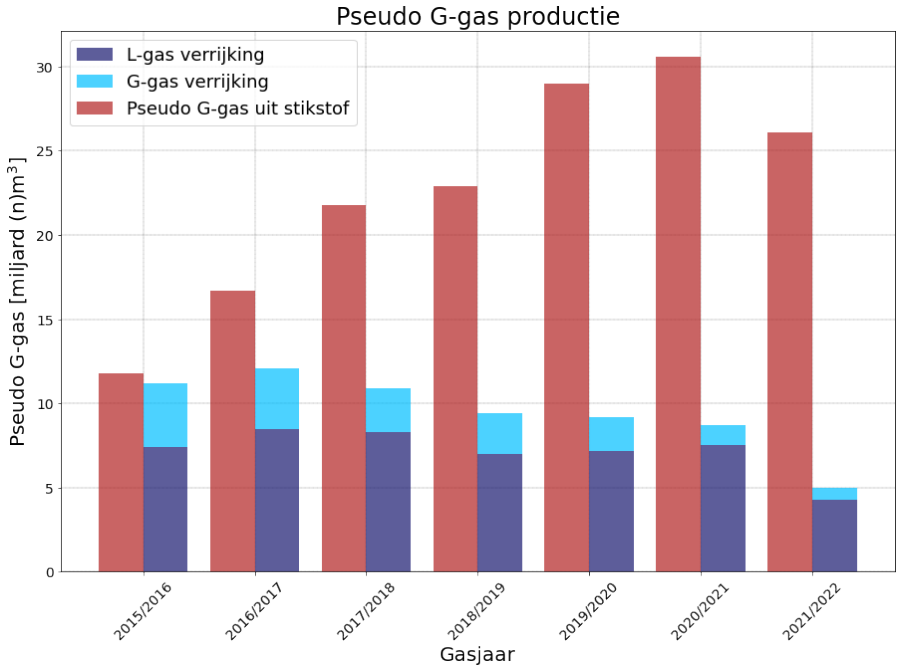

Figure 2: Production of pseudo G-gas from nitrogen, L-gas and G-gas enrichment

C. G-gas supply via production from the Groningen field

Gas year 2021/2022 had 2027 degree days[27]. It was a relatively warm year: there are 28 temperature profiles in the last thirty years with a higher number of degree days, in other words, that are colder. Our latest recommendation[28] contained a degree-day formula, with which we can estimate the Groningen production required for security of supply given a certain number of degree days. Using the number of actual degree days in gas year 2021/2022 as input, the degree day formula gives a Groningen production of 4.3 billion (n)m^3. The Groningen volume produced for the gas year was 4.5 billion (n)m^3 [29], as laid down in the amendment decree[30]. The backup volume (1.5 billion (n)m^3) was not used.

D. Green gas production[31]

In gas year 2021/2022, around 236 million (n)m^3 of certified green gas was fed into the gas network[32]. The total production of green gas or biogas is higher in the Netherlands, however, the production not included above is used for heat or electricity generation. Our models take account of both methods of green gas utilisation by inputting information from the Climate and Energy Exploration (KEV).

[27] Degree days as described in the implementing regulations pertaining to the Dutch Gas Act.
[28] Aanvullend advies Groningenproductie gasjaar 2021/2022, dated 31 March 2022, our reference L 22.0196
[29] https://www.nam.nl/feiten-en-cijfers.html
[30] Wijziging Operationele Strategie Groningen gasveld gasjaar 2021-2022, dated 26 July 2022, DGKE / 22271044
[31] Dutch Gas Act article 10a, paragraph 9, section b, fourth point.
[32] Data provided by Vertogas B.V.

3. Use of G-gas storage facilities and LNG installations[33]

There are two types of G-gas storage, seasonal and caverns. The seasonal storages have a relatively large working volume and follow a seasonal pattern: they produce in the winter months and inject in the summer months. In the Netherlands we have three G-gas seasonal storages: Norg, Alkmaar and Grijpskerk. The caverns, i.e., Energystock, Epe Uniper, Epe Vattenfall and Epe Eneco, behave differently; they are more flexible because they can switch between injection and withdrawal throughout the whole year, but on the other hand have a much more limited storage volume.

Our models incorporate both the seasonal storages and the caverns in the winter months if the required capacity can no longer be supplied from the necessary minimum flow from the Groningen field and the pseudo G-gas production. In the summer months, injection from the seasonal storages contributes to demand, but the caverns can be used if there is insufficient minimum flow capacity available from the Groningen field and pseudo G-gas production to cover demand. The models always assumed that gas storage was utilised in a volume-neutral manner, in other words, that the same amount is produced as injected over the gas year. However, our latest recommendation made two exceptions to this: for Norg, where calculations were based on the last known fill level at the time of the recommendation and injection during summer up till a working volume of 4.8 billion (n)m^3, and gas storage Grijpskerk was filled with 2.4 billion (n)m^3 of pseudo G-gas.

Table 3 shows the actual use of the L-gas storages in gas year 2021/2022.

Storage	Production (winter)	Injection (summer)	Working gas volume (fill level, 30 September 2022)
PGI Alkmaar	0.3	0.3	0.5
UGS Norg	2.9	3.7	5.6
UGS Grijpskerk	-	2.3	2.3

Table 3: Use of G-gas seasonal storages (values in billions (n)m^3)[34]

The injected volume for Norg is bigger than the amount included in the planning assumptions used to determine the degree-day formula. This has been made possible by the relatively high nitrogen utilisation and the additional Groningen volume, permitted by the degree-day-independent gas extraction decree[35].

The G-gas caverns directly connected to the Dutch gas grid were used (almost) volume-neutrally during gas year 2020/2021[36].

[33] Dutch Gas Act article 10a, paragraph 9, section b, third point.
[34] https://agsi.gie.eu/#/
[35] Wijziging Operationele Strategie Groningen gasveld gasjaar 2021-2022, dated 26 July 2022, DGKE / 22271044
[36] https://agsi.gie.eu/#/

The LNG Peakshaver is an emergency supply of liquid H-gas and liquid nitrogen, which is blended into pseudo G-gas when transmitted. The Peakshaver can be brought into use for a limited number of hours during peak situations. The LNG Peakshaver was not brought into use in gas year 2021/2022, which corresponds to LNG Peakshaver use for gas year 2021/2022 according to the model.

4. Status of measures for accelerating the closure of the Groningen field

Progress on using UGS Grijpskerk for L-gas

In September 2021, it was indicated by your predecessor that the use of gas storage facility Grijpskerk for low-calorific gas would be supported on condition that it could be done safely[37]. This year you adopted a consent decree enabling low-calorific gas also to be stored in Grijpskerk's seasonal storage facility[38]. After the leaning process of minimal two cycles, it is expected that the gas storage specifications should be sufficient to provide backup for the Groningen field. During the summer of gas year 2021/2022, the gas storage facility was filled with 2.3 billion (n)m^3. Studies will be done during the current gas year to examine what capacity and volume are necessary to provide backup for the Groningen field.

Progress on Zuidbroek II

When the nitrogen installation in Zuidbroek is brought into use, with a total production capacity of 180,000 m^3/hour evenly distributed over three units, annual pseudo G-gas production will increase by a maximum of 10 billion (n)m^3. This will ensure that, in normal situations, the Groningen field will no longer need to produce and will only have a standby function. The nitrogen installation commissioning date will be communicated via remit messages on the GTS website[39] as long as there is no impact on the Groningen production required for security of supply. If there is, we will keep you informed in line with our statutory obligation.

Progress on domestic industry switchover[40]

There are a total of nine consumers who have been identified as no longer permitted to take off G-gas or L-gas after 1 October 2022[41]. Four consumers have since stopped taking G-gas. Five consumers are scheduled with a switchover date after 1 October 2022, they have been granted a temporary exemption from the ban[42]. GTS is making every effort to have these five large-scale consumers converted as soon as possible. Given all the other measures implemented and in progress, the delayed switchover of these five consumers will have no impact on the final closure of the Groningen field.

[37] https://www.rijksoverheid.nl/documenten/kamerstukken/2021/09/24/kamerbrief-over-gaswinningsniveau-groningen-gasjaar-2021-2022
[38] Grijpskerk consent decision, dated 14 February 2022, reference DGKE-PDG / 22005823
[39] Exact data is communicated via https://www.gasunietransportservices.nl/en/transparency/remit/urgent-market-messages
[40] Dutch Gas Act article 10n, paragraph 1
[41] Dutch Gas Act article 10g, paragraph 1
[42] Parliamentary papers II 2021/22, 33529, no. 1065

Progress on conversion abroad

Parts of Germany, northern France and Belgium are connected to the low-calorific gas network. These households and businesses are dependent on low-calorific gas from the Netherlands. The network operators of these countries have made agreements on scaling back gas supplies from the Netherlands: low-calorific gas exports will be completely phased out between now and gas year 2029/2030. Extensive conversion operations are now under way in all these countries, with hundreds of thousands of consumers per year being converted to another form of energy in the coming years, mainly high-calorific gas. The Task Force Monitoring L-Gas Market Conversion, which contains representations from governments, network operators and energy regulators, reports on the progress of these conversion activities. In September 2022, the Task Force published a new report[43], which shows that the phase-out is still on track. In addition to Belgium, which had already indicated at an earlier stage that the phase-out could be accelerated[44], Germany is now also seeing the potential for accelerating conversion operations from 2026, meaning that low-calorific gas exports may possibly finish in 2029 instead of 2030. Over the coming years the conversion rate will remain high and it is expected that exports of low-calorific gas can be completely phased out by gas year 2029/2030.

[43] Parliamentary papers II 2021/22, 33529, no. 994
[44] Parliamentary papers II 2020/21, 33529, no. 868