gasunie
transport services

Draft GTS Investment Plan for 2020-2030

2 July 2020

Foreword

I am delighted to present our first draft of the Investment Plan (IP) 2020. In it, we give an overview of all our intended expansion and replacement investments, which we expect will keep us fit for purpose in the future.

For us at GTS, the draft investment plan is a valuable document. Not only because we, like the other network operators, have a statutory duty to compile an investment plan on a periodic basis, but also because it gives us insight into the combination of bottlenecks and opportunities and it helps us make the right choices for the development of our network. In the decade ahead, we will be facing numerous developments that we will have to take into account in operating and maintaining our grid. Our job is not only to keep our infrastructure in good condition, we also work to ensure a well-functioning gas market and the security of supply. This draft investment plan furthermore includes a look ahead to how our network could help accelerate the energy transition.

One major change that is already under way is that gas production in Groningen has already been reduced significantly and will be completely phased out over the coming years. But since demand for natural gas will remain at roughly the same level as it is now, phasing out the use of Groningen gas will very rapidly turn the Netherlands from a major gas exporter into a major gas importer. In this draft investment plan, we explore possibilities for increased gas imports into the Netherlands and draw attention to the importance of having sufficient gas storage facilities in the Netherlands to be able to guarantee security of supply. The opportunities offered by market integration are also addressed.

Aside from all of this, the pace has to be increased to be able to meet the climate targets. Our network can play a key role in hitting those targets, such as by using our pipelines to transport hydrogen and green gas. As also decreed in the climate agreement adopted by Dutch Parliament, supply volumes of these renewable molecules must grow significantly by 2030 and nationwide infrastructure must be developed to interconnect the supply side and the demand side. Our assets can be the foundation on which this infrastructure is built.

In early May, we submitted our draft investment plan to gas market participants for consultation. Where possible, we subsequently incorporated the responses from the various gas market participants into this draft Investment Plan 2020. We are now submitting this draft for review to the Ministry of Economic Affairs and Climate Policy (EZK) and the Netherlands Authority for Consumers and Markets (ACM), so as to be able to finalise the Investment Plan after the summer.

We are confident that the intended expansion and replacement investments will enable us to keep transporting natural gas to any location across our grid. Drawing also on existing other gas infrastructure such as local production, storage facilities, LNG and international connections, the Netherlands will, despite termination of local production, continue to play an important role in the international gas market with reliable gas pricing at north-western Europe's most liquid quality-neutral gas trading hub: TTF.

Our network furthermore empowers us to make an essential contribution to the reliability and affordability of the energy transition, as natural gas will continue to play a crucial role in the energy mix this decade and the use of hydrogen and green gas will gradually increase.

Bart Jan Hoevers
Managing Director

Summary

Gasunie Transport Services (GTS) owns and operates the national gas grid in the Netherlands, meaning that we are responsible for the management, functioning and further development of the Dutch gas grid.

Under the Dutch Gas Act, GTS has a statutory duty to publish a draft IP on a periodic basis. The draft IP gives an overview of all intended expansion and replacement investments, including supporting information. From a statutory perspective, the draft IP contains three elements: developments in the energy market, a bottleneck analysis to identify capacity and quality bottlenecks, and details of the investments.

The draft IP will be submitted to the Dutch Ministry of EZK and the ACM for assessment. Investments were the need is established through another process, such as investments required to connect small fields to our network or facilitate incremental capacity, are outside the scope of this draft IP.

Developments in the energy market

The scenarios used in this draft IP are based on the draft version of the Dutch Climate Agreement based on proposed government policy and expected developments in the energy market. Quantification is based on the detailed assessment of the impact of the draft Climate Agreement, as published by the Netherlands Environmental Assessment Agency (PBL) in March 2019.[1] Gasunie and TenneT have developed two additional scenarios: Alternative Transition (AT) and Foundation for System Integration (FSI). The flanking scenarios have been designed to allow assessment of the capacity of both the gas and the electricity network, meaning that they are focused on potential developments with a real impact on network load. Plus, the scenario storylines explicitly assume that the emission reduction target of -49% will have been attained by 2030.

Figure 0.1 Summary of the different scenarios.

Climate agreement (CA)	Alternative transition (AT)	Foundation for System Integration scenario (FSI)
• CO_2 target probably not met • Based on PBL* analyses • Mix of technologies for domestic heating • Electric vehicles • Limited P2H in industry • 7 MT of CCS • Coal phaseout • Increase in solar PV and wind generation	• CO_2 target reached • Green methane • Focus on hybrid heatpumps • Fewer electric vehicles • LNG for heavy goods transport • More CCS in industry (10MT) • Coal phaseout • Less solar PV and wind	• CO_2 target reached • Blue and green hydrogen • Focus on all-electric solutions • More electric vehicles • P2H in industry • 7 MT CCS • Coal phaseout, some transition towards biomass • Even more solar PV and wind

1 *Netherlands Environmental Assessment Agency: Effects of the draft Dutch Climate Agreement, 2019 (in Dutch).*

The main conclusion to draw from the scenarios is that transmission volumes will decrease through to approximately 2025 due to falling L-gas exports to Germany, Belgium and France. In these three countries, end users of L-gas will be switched to H-gas over the coming ten years, reducing L-gas exports to zero. Gas demand in the Netherlands and neighbouring countries will, however, not decline significantly over the period covered by the analysis. From 2025 onwards, L-gas export flows will partly be replaced by additional H-gas transit flows. At the same time, transmission capacity will decrease less rapidly than transmission volumes.

Given that production in the Netherlands will be phased out at a faster rate than the decline in domestic gas demand in the Netherlands, it is evident that additional gas imports will be needed to compensate for cessation of production from the Groningen field. Analyses show that this additional volume is available in Europe. In their questions and comments in response to the draft IP submitted for consultation, several market parties indicated that, based on commodity pricing, there will be sufficient H-gas available for the Netherlands, provided there is sufficient transmission capacity. Initial analyses have shown that supply of additional volumes from Germany would require expansion of transmission capacity in Germany.

The market mechanism and storages

GTS approaches matters such as security of supply and a well-functioning gas market from an infrastructure perspective. The analyses show that security of supply will require continued availability of seasonal L-gas storage facilities through to 2030 at least. For GTS, as the advisory authority on security of supply in the L-gas market, it is important to stress this point.

The H-gas market is more international and competitive. GTS has noticed that this market offers more alternatives. The outcomes of the analyses conducted show that H-gas storage facilities are also needed, which will give all storage providers a boost in their business model as soon as the Groningen field is closed down and other countries continue to make headway in switching to H-gas. Needless to say, the outcomes of such scenarios depend on the assumptions made.

The outcomes hinge mainly on the assumption of the extent to which the import profile is aligned with current market demand (domestic, export, transit). What is clear, however, is that any closure of a seasonal H-gas storage facility will lead to shortages in the market for H-gas flexibility. Aside from that, the fact that the current market mechanism is working so successfully is partly the result of the available infrastructure (storage facilities, LNG and supply through pipelines). GTS considers it key that this market mechanism be maintained, because a well-functioning market means better pricing and prosperity for all consumers in society. GTS therefore believes that, besides security of supply, these other success factors must also be taken into consideration in future decision-making: successful continuation of the TTF supported by supply diversification, storage facilities, a quality-neutral gas market and retention of transit flows.

The analyses conducted took all these factors into account, ultimately showing that the Netherlands, despite the loss of national production, will continue to play an important role in the international gas market, as long as adequate infrastructure continues to be available and supply to the Netherlands is ramped up. Given the enormously dynamic nature of the energy world, GTS proposes to repeat these kinds of analyses on a regular basis. Additionally, GTS will over the coming months, in consultation with relevant stakeholders, be looking into how to guarantee that L-gas storage facilities are used to a sufficient degree by shippers as soon as GTS has deployed all quality conversion facilities (QC) and the Groningen field has ceased to be available.

Market integration

GTS will also periodically look into possibilities to remove all interconnection points between its system and one or multiple other entry/exit systems, so as to facilitate cross-border trading and transmission, thus further optimising the market mechanism. This could, for example, be done by setting up a trading region. Existing market models in place in the countries involved would then be maintained as much as possible, albeit that there would be one single virtual transfer point to transfer gas from one portfolio to the other.

Hydrogen

To contribute to the energy transition, in addition to green gas, pure hydrogen can also be transported through a part of the current GTS network, a section that still needs to be separated. Although GTS' statutory duty does not extend to transporting hydrogen, it offers a cost-efficient way to transport energy in the future and keep the energy transition affordable. In this context, the letter to Dutch Parliament entitled "De rol van gas in het energiesysteem van nu en in toekomst" (The role of gas in the energy system today and in the future), the Dutch government's vision document on hydrogen (Kabinetsvisie waterstof) and the green gas roadmap (Routekaart groen gas) offer an important framework for the use of natural gas, green gas and hydrogen.[2]

Various exploratory studies have shown that hydrogen has the potential to play a key role in the future energy supply. The infrastructure for hydrogen transport will therefore ultimately be regulated. GTS has identified two possible options to get to that point:

- making hydrogen transport one of GTS' duties and charging a cost-reflective tariff for hydrogen as well;
- creating a separate entity for hydrogen transport, transferring the assets from one regulatory domain to another regulatory domain at the regulated value.

The Ministry of EZK has teamed up with TenneT and Gasunie to conduct a study entitled HyWay 27 to investigate how the existing gas grid can be used to transport hydrogen.

Bottleneck assessments

GTS checks for three potential bottlenecks: capacity bottlenecks, quality bottlenecks and IT bottlenecks. Capacity bottlenecks are determined using pressure drop calculations based on the identified scenarios; this has revealed that there are no capacity bottlenecks. Quality bottlenecks prompt replacement investments and are identified through risk analyses or findings during management and maintenance work. This concerns bottlenecks that contravene one or multiple of the company's values or are required under legislation and regulations. Bottlenecks are prioritised based on a risk assessment, while also taking

2 *Ministry of Economic Affairs and Climate Policy: Letter to Dutch Parliament on the role of gas in the energy system today and in the future, 2020 (in Dutch).*
Ministry of Economic Affairs and Climate Policy: Letter to Dutch Parliament on the green gas roadmap, 2020 (in Dutch).
Ministry of Economic Affairs and Climate Policy: Letter to Dutch Parliament on the government's vision on hydrogen, 2020 (in Dutch).

feasibility into account. The prioritisation method is specified in the quality assurance system. Replacements necessitated as a result of external reasons, such as planning developments, are also classed as replacement investments. Most future investments are prompted by quality bottlenecks. IT bottlenecks mainly arise as the result of new statutory duties/obligations, end of support by suppliers (giving rise to cybersecurity and continuity risks), replacement parts no longer being available, or a lack of sufficient knowledge concerning a certain technology to be able to guarantee continuity.

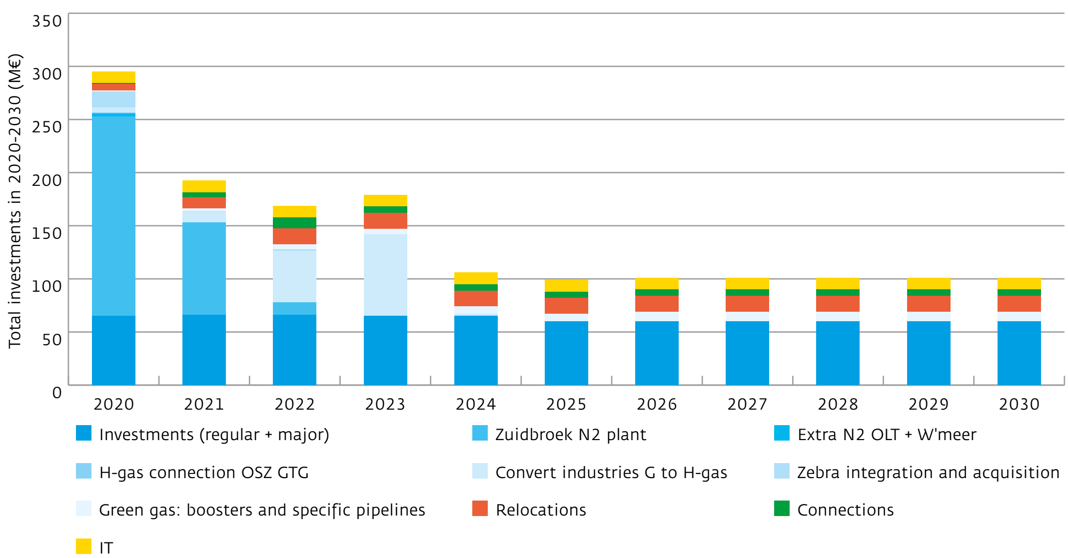
Total overview of GTS' investment portfolio

GTS' total investment portfolio can be divided into two periods, the first up to the end of 2023 and the second from 2024 to 2030.

In the period up to and including 2023, GTS' investment portfolio will be largely determined by measures to accelerate the phase-out of gas extraction from the Groningen field, i.e. the construction of the Zuidbroek nitrogen plant, the contracting and production of additional nitrogen, and switching large industrial consumers from G-gas to H-gas. Another noteworthy investment is the acquisition and integration of the Zebra network. Investments over the period between 2020 and 2023 will amount to between approximately €170 and €295 million per year. Total investment in 2020 will amount to €295 million, whereby €16.4 million of this figure is yet to be allocated through a final investment decision (FID). Total investment in 2021 will reach €192 million, of which €88.7 million is yet to be allocated through an FID.

From 2024 onwards, as the Groningen measures are set to be completed, the total annual investment level is expected to fall sharply to approximately €100 million, which is the normal level needed to maintain the transmission network, through to 2030. At this point, no additional investments are deemed necessary for the period starting in 2024, other than investments in measures for the energy transition (green gas). Investments required for the energy transition cannot be determined with any accuracy at this time, but are expected to result in additional costs in the long term.

Figure 0.2 Total investments in 2020-2030.



Contents

Introduction

Gasunie Transport Services (GTS) owns and operates the national gas transmission network in the Netherlands. Being the operator of the national transmission network, GTS is responsible for the management, functioning and further development of the Dutch gas transmission network. Other duties include connecting (new) customers to the network, monitoring gas quality, balancing, gas intake from small fields, connections to other national and international networks, guaranteeing sufficient transmission capacity and public duties with respect to security of supply (including peak supply and emergency supply) and giving advice regarding estimates on required production from the Groningen gas field and the capacity of the Groningen gas field.

Mission

We deliver gas transport services in a customer-focused and transparent way. Safety, reliability, sustainability and cost-effectiveness are central in everything we do. We serve the public interest, and work as professionals to create value for our stakeholders.

Vision

We aim to be an organisation that best serves the market, responds flexibly to changes in its surroundings, enables new gas flows, facilitates the introduction of sustainable energy and thus play a key role in the north-western European gas market.

To be able to continue to fulfil the above tasks with the required level of quality, GTS needs to invest in the expansion and maintenance of the gas transmission network. In this draft IP (the follow-up to the network development plan (NOP/KCD)) we provide insight into the required investments.

Statutory basis

Under the Dutch Gas Act, GTS has a statutory duty to draw up a draft IP on a periodic basis. The draft IP gives an overviewof all intended expansion and replacement investments, including supporting information. From a statutory perspective, the draft IP contains three elements: developments in the energy market, a bottleneck analysis to identify capacity and quality bottlenecks, and details of the investments. Legislation prescribes that the description of investments consistsof three parts: a look back on the progress and development of investments planned in the two prior years, a quantitative look ahead to the investments planned for the 2020-2024 period, and a qualitative look ahead to investments planned for the 2025-2030 period.

Further to the Dutch Gas Act, the Dutch government passed an Order in Council (the Decree) in 2018 and the Ministry of EZK issued a ministerial regulation (the Regulation) that both specify further rules for the draft IP.[3] The most important rule is the assessment of the draft IP: GTS must submit the draft IP for assessment to the ACM and the Ministry of EZK. The ACM assesses whether a network operator can in all reasonableness be deemed to have been able to put together a draft IP, while the Ministry of EZK verifies whether GTS has rendered sufficient account on developments in the energy market. Both these assessments will be made within 12 weeks after submission of the draft IP.

GTS considers the draft IP to be a guiding document when it comes to assessing the necessity for investments by GTS. The Method Decision provides for the compensation of capital costs (including those involved in new investments). GTS executes investments in this plan only on the condition that GTS is able to recover the efficient costs of these investments.

This draft IP is the first such plan drafted under the new regulations. After approval, this IP will be valid for a period of 18 months, from 1 July up to and including 31 December 2021, following which GTS will submit a new draft IP to the ACM and the Ministry of EZK on 1 January of each even calendar year. These subsequent investment plans will be valid for two years. In case of significant changes, the IP may be revised through an addendum at any time.

Besides the obligation to submit a draft IP every two years, the Minister of EZK has delegated the legal task to GTS to publish a delivery and security of supply report (leverings- en voorzieningszekerheidsrapport) every year. Given the overlap between the draft IP and the delivery and security of supply report, this draft IP meets both these statutory requirements. Two parts of the delivery and security of supply report are not addressed in the draft IP: peak and emergency supply. These topics are therefore addressed in Appendix V.

3 *Ministry of Economic Affairs and Climate Policy: Regulation of the Minister of Economic Affairs and Climate Policy of 7 November 2018, No. WJZ/18038636, containing further rules on the investment plan and the quality assurance system of operators of electricity grids and gas transmission networks and on several other subjects (Regulation on the scenario and quality of electricity and gas), 2018 (in Dutch).*
Bulletin of Acts and Decrees of the Kingdom of the Netherlands, 2018, 375: Decree of 16 October 2018 on investment plans of operators of electricity grids and gas transmission networks and on several other subjects (Decree on investment plan and quality of electricity and gas) 2018 (in Dutch).

Scope

This draft IP concerns the CAPEX investments for which a final investment decision (FID) will be made between 2020 and 2030. Investments that meet a need that has been proven through another process, such as investments in the connection of small fields or incremental capacity are not included in the scope of this draft IP. The need for these investments is established either through national legislation or a European process. However, given that GTS wants to present its full investment portfolio, these investments are also included in our draft IP for information purposes. In addition, for the necessity test conducted by the ACM, a more detailed overview of all other investments is provided in the confidential Appendix VIII.

Since this is the first ever draft IP, it does not include a look back on the progress and development of investments presented in the previous IP.

Coordination with other network operators

The sector organisation for network operators, Netbeheer Nederland, has set up a working group made up of representatives from all network operators to jointly take stock of requirements under new legislation. The resulting shared notion of these requirements under new legislation was subsequently submitted to both the ACM and the Ministry of EZK for validation.

Aside from that, GTS has, like in previous years, teamed up with TenneT in developing three scenarios for the draft IP to provide a comprehensive picture of developments in the Dutch energy system. These scenarios were complemented using data on import/export and transit flows from the Ten Year Network Development Plan (TYNDP) 2018 of the European Network of Transmission System Operators for Electricity and the European Network of Transmission System Operators for Gas (ENTSO-E/G). One of these scenarios, i.e. the Climate Agreement Scenario, is used as the reference scenario for all Dutch network operators.

Stakeholder involvement

GTS organised two information sessions for the various parties that operate in the gas market. The first information session about the process and the scenarios for the draft IP was held in the autumn of 2019, while the second focused on the investments and was held in the spring of 2020.

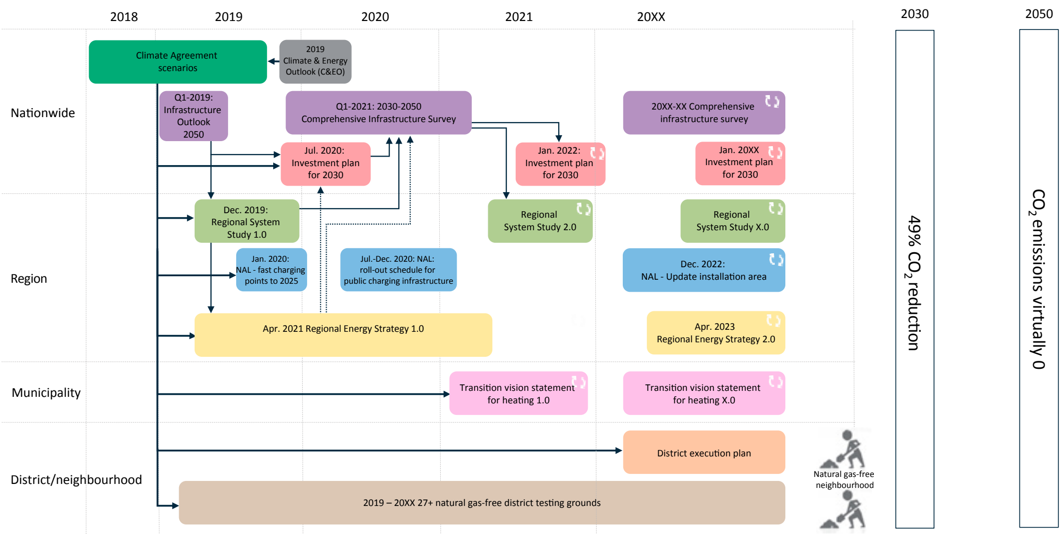
Dutch legislation furthermore provides for a public market consultation process that spans four weeks. The members of Netbeheer Nederland have agreed to submit, as much as possible, all draft IPs to consultation at the same time over the period from 1 to 28 May 2020. Responses from these public consultations will be appended to this document.

For the benefit of our customers, GTS will publish both a Dutch and an English version. The Dutch version, however, takes precedence over the English version.

Correlation with other developments

Various national bodies are currently looking into ways to structure both the Dutch energy system and the infrastructure to be able to hit domestic and international climate targets. Figure 0.1 Relevant energy system developments and research, provides a summary of developments and research in this area. The studies with particular relevance to the (current or future) draft IP are briefly outlined below.

Figure 0.3. Relevant energy system developments and research.



Drafted by the Netherlands Environmental Assessment Agency (PBL), Statistics Netherlands (CBS), the Energy Research Centre of the Netherlands (ECN), and the Dutch National Institute for Public Health and the Environment (RIVM), the Climate & Energy Outlook (C&EO) paints an up-to-date picture of current and proposed government policy with respect to the total Dutch energy system. Additionally, the C&EO offers a look ahead to developments in the area of energy and greenhouse gas emissions through to 2030.

The Infrastructure Outlook 2050 is a joint study by TenneT and Gasunie on the energy infrastructure in the Netherlands and Germany in 2050. As part of the Dutch Climate Agreement, it has been agreed that the Dutch part of the Infrastructure Outlook 2050 will be updated in what is known as the Comprehensive Infrastructure Survey for 2030-2050 (II3050), which is expected to materialise in 2021. The supply and demand scenarios for 2050 that will be used as a basis for II3050 have meanwhile been published. These supply scenarios are a logical follow-up to the C&EO and the scenarios in this draft IP.

To further flesh out implementation of the Dutch Climate Agreement, Regional Energy Strategies are being prepared for 30 regions across the Netherlands. As these will not be published until 2021, the content of these strategies has not been included in this draft IP.

1 Methodology

1.1 Investment portfolio composition process description

This section will describe the methodology used to compose and adopt the investment portfolio.

The investment portfolio is made up of three types of investments:

- expansion investments to increase the available capacity, acquisitions, and connections for new customers;
- replacement investments to maintain the quality/condition of the network and pipeline relocation. Pipeline relocation is when a pipeline is moved to another location at the request of a third party, such as Rijkswaterstaat;
- network-related investments, which are investments in IT systems.

As part of GTS' current investment portfolio process, GTS sets the budget required for year n+1 in mid-August of every year. Aside from that, data on current expansion and replacement investments is available for 2022 and 2023. This data has, to the extent that it has been requested by the ACM, been included in this draft IP.[4]

GTS therefore notes that the portfolio process for GTS' technical and IT investments is only limited aligned with the approval period under relevant legislation governing the draft IP, which complicates the multi-year forecast. GTS is aiming to bring forward the setting of the portfolio in the following draft IP so that this is more in line with the approval periods stipulated by law.

1.2 Based on scenarios

Storylines

The basis for the scenarios used in this draft IP is the draft version of the Dutch Climate Agreement based on proposed government policy and expected developments in the energy market. Quantification is based on the detailed assessment of the impact of the draft Climate Agreement, as published by the Netherlands Environmental Assessment Agency (PBL) in March 2019.[5] Gasunie and TenneT have furthermore developed two supporting scenarios: Alternative Transition (AT) and Foundation for System Integration (FSI). These scenarios were completed in the summer of 2019.

The three scenarios have been designed to allow assessment of the capacity of both the gas and the electricity network, meaning that they are focused primarily on potential developments with a real impact on network load. Plus, the scenario storylines explicitly assume that the emission reduction target of -49% will have been attained by 2030.

Quantification for the Netherlands

TenneT and Gasunie have jointly quantified three scenario storylines for the Netherlands, based initially on Quintel Intelligence's Energy Transition Model (ETM).[6] Using the ETM, volume balances of annual demand for gas, electricity and other energy carriers such as oil,

4 *See Section 5.1 General for a summary of the investment data that GTS has included in the draft IP.*
5 *Netherlands Environmental Assessment Agency: Effects of the draft Climate Agreement, 2019 (in Dutch).*
6 *Quintel Intelligence: Energy Transition Model, 2020.*

coal and biomass were defined for each of the three scenarios. From this quantified data, TenneT subsequently extrapolated demand in the electricity market on an hourly basis. This analysis allowed TenneT to determine gas demand from power stations among other things, which has been included in this draft IP. GTS furthermore used the ETM quantification to estimate peak gas capacity for end user sectors.

Cross-border gas flows

When it comes to cross-border gas flows, this draft IP is based on flow simulations from the ENTSOG TYNDP 2018. However, owing to recent developments in the Netherlands, the results from the TYNDP have not been incorporated verbatim. Since publication of the TYNDP, there have been two key changes:

- NAM announced the closure of its underground gas storage facility in Grijpskerk in 2021;
- the Ministry of EZK further lowered the limit for production from the Groningen gas field in September 2019.

At GTS' request, ENTSOG has updated the relevant flow simulations in the TYNDP from 2018 in the summer of 2019. The results of these new calculations are the basis for the analysis in this draft IP.

1.3 Based on bottlenecks

1.3.1 Bottleneck definition

This draft IP uses the definition of bottleneck as specified in Article 1.1 of the Regulation on the investment plan and quality of electricity and gas (hereinafter: The Regulation); parts of the grid or gas transmission network that are expected to pose a considerable risk to the adequate fulfilment of the duties assigned to the network operator by or under the Dutch Electricity Act of 1998 or the Dutch Gas Act. GTS uses three definitions for 'considerable risk'; one for capacity bottlenecks, one for quality bottlenecks, and one for IT bottlenecks:

- in case of a capacity bottleneck, 'considerable risk' is defined as a situation ensuing from one or multiple pressure drop calculations (as specified in Section 1.3.2 Capacity bottleneck identification), where the entry and/or exit capacity cannot be transported, while factoring in entry and exit specifications;
- in case of a quality bottleneck, 'considerable risk' is defined as a breach of one or several of the company values, determined based on the combination of the frequency of occurrence of the unwanted event and the potential severity of the impact. This risk is measured in financial terms'
- IT investments are typically prompted by a need to install systems that are required to be able to fulfil new duties/obligations under legislation, such as REMIT, end of support by suppliers (which results in cybersecurity and continuity risks), replacement parts no longer being available, or insufficient availability of knowledge on certain technology.

1.3.2 Capacity bottleneck identification

GTS has the task of facilitating the transport of gas to the network users on economic conditions and to develop the national gas transport network for this purpose in a safe, efficient and reliable manner. Under EU regulations, GTS operates its network as a decoupled entry-exit system, which gives grid users the right (and freedom) to use the available capacities independently from each other, provided that gas quality and system balance are secured.

Simultaneous combinations of entry and exit capacity may occur that require much transmission activity. GTS sets up the network in such a way that it can accommodate these kinds of peak transmission situations, taking into account grid users' realistic behaviour at entry and exit points, so as not to have to invest to cover unrealistic extremes. This way of working makes it possible to set up the national gas transmission network in a targeted manner.

GTS conducts the bottleneck analysis based on forecasts of capacity at entry and exit points. These forecasts are based on current contracts and anticipated developments in these contracts.

Main gas grid and regional distribution network

GTS' network is made up of two parts. The high-pressure gas grid (HTL) transports gas over long distances and operates at pressures ranging from 40 to 80 bar, meaning that the HTL is used as a transit network for transmission from and to other countries, while also transporting gas to high-volume users such as large industries and power stations. The regional distribution network (RTL) is made up of branches from the HTL that operate at pressures ranging from 8 to 40 bar. The RTL is a distribution network that supplies directly to smaller industries and distribution network operators that supply to the small users' market.

The HTL is split up into two networks, one for transmission of high-calorific gas and one for low-calorific gas (originally known as Slochteren gas). High-calorific gas can be converted into low-calorific gas at several points in the system by blending different gases or adding nitrogen. The RTL almost exclusively transports low-calorific gas.

The largest gas flows and the most dynamic part of the entry-exit system are found in the HTL. The major import and export flows, industrial demand, the alternating filling of and withdrawal from storage facilities, and the blending of different gas qualities all converge in the HTL. The HTL has long pipelines with large diameters of up to 48 inches, compressors to increase the pressure, and blending stations to switch from high-calorific gas to low-calorific gas with nitrogen. The RTL is of an entirely different nature, as it accommodates smaller gas flows over average distances of only a few kilometres from the HTL to grid users. The RTL pipelines have smaller diameters (typically between 4 and 20 inches), while compressors and blending stations are not needed due to the small transmission distances.

Capacity testing

Models are used to test network capacity. Given the differences between the HTL and the RTL, a different testing method is used for each network. However, what both have in common is that pressure drop calculations are performed for the key extreme transmission situations for each of them. Pressure drop calculations are made using the Multi-Case Approach (MCA) tool.

Capacity testing for the HTL starts by generating a complete set of realistic severe-load transmission situations in a certain forecast year. These situations are based on a broad range of possible circumstances (summer versus winter, high and low temperatures, technical outages at entries and exits, etc.), as well as on relevant combinations of expected entries and exits. Owing to the temperature dependence of part of the demand, calculations for each month are based on the lowest possible temperature that can occur in that month (as shown by weather and climate analyses). In addition, the following parameters are used in the analyses: the risk of technical unavailability of major supply points, behaviour of storage facilities, possible correlations between different entry and exit points, and the latest insights with respect to the phase-out of the Groningen field. In all three forecast years, this has led to roughly two hundred balanced entry and exit combinations that were tested for transmissibility by performing the associated pressure drop calculations. Tests are subsequently performed to assess transmissibility within the network's pressure and flow limits. If pressure remains under the minimum or the flow limit is exceeded at a point or in a pipeline during one or several of the tested transmission situations, this constitutes a capacity bottleneck.

Capacity testing on the RTL is based on an analysis of network load at the peak time of a day in January or February with an average effective 24-hour temperature of -17°C.[7] If transmission can be accommodated in these extreme conditions, there are no bottlenecks. This basically covers all possible transmission situations. Recent developments, such as green gas feed-in at specific points of the RTL, could lead to other types of bottlenecks.

The severity of any bottlenecks identified will be determined through a follow-up test. The criteria used are the expected frequency of occurrence and the magnitude by which the capacity limit is exceeded and/or pressure drops below the minimum. Some bottlenecks may be overcome by adjusting network connections, for example by setting a valve or coupling piece (temporarily) differently. To eliminate larger bottlenecks, more substantial measures may be needed, such as laying a new pipeline section, expanding a compressor station, building an entirely new station, or installing a new connection.

Especially in the HTL, but sometimes in the RTL as well, the cause of a capacity bottleneck may be elsewhere in the network, i.e. not where the capacity limit is actually exceeded or where pressure actually is below the minimum level. The location of a bottleneck is generally not a good indicator for the place where it would be most efficient and effective to take measures.

7 *Based on art. 10a, paragraph 1 of the Gas Act, GTS has a general task with regard to security of supply. Article 10a, paragraph 4 then refers to the Decree on the Security of Supply of the Gas Act, in which Article 2 (1) describes the peak delivery task up to a temperature of -17 degrees Celsius.*

For the purposes of the draft IP 2020, a bottleneck analysis was conducted for the CA (Climate Agreement) scenario, the AT (Alternative Transition) scenario and the FSI (Foundation for System Integration) scenario for the forecast years of 2020, 2025 and 2030, whereby it should be noted that these are 'gas years', which means that 2030, for example, runs from 1 October 2029 to 30 September 2030. Because gas year 2020 had already started at the time of the calculations, a delta analysis was performed for that year compared to the figures with which last year was calculated. For gas years 2025 and 2030, a full capacity calculation has been conducted for all scenarios.

1.3.3 Quality bottleneck identification

The methodology used to identify quality bottlenecks is detailed in our up-to-date 'Description of GTS' quality assurance system', which is available online.[8]

1.3.4 Identification of IT investments

When it comes to IT, the investment drivers differ from those for capacity and quality bottlenecks. GTS may decide to invest in IT for the following reasons: to comply with new legislation and regulations or market agreements, due to expiring IT-support (resulting in cybersecurity and continuity risks) or a lack of replacement components or technological knowhow or to improve processes.

The investment drivers for process improvement are partly the changing needs due to market circumstances, work on the transmission network, or changes in the organisation. Aside from that, technological innovations create opportunities to digitalise processes that could previously not be digitalised.

Plans for the coming years are recalibrated in an annual cycle. Besides that, management assesses developments in the IT portfolio on a monthly basis to address changing insights and process possible consequences. Following careful assessment of various alternatives, the decision is made to either invest or accept the risk for a certain period of time. If GTS decides to invest, the lowest possible 'Total Cost of Ownership' of investments with respect to different implementation options serve as a guiding principle.

8 *Gasunie Transport Services: Description of GTS' quality assurance system*, 2020.

1.4 Based on risk scores

1.4.1 Risk scores

GTS manages its operating assets based on the philosophy of risk-based asset management. This means that whenever a decision is needed on expenditure for management, maintenance, replacements and expansions (or reductions), the required outlay will be weighed against the level of risk mitigation that it would deliver. In order to simplify this comparison, risks are expressed in monetary terms (potential expenditure over a 25-year period as a net present value). The discount rate used for that is calculated as follows:

Based on the failure frequency λ [year^{-1}], the losses S [€] and aversion factor a, the number of points P in the risk matrix equals

$$P = \frac{\lambda}{\sqrt{10}\cdot 10^{-2}\ \text{year}^{-1}}\cdot\frac{S}{10^6€}\cdot a^{\log_{10}\left[\frac{S}{10^6€}\right]}$$

Select the economically relevant period N years (generally N=25 years). With a WACC equal to W and inflation equal to I, the discount rate r equals: $r = \frac{1+I}{1+W}$

So for the present value CW of a risk R over a period of 1...N years:

$$CW = R\cdot\sum_{j=1}^{N} r^{j-1} = R\cdot\frac{1-r^N}{1-r}$$

For example: let's say the risk has been set at C3 (1 point, €31,600 per year), the WACC is 3.83% per year (before tax) and inflation is 1.5% per year. In that case:

$$r = \frac{1+0.015}{1+0.0383}\ 0.9775$$

This means that the present value over a period of 25 years equals:

$$CW = €\,31{,}600 \text{ per year}\cdot\frac{1-0.9775^{25}}{1-0.9775}\text{year} = €\,31{,}600\cdot 19.296 = €\,610{,}000$$

Risks are assessed based on the four company values that GTS goes by:

- safety;
- transport security;
- sustainability;
- financial loss acceptance.

Product quality, i.e. the quality of the gas, is part of the company values of safety and transport security: GTS takes the Ministerial Regulation on Gas Quality as the guiding principle for gas quality. The total risk is the sum of the scores on these four company values, which each have the same weighting.

As laid down in our mission and vision, we aim to best serve the market by delivering our transport services in a customer-focused and transparent way. In the customer satisfaction survey of 2018, shippers and directly connected parties rated our services with a 7.9 out of 10.

In the domain of management and maintenance, this makes it possible to choose from different maintenance strategies. Using a risk assessment of the four company values, the various possible investment projects can be ranked by risk efficiency. This ranking is one of the inputs in deciding in what order to handle the various projects.

Aside from that, the absolute risk involved in using the assets in each of the asset categories is assessed on a regular basis. This absolute risk is assessed using the risk matrix, as specified in the 'Description of the quality assurance system'.[9] This assessment can have the following outcomes:

- for risks that are not acceptable (red), measures are taken right away. These are the projects included in the investment portfolio;
- for risk that are undesirable (orange), measures are taken in a systematic and structural manner. These are captured in policy and translated to maintenance and management interventions or projects;
- risks that are acceptable on certain conditions (yellow) will be monitored based on the ALARA principle (As Low As Reasonably Achievable) and on the condition of performance monitoring and periodic evaluation of control measures through audits or safety studies;
- for risks that are acceptable without further conditions (green), no additional measures are taken. These are logged in the risk management system and monitored as part of the continuous improvement management process;
- it may be that an unacceptable risk cannot be mitigated further and has therefore been accepted as such by the board of GTS, which must be recorded in writing if it hasn't already.

GTS has a good overall view of the risks that exist in its gas transmission system. In recent years, the Gasunie Network Improvement Programme (GNIP) was carried out, whereby renovations were first focused on dealing with the parts of the system involving the greatest risk. Not only did these investments turn out to be both useful and necessary, but they also showed that the network is possibly in a better condition than was to be expected. As a result, the risk for the remaining part of the system could be downgraded significantly and the maintenance strategy for that group could be switched to a more corrective one. The phasing out of preventive replacements through the GNIP does, however, lead to an increase in management and maintenance work. That said, the scope of the ensuing projects is expected to be smaller than the originally planned GNIP projects.

1.4.2 Prioritisation

There are two prioritisation rounds:

1. when risks are ranked. For risks that are not acceptable (red), measures are taken right away. For risks that are undesirable (orange), measures are taken in a systematic and structural manner, while risks that are acceptable on certain conditions (yellow) are monitored based on the ALARA principle (As Low As Reasonably Achievable). Risks that need to be resolved are scheduled and solved in a certain year of implementation;

9 *Gasunie Transport Services: Description of GTS' quality assurance system, 2020.*

2. when making plans for a year of implementation. In the latter case, the following aspects are decisive:
   - technical gas transmission possibilities;
   - permit procedures;
   - synergy with other activities, such as cost savings, reduction of impact on safety and gas transmission;
   - the organisation, availability of (technical) staff;
   - the budget;
   - impact of and on regular maintenance;
   - energy transition.

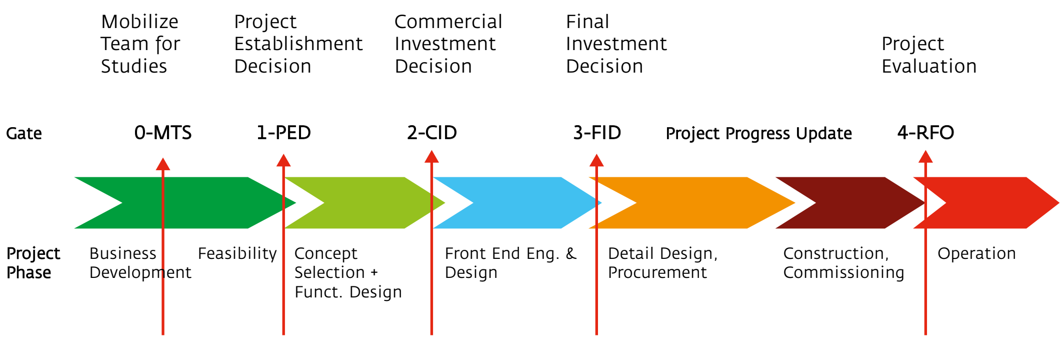
1.5 Measures

1.5.1 Governance and project phases

Engineering and IT project governance is based on the GTS Project Governance System, which details project development from initiation through study, assessment and substantiation (market, technical and/or business case), approval (CID/FID), and construction to commissioning.

The governance process includes several gates (see Figure 1.5 Process gates). It is an integrated working process with clearly defined roles and responsibilities.

FIGURE 1.5 PROCESS GATES.



Gate details:
- gate 0: project initiation (definition of the project drivers, specification of the need and start of studies);
- gate 1: evaluation of possible alternatives and selection of preferred alternative;
- gate 2: specification of functional principles (function specification);
- gate 3: approval of the project, including the scope, schedule and costs based on project specifications.;
- gate 4: completion and project evaluation, approx. one year after RFO (ready for operation).

Through the Project Governance System, GTS ensures that projects are developed and executed in a controlled and cost-effective way. Depending on the nature and size of a project, one or more 'gates' may be non-applicable.

Relevant information relating to a project is recorded in a project file and reports from the project board.

1.5.2 Budgeting methodology

The costs involved in an investment project are both the primary costs, including material costs and work by third parties, and secondary costs such as internal hours worked by employees. Projects are approved/authorised based on the basic project estimate. The basic project estimate consists of the following cost components:

- indirect engineering, permits, soil surveys;
- management, design and guidance;
- materials;
- construction.

A basic project estimate does not include allowance, indexation, contingency and management reserve.

The Final Investment Decision (FID) for a project provides insight into the risk of a budget overrun through the 'contingency' (P50 estimate) and 'management reserve' (P90 estimate) items.[10] The size of these items is based on the inaccuracy of the basic estimate and the estimate overrun probability.

The costs of projects for which an FID has not yet been made are based on study estimates or indicators with an uncertainty margin of 40%.

As soon as an FID has been made, the financial development of a project is monitored and recorded. Ultimately the financial result is the basis for capitalisation of costs.

1.5.3 Portfolio and budget

The investment portfolio includes investments relating to expansion (capacity and connections), replacement (quality), relocation of infrastructure and network-related investments (IT). Measures requiring investments are needed for the following reasons:

- quality bottlenecks, as part of general policy or periodic risk analyses;
- quality bottlenecks, corrective action following findings from management and maintenance activities as specified in the quality assurance system;[11]
- capacity bottlenecks, as a result of market demand;
- external drivers (including planning developments, legislation and software/hardware compatibility);
- efficiency measures (business cases);
- Corporate Social Responsibility (CSR) initiatives, including measures emission reduction measures.

10 The P50 estimate includes the Basic estimate + Allowance + Indexation + Contingency. The sum of these four items is the most probable level of capital investment needed to carry out the project (50/50 value). With a P50 estimate, there is a 50% chance of either exceeding the budget or remaining below budget. The P90 estimate is the P50 estimate plus the management reserve (overrun allowance). The management reserve is an unallocated sum set aside to cover parts of a project or events that occur during a project that cannot be predicted, the 'unknown unknowns'. With the P90 estimate, there is a 90% probability of staying under budget and only 10% of exceeding it.

11 Gasunie Transport Services: Description of GTS' quality assurance system, 2020.

There are three factors that complicate clear multi-year forecasts for the investment portfolio. These three factors are explained below.

Investment portfolio adoption process

As part of GTS' current investment portfolio process, GTS sets the budget required for year n+1 in mid-August of every year. Moreover, when it comes to network-related investments, the highly dynamic nature of the IT industry makes investment terms, by definition, very short.

GTS therefore notes that the portfolio process for GTS' technical and IT investments is only limited aligned with the approval period under relevant legislation governing the draft IP, which complicates the multi-year forecast.

Asset management

In GTS' mission, vision and strategy, we express our aim to serve the market well with due care for safety, reliability, sustainability and cost awareness, which we do by managing our operating assets based on a risk-based asset management philosophy. As a result, only a small section of the replacement investments is made up of preventive (and therefore predictable) measures. The majority of the replacement investments are made based on an asset's condition and can therefore be planned ahead to a limited degree only. Experience with similar operating assets gives GTS an idea of how many replacement investments will be needed in the long term and of the funds involved. Based on the risk scores, GTS will decide in the short term whether items need replacing, and if so, which ones.

The risk-based asset management philosophy enables GTS to make the most of its operating assets and limit the investment levels (and the ensuing tariffs), while at the same time offering its customers a reliable, future-proof gas grid.

Developments prompted by third parties

Part of the portfolio is determined by developments prompted by third parties rather than driven by GTS itself, such as connection requests, relocation, and expiry of software support licences.

GTS factors in that the investment portfolio and ultimate financial realisation during the year may be subject to change as a result of contingencies and disruptions in the system and other (unforeseen) circumstances.

1.6 Realism

With this draft IP, GTS offers an overall view of all investments required for expansion of and replacements within the national gas grid. In prioritising activities, GTS takes the following aspects into account:

- technical gas transportation possibilities;
- permit procedures;
- synergy with other activities resulting in cost savings, reduction of impact on safety and gas;
- transportation;
- the organisation and availability of (technical) staff;

- the budget;
- impact of and on regular maintenance;
- energy transition.

Seeing as disruptions to investments may prompt us to revise our plans and schedules for the activities, investments could overrun and part of the work would then be performed in the following year, or investments could be included again in the next annual plan. This is always subject to the risk ranking and aforementioned aspects.

There are numerous factors, both external and internal ones, that could lead to an intended investment being delayed or adjusted. An investment may therefore not be completed within the allotted time frame. The following will go into the main factors that could lead to delays, as well as into measures to prevent and/or mitigate delays.

1.6.1 External factors

Permits

Whenever we decide to expand or replace parts of the gas transmission network, we need permits to be able to go ahead with that. These can be temporary permits for the work involved, such as a permit for excavation work, or permanent permits for high-pressure gas transmission. Topical examples of permits include the ones we need under the Dutch government's Integrated Approach to Nitrogen and for per- and polyfluoroalkyl substances. These permit procedures can be lengthy in some cases. To prevent project delays, GTS starts permit procedures at an early stage and maintains close contact with local authorities and communities.

Whenever obtaining a permit turns out to take longer than expected, GTS will look into the option of rescheduling the work, whereby part of the work will be done at the initially scheduled time and the rest after the permit has been granted.

Material delivery time

Certain materials, such as custom materials, are subject to long delivery times. To make sure projects can stay on schedule, GTS tries to use standardised materials as much as possible. Whenever customisation is inevitable, we will order such non-standardised materials well ahead of the construction phase.

Should delays occur regardless, we will take appropriate control measures, such as relocating standardised materials from one project to another, provided that the former project can then still be executed as planned, or by scaling up by switching from on-site manufacturing alone to both on-site and off-site manufacturing or prefabrication.

Other circumstances

Work on the gas transmission network sometimes involves unforeseen circumstances, such as detection of soil contamination, change of connected parties' production stoppage, extreme winter weather conditions, legal procedures, or an obligation under the Dutch government's Integrated Approach to Nitrogen to take additional measures to prevent nitrogen deposition. To prevent such circumstances causing delays, GTS always tries to include some leeway in its project plans.

GTS monitors and takes into account the developments in relation to the coronavirus situation. The impact of coronavirus on the implementation of projects seems to be minor (as at May 2020). Supplies of critical materials from abroad may be affected to some degree if it turns out that production companies will face restrictions for longer. This assessment of the impact of the coronavirus situation does not take into account a possible second wave of the virus.

1.6.2 Internal factors

Availability of (technical) staff

The Dutch labour market is currently under considerable strain, especially when it comes to technical staff. GTS' parent company, Gasunie, actively encourages secondary school pupils (especially those in vocational education) to consider systems engineering, building engineering and electrical engineering when deciding what to study after secondary school. We do so by organising information sessions on the energy future and treating students to tours of our sites.

Despite the strain on the Dutch labour market, GTS does not yet see any reason to assume that low availability of (technical) staff will lead to a delay in the intended investments.

1.6.3 Conclusion

GTS expects to largely make the investments detailed in this draft IP within the approval period specified.

As pointed out above, GTS monitors and anticipates developments in relation to the coronavirus situation. The impact of coronavirus on the implementation of projects seems to be minor (as at May 2020). Supplies of critical materials from abroad may be affected to some degree if it turns out that production companies will longer face restrictions. This assessment of the impact of the coronavirus situation does not take into account a possible second wave of the virus.

2 Developments and scenarios

2.1 Scenario details

In this draft IP, GTS uses the three scenarios shown in Figure 2.1. Summary of the different scenarios. These scenarios comprise a realistic estimation of the future to the extent that it has an impact on the design of the gas transmission network that GTS manages. This section will detail the storylines of these three scenarios.

FIGURE 2.1 SUMMARY OF THE DIFFERENT SCENARIOS.

Climate agreement (CA)	Alternative transition (AT)	Foundation for System Integration scenario (FSI)
• CO_2 target probably not met • Based on PBL* analyses • Mix of technologies for domestic heating • Electric vehicles • Limited P2H in industry • 7 MT of CCS • Coal phaseout • Increase in solar PV and wind generation	• CO_2 target reached • Green methane • Focus on hybrid heatpumps • Fewer electric vehicles • LNG for heavy goods transport • More CCS in industry (10MT) • Coal phaseout • Less solar PV and wind	• CO_2 target reached • Blue and green hydrogen • Focus on all-electric solutions • More electric vehicles • P2H in industry • 7 MT CCS • Coal phaseout, some transition towards biomass • Even more solar PV and wind

2.1.1 Climate Agreement scenario (CA)

In 2015, the signatories to the Paris Agreement agreed that global warming needs to be reduced to under two degrees Celsius compared to pre-industrial levels. The aim is to limit temperature increases to 1.5 degrees Celsius. In the Netherlands, this global ambition was translated to a national Climate Agreement, which was presented by the Dutch government in June 2019. The Dutch Climate Agreement contains an extensive package of agreements, measures and instruments all aimed at reducing carbon emissions in the Netherlands by at least 49% in 2030 compared to 1990. This draft IP is based on the draft Climate Agreement presented in December 2018.

Plans from the Climate Agreement have an impact on all industries in the Netherlands. New homes will not be connected to the national gas grid, and a total of 2 million existing homes are set to be made sustainable between now and 2030. These homes will no longer be heated with a traditional condensing gas boiler, but using a heat grid or with a hybrid heat pump. The uptake of electric vehicles is incentivised through tax breaks to take the total fleet of electric passenger cars up to 1.5 million by 2030.

Aside from that, measures are also taken in the industrial domain to reduce carbon emissions. Carbon Capture and Storage (CCS) efforts financed from the SDE++ grant scheme will play a key role in making this happen. A limited contribution to carbon reduction in the industrial domain will come from Power-to-Heat (P2H). Energy supply will also gradually move towards energy generated from renewables. Scheduled coal-fired power station closures will be brought forward. A decision has been made not to use the option of burning biomass in coal-fired power stations from 2030. Installed solar and offshore wind power will be increased considerably.

2.1.2 Alternative Transition scenario (AT)

Given the rapid advances in green gas production technology, green gas is turning out to offer an attractive alternative way of meeting the carbon reduction target from the Climate Agreement. Although wind and solar energy systems are being rolled out on an increasingly large scale, the emergence of this alternative way to cut carbon emissions means that wind and solar energy production are now not growing at the rate targeted in the Climate Agreement. While solar power from photovoltaic systems will show solid growth through to 2025, the phase-out of the netting scheme and less-than-expected reduction in the costs of energy storage solutions in homes and factories will lead to growth levelling off after 2025. The amount of power generated by offshore wind turbines is set to grow substantially. However, it has turned out to be difficult to add capacity on top of the adopted 'Offshore wind roadmap for 2030'.

The development of gasification technology is pushing up supply of green gas considerably, which is therefore increasingly available in the Netherlands. There could potentially be 30 TWh of green gas available for use in the Netherlands by 2030, making the use of hybrid technology an attractive sustainability driver. Especially in the built environment, the hybrid heat pump already occupies a significant market share. That said, the government will persevere with plans to require all new homes to be gas-free. Industry also benefits from the 'greening' of the gas supply, while also using carbon capture to reduce carbon emissions to agreed levels.

When it comes to mobility and transportation, electricity and gas are both crucial in achieving the carbon emission reduction targets. Even though the relatively high purchase prices of electric vehicles are slowing the electrification of transportation overall compared to the growth rate targeted in the Climate Agreement, the use of (bio-)LNG is reducing carbon emissions produced by heavy goods vehicles and shipping.

Although the development towards sustainability is not quite going as targeted by the Climate Agreement in individual areas, the Netherlands is still on track to reduce its carbon emissions by 49% by 2030.

2.1.3 Foundation for System Integration scenario (FSI)

Energy generation from renewable sources such as solar and wind is developing faster than assumed in the Climate Agreement, leading to a need to integrate infrastructures for gas, heating and electricity. This 'system integration' will have been shaped to some degree by 2030 and will provide a solid foundation going forward.

Both solar PV and offshore wind are booming. Large-scale solar fields are being developed, which will take the total installed capacity up to over 34GW. Offshore wind, too, has turned out to be a competitive energy source in the long term, as it will produce nearly 15GW of power by 2030. The need to have flexible zero-emission capacity available is covered partly by using biomass as a fuel in former coal-fired power stations and blue hydrogen as a fuel in gas-fired power stations.

Along with increased supply of renewable power, demand is also set to increasingly go electric. The number of electric cars, buses and lorries on the road will grow considerably. In industry, the application of Power-to-Heat (P2H) becomes economically viable. In the built environment, the number of electric heat pumps is on the rise. All these developments are pushing down natural gas usage.

Extra growth in both electrification and renewable energy production is creating an increasing need for flexibility. Various parties operating in the market are covering this need, both bulk users in industry and small users. Home batteries and electric cars are, for example, not used only for personal needs, but increasingly also smartly, such as to relieve pressure on the electricity infrastructure.

Government grants are used to forge a market for hydrogen. Companies are investing in green hydrogen production to get the technology ready to play a pivotal role in energy supply in the future. Up to 3.5 GW of the growth in the generation of power from renewables, especially solar and wind, will be converted and stored in the form of hydrogen, which is subsequently used mainly as a resource in industry.

2.2 Impact on the gas market and the national gas transmission network

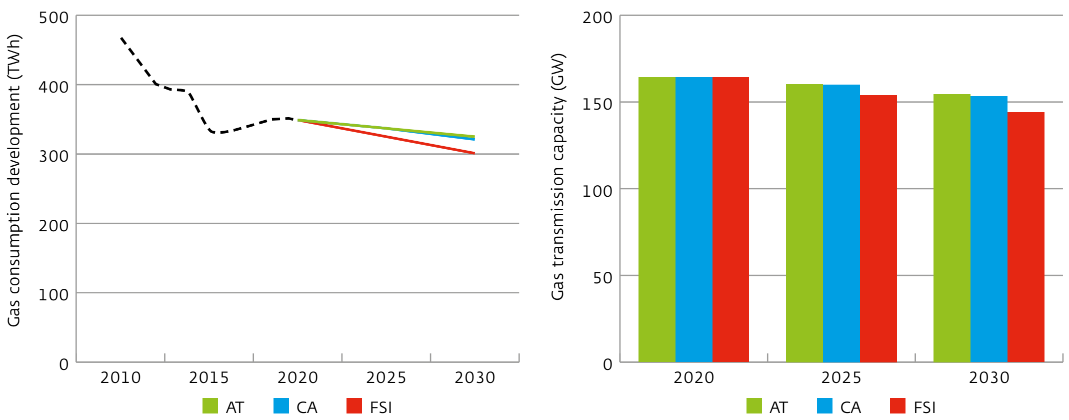
This section describes the developments relevant to GTS in three different scenarios, i.e. developments with an impact on the gas market and the national gas transmission network. This section is divided into 4 parts: Part 1 deals with the demand for gas on a national level. This is followed by the national supply of gas, which is covered in part 2. Part 3 describes developments outside the Netherlands. And lastly, part 4 provides an overview of the gas flows in the GTS network.

This section makes a distinction between volume developments and capacity developments. Volume in this case means the total volume of gas consumed in one year. The annual volume is expressed in terawatt hours (TWh). By capacity, we mean the peak hourly demand in a particular year. The peak hourly demand will generally occur during a period of extremely cold weather. Capacity is expressed in gigawatts (GW).

2.2.1 Gas demand in the Netherlands

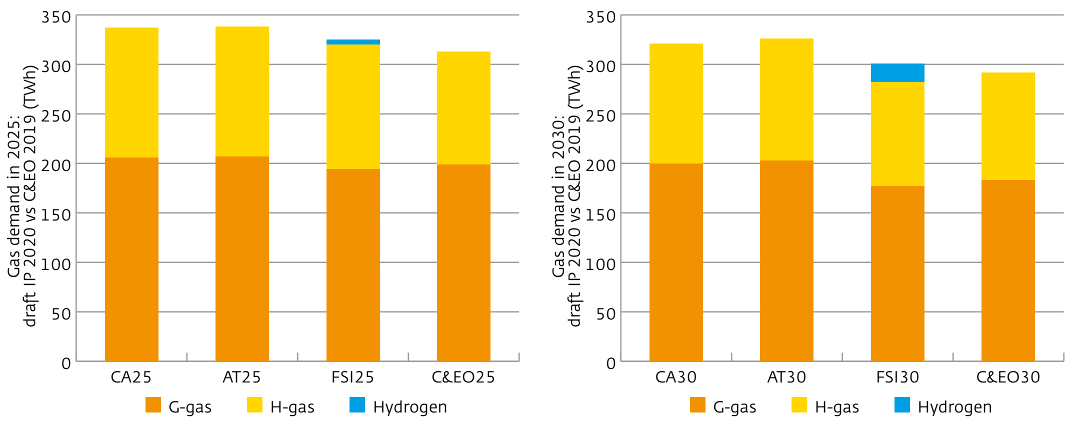
Figure 2.2 Developments in both volume and required transmission capacity, shows the volume and capacity development for the various demand scenarios. Gas demand includes the demand for natural gas, green gas and hydrogen. The charts in this figure show that both annual consumption and gas transmission capacity will decrease in the coming years. The figure however also shows that there will still be a substantial gas demand until 2030. The causes of the decrease differ per market segment and will be discussed in the rest of this section.

FIGURE 2.2 DEVELOPMENTS IN BOTH VOLUME AND REQUIRED TRANSMISSION CAPACITY.



The scenarios for 2025 and 2030 have also been compared with the C&EO 2019.[12] The comparison was made for the C&EO scenario of the current and proposed government policy. In terms of magnitude, the gas demand in the C&EO scenario is more or less comparable to the FSI scenario, as can be seen in Figure 2.3 Comparison of gas demand draft IP and C&EO. For 2030, the demand for G-gas and H-gas from the C&EO is within the range of the scenarios of this draft IP.

FIGURE 2.3 COMPARISON OF GAS DEMAND DRAFT IP AND C&EO.



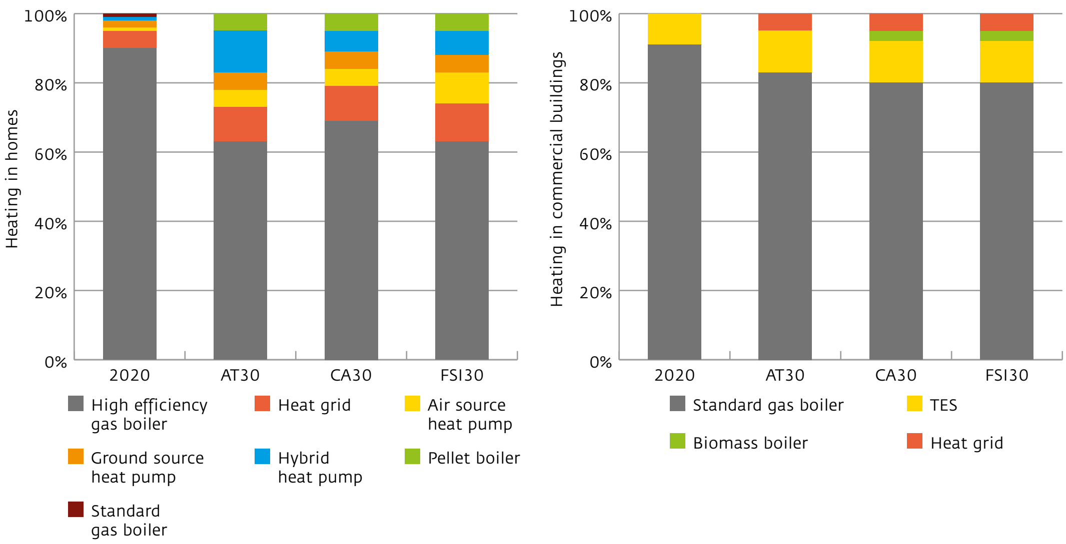
12 *Netherlands Environmental Assessment Agency: Climate & Energy Outlook 2019, 2019 (in Dutch).*

Developments in the built environment, industry, electricity generation and mobility are discussed below.

Built environment

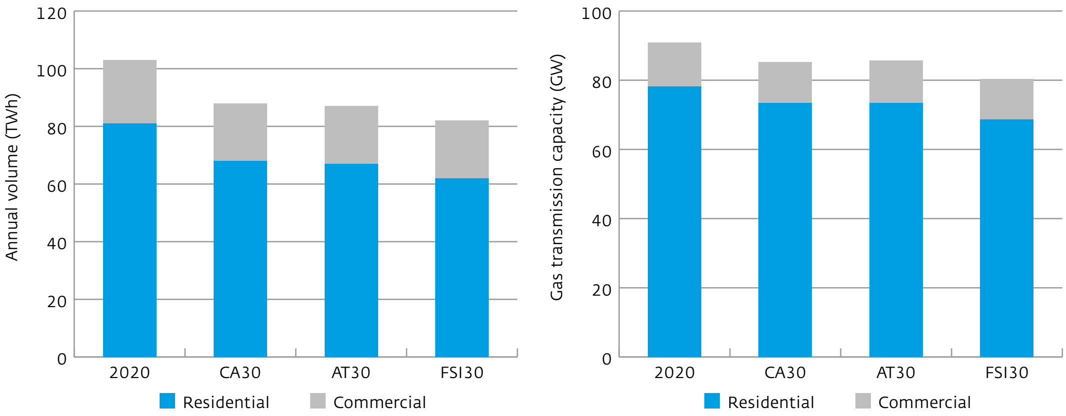
The built environment encompasses all residential and commercial buildings in the Netherlands. In these homes and buildings, natural gas is used for heating and/or cooking. The demand for natural gas is declining in this sector and there are two reasons for this. Firstly, because of better insulation in the built environment there is a decreasing need for heating, and, secondly, this is a natural development given the plans for transitioning to alternative heating methods. Figure 2.4 Meeting the heating demand for Dutch residential and commercial real estate, illustrates how the heating demand from Dutch residential and commercial real estate is met and how the means of meeting this demand changes in the various scenarios towards 2030. Depending on the type of heating, homes and commercial buildings will use less gas or none at all. Hybrid heat pumps use electricity for much of the year, but still use gas in peak demand situations. For heat networks, part of the peak demand is also supplied with auxiliary gas boilers in the districts. The other types of heating (all-electric, ground-coupled heat exchangers and biomass) do not use gas at all.

Figure 2.4. Meeting the heating demand for Dutch residential and commercial real estate.



The two graphs in Figure 2.5 Possible development in the annual volume and in the transmission capacity for the built environment show the possible development in the annual volume and in the gas transmission capacity for the built environment. In both graphs we see a downward trend in all scenarios, with the volume declining by between 16% and 22% over a period of ten years and the gas transmission capacity declining less rapidly, by between 6% and 11%. This is because, for hybrid applications and district heating, some gas transmission capacity will still be needed to handle peak demand situations.

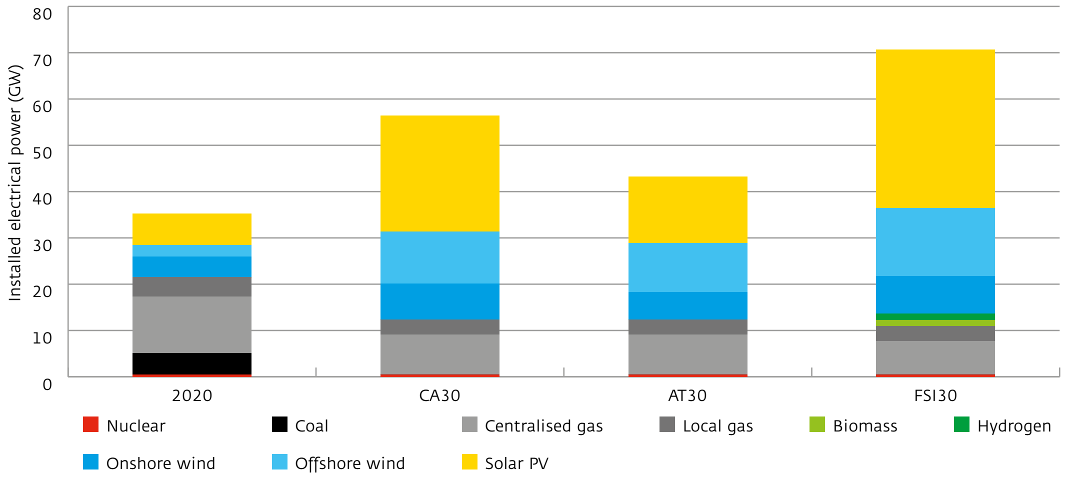
FIGURE 2.5 POSSIBLE DEVELOPMENT IN THE ANNUAL VOLUME AND IN THE TRANSMISSION CAPACITY FOR THE BUILT ENVIRONMENT.



Electricity generation

In the Netherlands, gas is also used to generate electricity, at power stations and in combined heat and power (CHP) installations, for example. In this regard, gas competes with other forms of electricity generation, such as coal, solar PV and wind. Figure 2.6 Total electric power generation in the Netherlands per scenario, shows the total electrical power generation in the Netherlands. In all scenarios, we see an increase in the use of renewables and a decline in capacity from conventional sources. This is mainly due to the closure of coal-fired power stations, though capacity from gas-fired power stations will decline somewhat as well. In the FSI scenario, hydrogen accounts for a portion of the gas capacity.

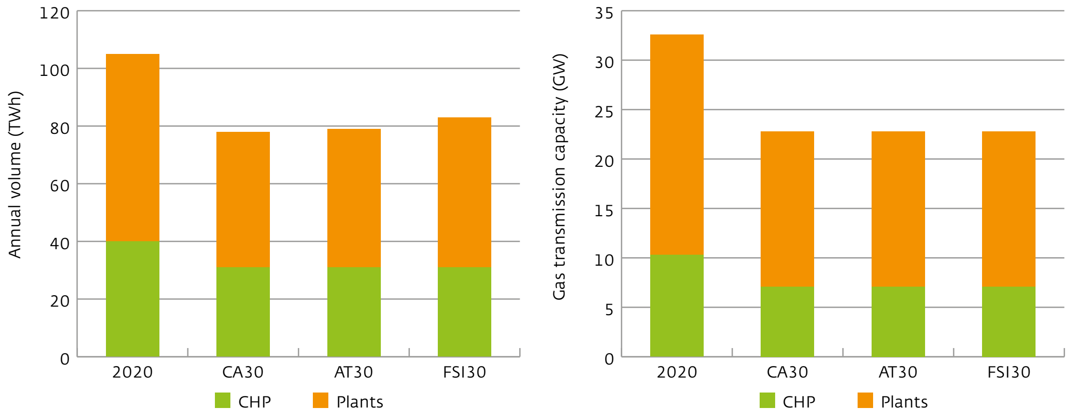
FIGURE 2.6. TOTAL ELECTRIC POWER GENERATION IN THE NETHERLANDS PER SCENARIO.



The use of gas-fired capacity depends entirely on the conditions on the electricity market. With a good supply from solar PV and wind, gas-fired power stations would probably not operate that much; they would, however, be in full operation during periods with little sun and little wind. Furthermore, use of power stations also depend on countries outside the Netherlands. To make a good estimate of gas consumption for the generation of electricity, GTS uses TenneT's calculations in this draft IP.

Figure 2.7 Gas consumption for the generation of electricity, shows the levels of gas consumption for generating electricity, with one graph illustrating the annual volumes and the other peak capacity. The gas transmission capacity in 2030 is the same in all scenarios. The annual volume in the FSI scenario is somewhat higher than in the others; this is related to the increase in electrification in this scenario.

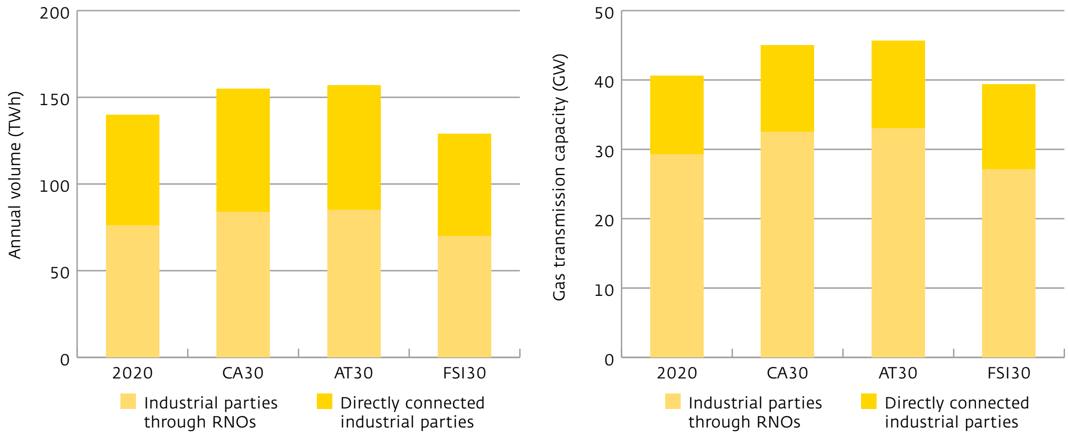
FIGURE 2.7 GAS CONSUMPTION FOR THE GENERATION OF ELECTRICITY.



Industry

Natural gas is used in industry for a wide range of applications, like for heating or as a feedstock for fertiliser. As can be seen in Figure 2.8 Industrial gas consumption for both industrial parties connected via regional network operators and directly connected industrial parties, the demand for gas from industry increases in both the CA scenario and the AT scenario. This is due to the assumed increase in industrial activity in the Netherlands. The FSI scenario also foresees a higher level of industrial activity, but also assumes a higher level of electrification, which is why, in this scenario, the overall demand from industry decreases somewhat. Up to 2030, the annual volume decreases by about 8% and the gas transmission capacity by about 3%. So, it can be seen in the FSI scenario that gas transmission capacity decreases less than the annual volume, which can be explained by the flexible Power-to-Heat (P2H) system that still uses gas when the cost of electricity is high (or too high).

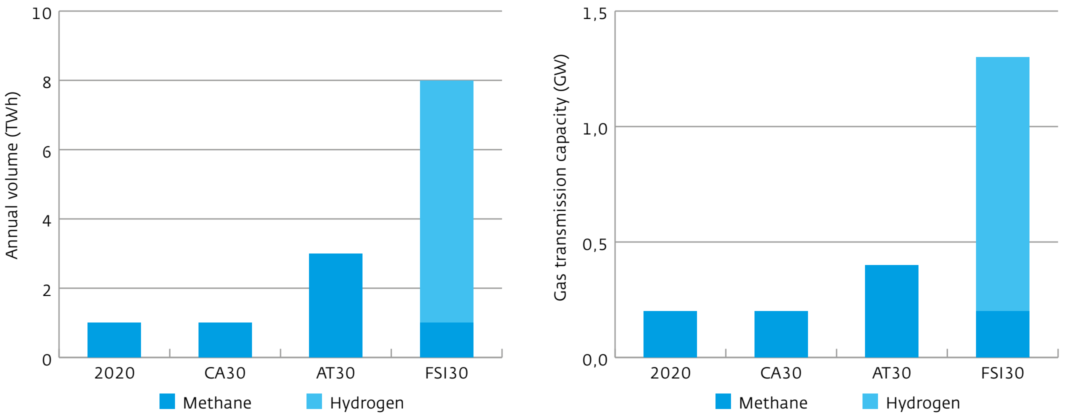
FIGURE 2.8 INDUSTRIAL GAS CONSUMPTION FOR BOTH INDUSTRIAL PARTIES CONNECTED VIA REGIONAL NETWORK OPERATORS AND DIRECTLY CONNECTED INDUSTRIAL PARTIES.



Mobility

In terms of gas demand, mobility is currently a relatively small sector consuming a modest annual volume of approximately 1 TWh. In the AT and FSI scenarios, the demand for gas increases relatively significantly. In the AT scenario, the gas concerned is mainly methane for freight transport, and in the FSI scenario the increase concerns almost exclusively hydrogen for fuel cell electric vehicles (FCEV).

Figure 2.9. Gas consumption for mobility in the various scenarios.



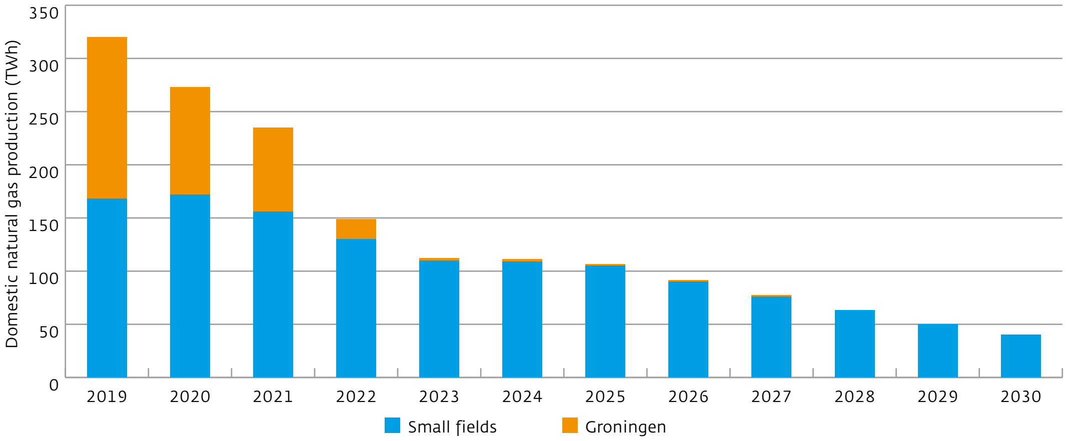
2.2.2 Gas supply in the Netherlands

In the previous section, we saw that gas demand in the Netherlands decreases in all scenarios. However, the domestic supply of natural gas is decreasing even faster, as can be seen in Figure 2.10 Total domestic natural gas production, divided into Groningen and other gas fields. The decline in domestic gas production is mainly driven by the phase-out of the Groningen field.[13] In 2019, approximately 150 TWh was still being produced from the Groningen field. In 2020, the production level will be around 100 TWh. In the course of 2022, Groningen production will come to a virtual standstill. Volumes from the smaller fields are also declining, with a production of around 170 TWh expected for 2020 and this figure falling to about 40 TWh by 2030 as the fields are exhausted.[14]

13 *Gasunie Transport Services: Recommendations to the Minister of Economic Affairs on the security of supply for the required Groningen volumes and capacity, 2020 (in Dutch).*

14 *Figures for small fields come from the 2018 annual review on natural resources and geothermal energy in the Netherlands. Only (conditional) reserves were considered. Ministry of Economic Affairs and Climate Policy: Natural resources and geothermal energy in the Netherlands, 2018 (in Dutch).*

Figure 2.10 Total domestic natural gas production, divided into Groningen and other gas fields.



Compared to the trend in gas demand, the supply of natural gas production is relatively easy to predict; accordingly, the same level of natural gas production is anticipated in all scenarios. Given that the supply of renewable gas, such as green gas (methane) and green hydrogen, is less predictable, the production of renewable gas differs per scenario.

Green gas is methane produced from organic material via anaerobic digestion or gasification. Since the resulting gas is chemically identical to natural gas it can be injected directly into the gas grid. Use of this type of renewable gas mainly increases in the AT scenario, to about 20 TWh in 2025 and 30 TWh in 2030; the other two scenarios show more modest growth.

In the FSI scenario, in addition to green gas production a large volume of green hydrogen is envisioned. Green hydrogen is produced via electrolysis (using electricity to split water into hydrogen and oxygen). In the FSI scenario, the electrolysis capacity will grow to 500 MW in 2025 and 3500MW in 2030, enabling the production of more than 8 TWh of green hydrogen by 2030. The other two scenarios do not foresee any use of green hydrogen in 2030.

Figure 2.11. Overview of green gas production in the Netherlands.

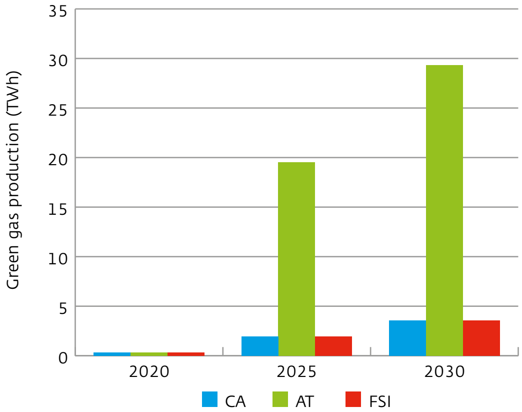
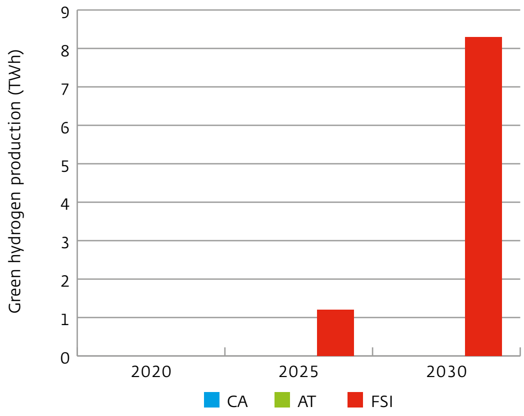
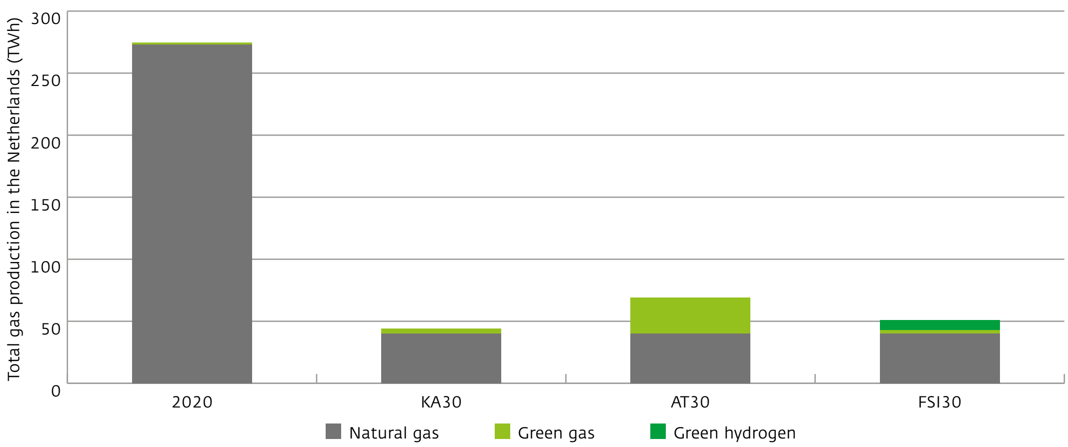


Figure 2.12 Production of green hydrogen in the Netherlands.



If we add up the production of natural gas and renewable gas, we get the total gas production in the Netherlands. This figure is shown for 2020 and 2030 in the graph below, in which a sharp decrease in the production of gas can be seen, despite the increase in renewable gas. In 2020, the total gas production is around 300 TWh, virtually all of which comes from the Groningen gas field and the small fields. In 2030, gas production varies between 50 and 75 TWh, depending on the scenario. The share of renewable gas increases substantially, from 20% in the FSI to nearly 40% in the AT scenario.

Figure 2.13 Total gas production in the Netherlands.

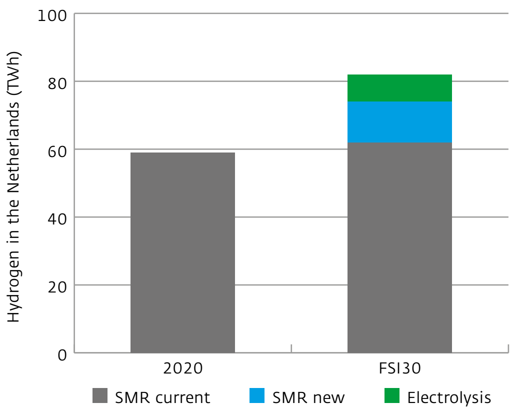


Hydrogen in the Netherlands

In the FSI scenario, production of around 8 TWh of green hydrogen produced via electrolysis is envisioned for 2030. However, this hydrogen only represents a portion of the total hydrogen production in the Netherlands. Large volumes of hydrogen are already being produced from natural gas using steam methane reforming (SMR). The resulting hydrogen is then mainly used in the production of fertiliser and in oil refining. Since this is considered to be conversion of natural gas, this part of hydrogen production is not included in the graphs depicting supply. Accordingly, the natural gas required for this is included under industrial gas demand (see also Figure 2.14 Hydrogen demand in the FSI scenario, shown per production method).

In the figure below, we show the total hydrogen production in the FSI scenario. It shows all Dutch sources of hydrogen, including hydrogen produced from natural gas and by-products . Right now, nearly 60 TWh of hydrogen is being produced in the Netherlands. This figure is expected to grow to 80 TWh by 2030, with the extra production mainly driven by the growth in industry. However, in the FSI scenario hydrogen is also used in other sectors, such as mobility (fuel cell electric vehicles) and electricity generation. In these sectors, hydrogen is set to replace conventional fuels like oil, coal and natural gas. The extra hydrogen required for this will be produced partly via electrolysis and partly through new SMR capacity.

Figure 2.14 Hydrogen demand in the FSI scenario, shown per production method.



2.2.3 Developments outside the Netherlands

Since the gas demand and gas supply trend abroad has an impact on gas flows through the Netherlands, the developments in surrounding countries are also considered in this draft IP. For this purpose, this draft IP uses data from the TYNDP 2018 joint scenario report of ENTSOG and ENTSO-E.[15] This section looks at the basic principles for gas demand and gas supply in the Netherlands and abroad.

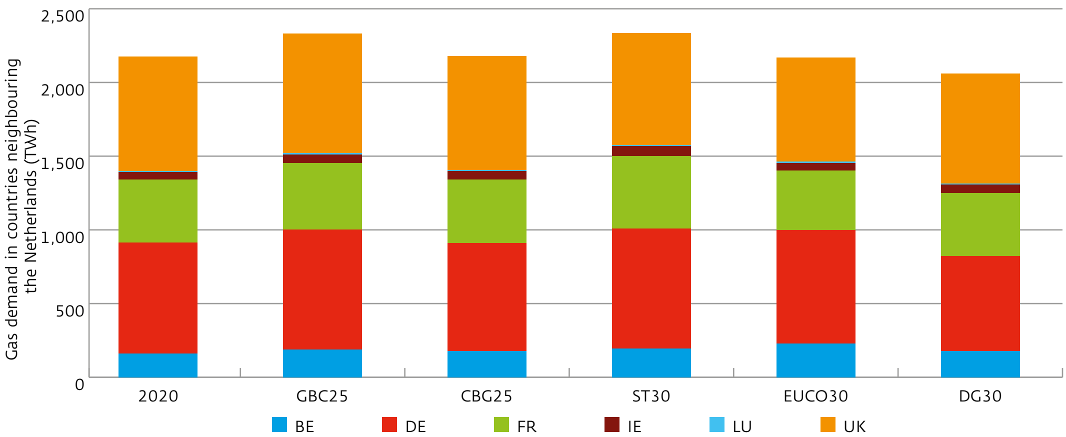
Gas demand

The TYNDP 2018 has two scenarios for 2025 and three for 2030. The two scenarios for 2025 are based on a 'best estimate' of the TSOs, but have a different merit order for coal-fired and gas-fired power stations. In CBG25 (Coal Before Gas), coal is cheaper than gas, resulting in a lower demand for gas for electricity generation. In GBC (Gas Before Coal), the gas-fired power stations are producing more electricity than the coal-fired power stations, leading to an increased demand for gas.

For 2030, the TYNDP 2018 presents three scenarios. The Sustainable Transition (ST30) foresees growth in gas demand, for gas-fired power stations and mobility in particular. In Distributed Generation (DG30), as the result of developments like electrification and energy-saving measures, there is a decline in the demand for gas. And lastly, the EUCO30 is a core policy scenario produced by the European Commission. In terms of gas demand, this scenario fits between the other two scenarios.

Where gas demand is decreasing in all scenarios in the Netherlands, we see potential growth in the surrounding countries. Even in the scenarios that show a decline in demand in neighbouring countries, this decline is not as drastic as in the Netherlands.

Figure 2.15 Development of gas demand in countries neighbouring the Netherlands.

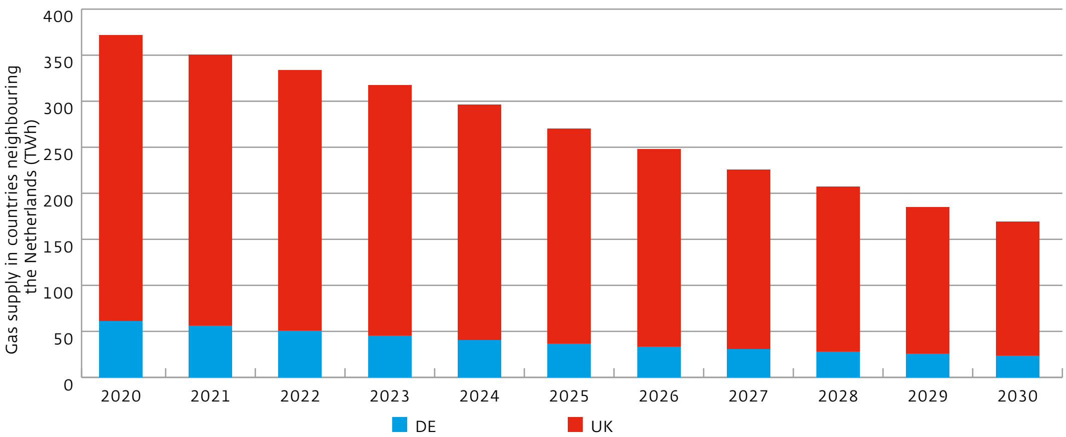


15 *ENTSOG: Ten Year Network Development Plan 2018, 2018.*

Gas supply

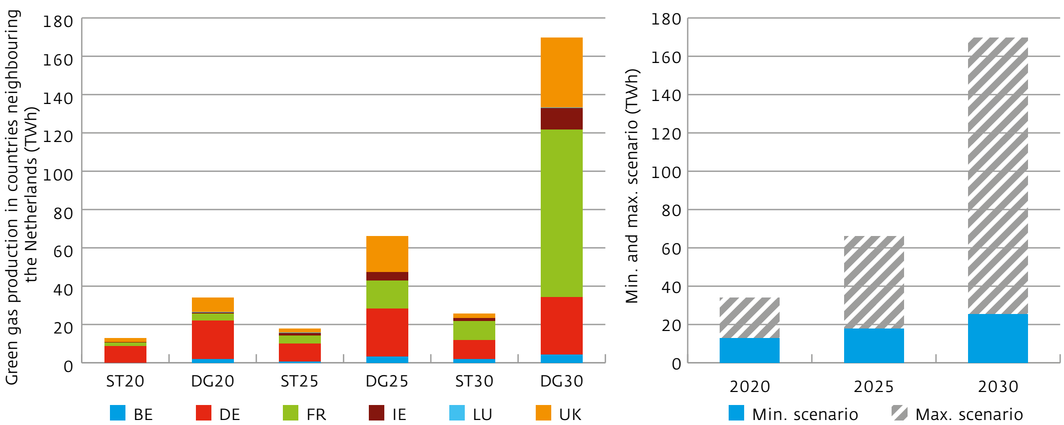
As in the Netherlands, natural gas production in the rest of north-western Europe is also declining. Alongside the Netherlands, Germany and the United Kingdom are the main gas producers at the moment. Figure 2.16 Development of gas production in countries neighbouring the Netherlands, shows the development in gas production in the Netherlands' neighbouring countries, specifically the United Kingdom and Germany, both of which show a decline in gas production, with the steepest decline in the United Kingdom.

Figure 2.16 Development of gas production in countries neighbouring the Netherlands.



On the other hand, renewable gas production is also expected to grow in the surrounding countries. Figure 2.17 Green gas production in countries neighbouring the Netherlands under the ENTSOG scenarios, shows the development in green gas production in the countries neighbouring the Netherlands. A significant increase in green gas is forecasted for France and the United Kingdom in particular. In the maximum scenario of Distributed Generation, green gas production in surrounding countries will grow to more than 160 TWh by 2030. At the other end, in the Sustainable Transition scenario we see a very limited increase in green gas production. We infer from this that the production volume of green gas is uncertain.

Figure 2.17 Green gas production in countries neighbouring the Netherlands under the ENTSOG scenarios.



In addition to green gas, the TYNDP 2018 scenarios also foresee growth potential for renewable hydrogen. In the surrounding countries, this will increase by between 3 TWh and 7 TWh by 2030. Germany accounts for about half of this volume.

2.2.4 Utilisation of the GTS network

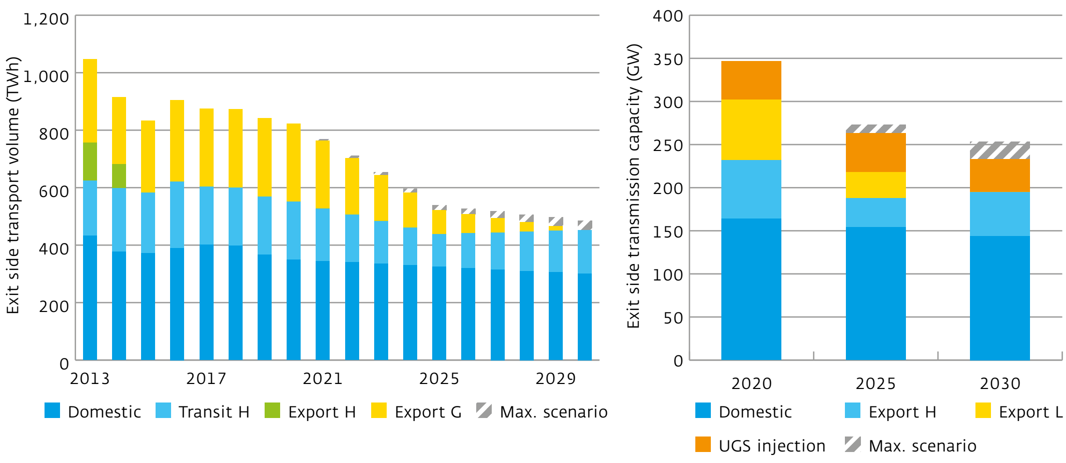
The previous sections provide an overview of domestic and foreign developments in gas supply and demand. Naturally, domestic developments directly affect the gas flows through the GTS network, but GTS also transports gas abroad. The Netherlands is still an exporter of low-calorific gas, for example. In addition, the Netherlands also handles 'transit flows', like the flow of gas from Russia to the United Kingdom via the Netherlands.

Figure 2.18 Utilisation of the GTS network, both for annual transmission volumes and peak capacities shows the total gas transmission through the GTS network, both for annual transmission volumes and peak capacities. This total transport is the sum of domestic (CA, AT and FSI scenario), export and transit. The coloured sections of the graph correspond to the minimum demand scenario. CA, AT and FSI show a spread that is captured in the grey shaded section. The grey shaded section also includes the H-gas transit flow uncertainty.

From 2025, part of the low-calorific gas exports that will disappear will be offset by an additional transit flow of high-calorific gas. One of the reasons for this is that part of the H-gas for the former L-gas markets will flow through the Netherlands. As a result, we see that the decline in transmission volume levels off somewhat from 2025 onward.

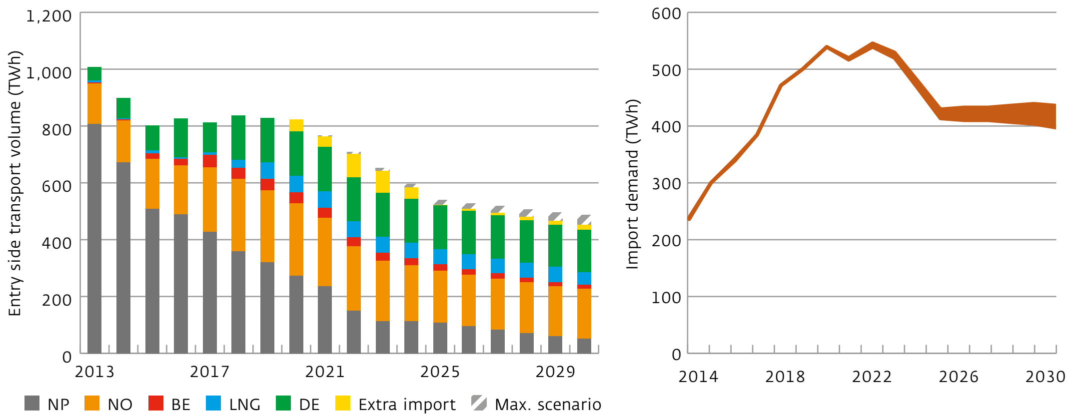
Transmission capacity on a peak capacity basis will also decrease in the coming years, by between 27% and 33% over the next ten years. So, compared to the annual transmission volume, peak capacity does not decrease as quickly, thanks to the introduction of hybrid applications that only use gas in peak situations, for example.

Figure 2.18 Utilisation of the GTS network, both for annual transmission volumes and peak capacities.



Since the domestic supply of gas is decreasing faster than demand, increasing volumes of gas will need to be imported into the Netherlands. This can be seen in Figure 2.19 Import demand of the Netherlands over the coming years. The import demand in the Netherlands will peak at around 550 TWh in the period 2020 to 2025, after which it will decline again slightly. The additional import volume required will probably be imported via Germany in the form of LNG or Russian gas. It is expected that very high usage will occur for the interconnection with Germany in particular. Imports from Norway are unlikely to grow further, as Norwegian production reached its plateau level some time ago.

Figure 2.19 Import demand of the Netherlands over the coming years.



2.3 Sources

The table below lists the sources used in compiling the scenarios.

Figure 2.20. List of sources used in compiling the scenarios.

Source		Data used
1.	ECN: Nationale Energieverkenning (National Energy Survey) 2017, 2017.	Domestic energy demand; Production from wind and solar
2.	Klimaatberaad (Climate Advisory Board): ontwerp Klimaatakkoord (draft Climate Agreement), 2018.	Agreements and bandwidths on the built environment, industry, agriculture, energy sector
3.	PBL: Effecten ontwerp Klimaatakkoord (Effects of the Draft Climate Agreement), 2019.	Assumptions and bandwidths on the built environment, industry, agriculture, energy sector
4.	PBL: Achtergrondrapport elektriciteit - effecten ontwerp Klimaatakkoord (Background report on electricity - effects of the draft climate agreement), 2019.	Assumptions and bandwidths for defined capacities in the electricity sector
5.	Klimaatberaad: Voorstel voor hoofdlijnen van het Klimaatakkoord (Proposal for the main points of the Climate Agreement), 2018.	Ambitions and bandwidths on the built environment, industry, agriculture, energy sector

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Source	Data used
6. PBL: Analyse van het voorstel voor hoofdlijnen van het Klimaatakkoord (Analysis of the proposal for the main points of the Climate Agreement), 2018.	Ambitions and bandwidths on the built environment, industry, agriculture, energy sector
7. PBL: Achtergrondrapport analyse elektriciteit t.b.v. voorstel voor hoofdlijnen van het Klimaatakkoord (Background report analysis on electricity for proposal for main points of the Climate Agreement), 2018.	Ambitions for defined capacities in the electricity sector
8. Dutch Central Government: Kolencentrale Hemweg volgend jaar dicht (Hemweg coal-fired power station to close next year), 2019.	Intention to close the Hemweg coal-fired power station
9. Dutch Central Government: wetvoorstel Wet verbod op kolen bij elektriciteitsproductie (legislative proposal Legislation prohibiting the use of coal to produce electricity), 2019.	Assumptions for change to defined production capacity in the Netherlands
10. Dutch Central Government: Kamerbrief over de voortgang uitvoering routekaart windenergie op zee 2030 (Letter to Parliament on progress in the implementation of offshore wind energy roadmap for 2030), 2019.	Assumptions for offshore wind developments
11. DNV GL: Biomassapotentieel in Nederland, Verkennende studie naar vrij beschikbaar biomassapotentieel voor energieopwekking in Nederland (Biomass potential in the Netherlands, Exploratory study into the Netherlands' freely available biomass potential for energy generation), 2017.	Biomass potential in the Netherlands
12. Green Liaisons: Hernieuwbare moleculen naast duurzame elektronen (Renewable molecules alongside sustainable electrons), 2018.	Green gas volume developments
13. Revnext: Achtergrond Carbon tax-model (Carbon tax model background), 2019.	Development of the potential of electric vehicles
14. TNO: Inputs and considerations for estimating large scale uptake of electric vehicles in the Dutch passenger car fleet up to 2030, 2018.	Development of the potential of electric vehicles
15. RVO: Elektrisch rijden personenauto's en laadpunten (Electric passenger vehicles and charge points), 2019.	History of the electric vehicle
16. RWS: Rapportage Routeradar Brandstofvisie Duurzame energiedragers in mobiliteit (Report on the use of renewable energy carriers in mobility), 2019.	Developments in mobility
17. PBL: Achtergronddocument effecten ontwerp Klimaatakkoord, gebouwde omgeving (Background document on the effects of the climate agreement, built environment), 2019.	Quantities, bandwidths and transition paths for various kinds of heating technology
18. Quintel: Energy Transition Model (ETM).	Assessment of scenario assumptions
19. European Network of Transmission System Operators for Gas (ENTSOG): Ten-Year Network Development Plan (TYNDP) 2018, 2018.	Data from neighbouring countries on consumption, production and interconnections capacity

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Source	Data used
20. European Network of Transmission System Operators for Electricity (ENTSO-E): Ten-Year Network Development Plan (TYNDP) 2018, 2018.	Data from neighbouring countries on consumption, production and interconnection capacity; Tax profiles for Europe; Profiles on the availability of weather-dependent sources. Long-term net transmission capacities (NTCs); Thermal capacities of connections between countries.
21. ENTSOG and ENTSO-E: Ten-Year Network Development Plan (TYNDP) 2020 Scenario Report, 2020.	Fuel costs, costs of CO2 emission allowances
22. Large-scale consumers	Forecast of demand from large-scale consumers
23. TenneT	Forecast of production from electricity producers
24. Regional network operators	Assumptions on the development of demand and production capacity at regional level
25. Statistics Netherlands (CBS)	Historical consumption figures
26. Ministry of Economic Affairs and Climate Policy: Jaarverslag delfstoffen en aardwarmte in Nederland 2018 (Natural resources and geothermal energy in the Netherlands), 2018.	Forecast for small fields

3 Developments in the Dutch gas market

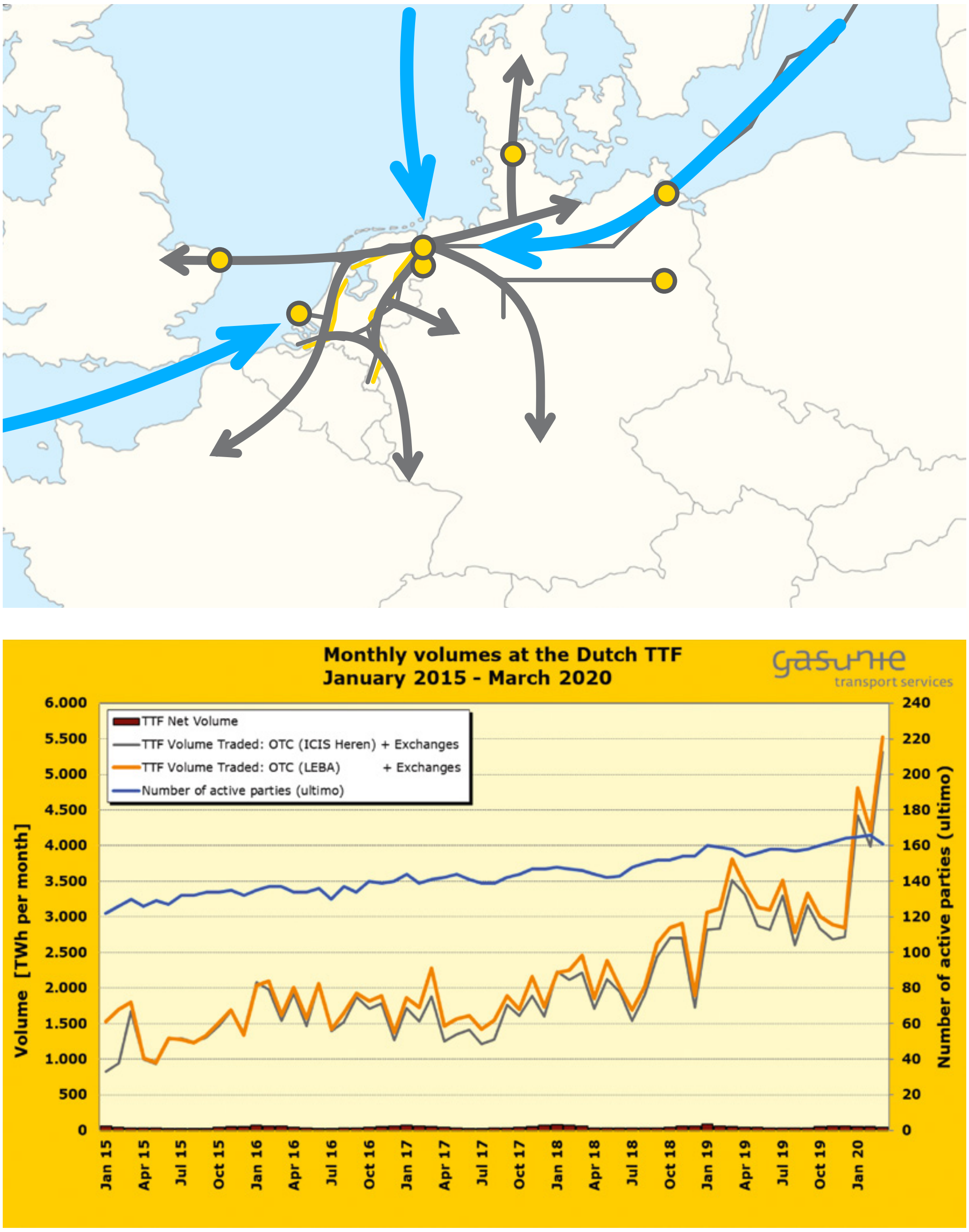
3.1 The gas market between 2005 and 2020

The Dutch gas market has gone through a remarkable transformation over the past 15 years. Home to the huge Groningen gas field and several smaller fields, the Netherlands used to be a major gas-producing nation. With indigenous production levels of around 800 TWh a year, output from these fields was enough to meet domestic demand and also export gas to neighbouring countries. Aside from that, the Dutch state's 'small fields policy' meant there were extensive physical facilities available to mix H-gas with nitrogen to convert it into L-gas. In the early days, gas supply was dominated by large integrated gas companies, whereby gas transmission was part of the core business of buying and selling gas. The (international) market was dominated by long-term commodity contracts with relatively little trading. There was no 'hub', no decoupled entry/exit system and as customers had to accommodate various different physical gas qualities. Access to gas storage facilities was relatively limited. A series of changes subsequently drastically transformed the Netherlands into Europe's most dynamic and liquid gas market. In 2005, gas transmission and gas trading were split into two separate companies. Ever since, the gas grid has been operated by Gasunie Transport Services (GTS) as a fully regulated and unbundled TSO. This unbundling went further than what EU rules required at the time, giving network users the convenience of access rules which were developed in a fair and transparent way, based on the principle of non-discrimination.

The Dutch gas market changed into an energy-based system, meaning that gas is traded as energy (in kWh), regardless of the physical quality. As a result, shippers no longer needed to book and individually pay for physical quality conversion, as quality conversion became a statutory task of GTS and the cost of quality conversion was socialized. This boosted competition, as shippers with limited access to (L-gas) sources could now also supply to the (L-gas) market. With the introduction of a decoupled entry/exit system with a virtual trading point (Title Transfer Facility), trading was facilitated even further.

Owing to its location between major gas-producing countries such as Norway and Russia and major (gas) consumption markets such as Germany, Belgium, France, the United Kingdom and Italy, the Netherlands has always been a gas production and transit country. This has resulted in a Dutch gas grid that has excellent connections and is able to accommodate large volumes of locally produced gas, as well as gas imports and exports. For years, the Netherlands has been a crossroads of international gas flows, and it became even more of a hub with the creation of the Dutch gas roundabout.

Figure 3.1 Import and export flows in the Netherlands and monthly traded volumes on the TTF.



The diversity of the physical supply, the presence of major gas transit flows and the possibilities of storing gas in storage facilities, combined with the Title Transfer Facility (TTF) set up in 2003, created ideal conditions for successful gas trading. Liquidity on the TTF has shown steady growth, both in the spot and the prompt market. The TTF has meanwhile grown into Europe's most liquid hub.

The massive trading volume on the TTF with excellent liquidity has forged reliable pricing for a wide array of gas products. These prices reflect gas demand and supply at any given moment. In fact, market parties in the Netherlands and abroad now prefer TTF prices to traditional oil index-based prices.

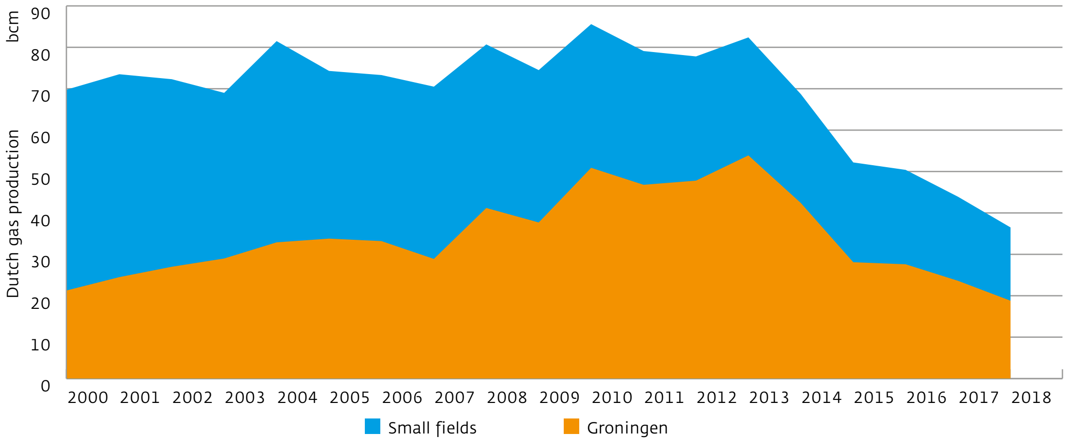
Spurred partly by the liquidity of the TTF and good market conditions, independent storage facility operators have built commercial storage facilities, which has increased the total number of storage facilities. Under the independent supervision of the ACM, the network codes ensuing from EU regulations (CAM, CMP, BAL, INT, TAR) were implemented, which has helped ensure efficient allocation and use of infrastructure at transparent prices. This price transparency has, in turn, facilitated market access and helped ensure a well-functioning market. Owing to the presence of the gigantic Groningen field and the associated infrastructure, the Netherlands has always had a reliable gas supply. Over the past 15 years, security of supply was improved further by increasing cross-border capacity and adding the Gate LNG terminal and several storage facilities. The latter factor, as well as the introduction of a quality-neutral gas market (TTF without Wobbe labels), has also given TTF liquidity an extra boost. The growing gas trade has integrated the Dutch gas market (with the BBL meanwhile having become part of the TTF market area) into the north-western European gas market to a greater degree. The most recent step in this direction was the introduction of virtual interconnection points (VIPs) with Belgium and Germany.

3.2 The gas market between 2020 and 2030

As outlined above, the market has become mature and liquid over the past 15 years. Access conditions were developed and the energy market is increasingly viewed from a European perspective, instead of from a domestic perspective. This has brought efficient use of gas infrastructure in a competitive market, and with that maximum prosperity for consumers as costs came down. Part of this success is reflected in the TTF as north-western Europe's leading gas hub, also thanks to the creation of a quality-neutral gas market and the available infrastructure (production, storage facilities, LNG, international connections).

However, the Dutch gas market is subject to constant change, and these changes may even jeopardise some of the positive features of the market detailed above. One of the most prominent changes is the acceleration of the phase-out of gas production from the Groningen field, along with the natural decline in gas production from smaller fields.

Figure 3.2 Dutch gas production between 2000 and 2018.[16]



The well-functioning gas roundabout (diversity of the physical supply including LNG, transit, storage facilities) has made it possible to drastically reduce production from the Groningen field without causing security-of-supply issues and without compromising the liquidity of the TTF. The TTF's long-term growth has even increased during the step-by-step reduction of gas production from Groningen. The Dutch gas market has so far been able to absorb the reduction in volumes from Groningen without any problems.

In the following, we will outline the relevant developments for the current decade. In this context, the letter to Dutch Parliament entitled "De rol van gas in het energiesysteem van nu en in toekomst" (The role of gas in the energy system today and in the future) published on 30 March 2020 offers an important framework for the use of natural gas, green gas and hydrogen.[17]

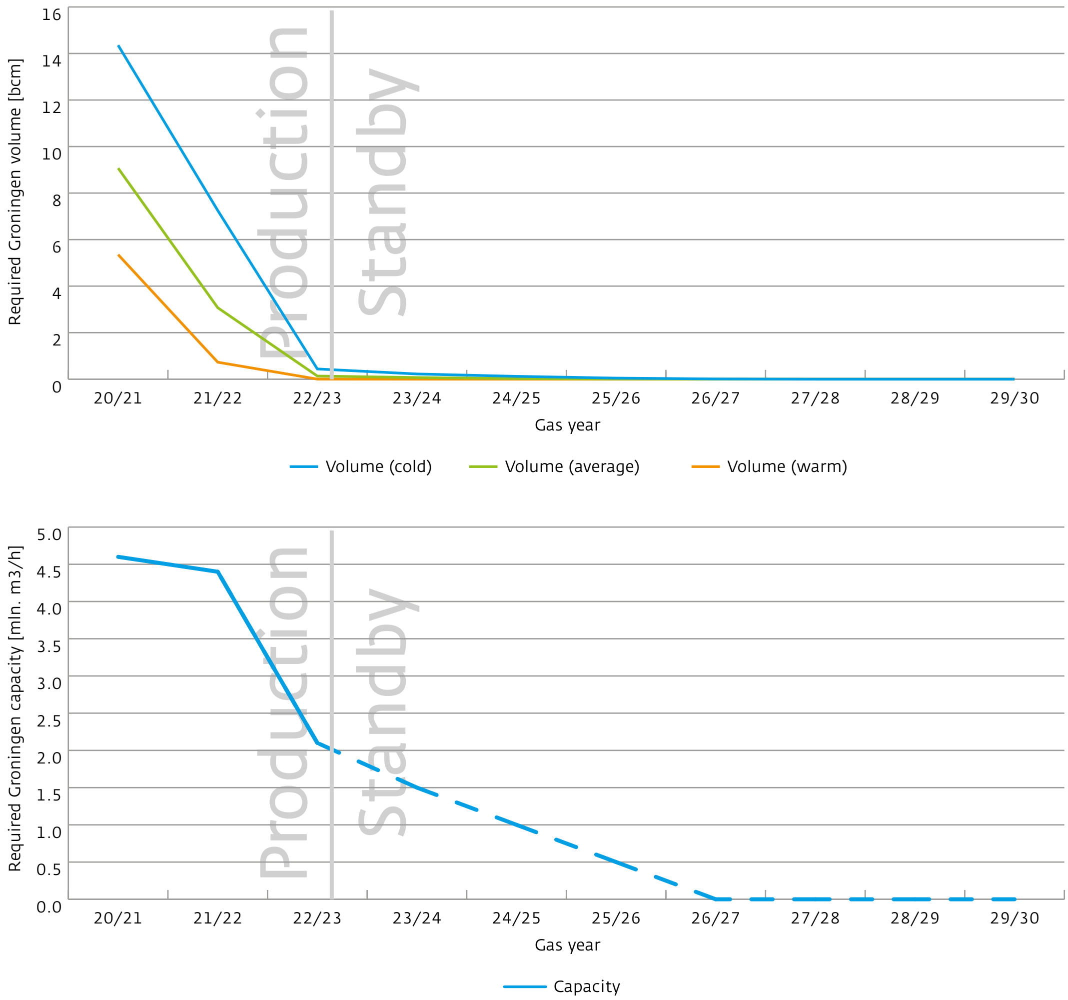
3.2.1 The phase-out of production from the Groningen field

Following the earthquake near Zeerijp in January 2018, the Ministry of EZK decided that gas production from the Groningen gas field would be terminated completely by no later than 2030. After the earthquake near Westerwijtwerd (22 May 2019), the Ministry stated that gas production from the Groningen field could be phased out almost completely by gas year 2022/2023, only in the event of a severe winter, it may be necessary to continue to produce gas after 2022.

As shown by Figure 3.3 Development of the required Groningen volume and capacity per gas year, the Groningen field will have to continue to be available as a backup for some time to come, so as to be able to guarantee security of supply in the event of asset outages in cold conditions. In both graphs, a grey vertical line indicates the switching moment between these two operational modes (production/standby) of the Groningen field.

16 Statistics Netherlands: Natural gas revenues from gas production nearly 417 billion euros, 2019 (in Dutch).
17 Ministry of Economic Affairs and Climate Policy: Letter to Dutch Parliament on the role of gas in the energy system today and in the future, 2020 (in Dutch).

Figure 3.3 Development of the required Groningen volume and capacity per gas year.



A sensitivity analysis has also been carried out to investigate the biggest drivers for the required Groningen production in the coming years. This sensitivity analysis shows that, for the coming years, the cases in which part of the backup supply of nitrogen is used, the quality of the gas supplied, and the timely completion of the Zuidbroek nitrogen plant will have the greatest impact on the level of production required from the Groningen field. For the later years, uncertainty on the conversion in Germany, Belgium and France has the greatest impact. A realistic bandwidth within which the Groningen field no longer has to play a backup role is, according to GTS' current estimates, from between mid-2025 to mid-2028. To reduce the required Groningen gas production in the coming years, measures will be taken on both the supply and the demand side. The following describes which measures have already been or are being implemented.

Measures to reduce demand for L-gas

1. the switch in the German, Belgian and French gas markets from L-gas to H-gas: L-gas exports will be zero by 2030 after an average year-on-year drop of 10% (i.e. approx. 20 TWh per year) over the 2020-2030 period;

2. exporting pseudo L-gas via Oude Statenzijl: until April 2020, export at the Oude Statenzijl point was limited to gas from the Groningen field. There is now a connection between two GTS pipelines so that Oude Statenzijl can be supplied with pseudo L-gas. This measure was implemented in April 2020 as planned;
3. GTG Nord blending facility in Oude Statenzijl: GTG Nord will use this blending facility to enrich the incoming L-gas (already enriched to the maximum Dutch quality index) to the upper limits of the German L-gas Wobbe Index. This measure will save about 30% of L-gas exports to GTG Nord. GTS' work has been completed and the expectation is for GTG Nord to be able to use the blending station from the third quarter of 2020;
4. conversion of industrial large-scale consumers: a new legislative proposal aims to amend the Dutch Gas Act such that a ban on the use of L-gas would be imposed on large industrial consumers, specifically those that consume over 0.98 TWh per year (100 million m^3 per year).[18] The nine companies that fall under this category must have been weaned off L-gas by 2022. GTS is in talks with these parties and already preparing possible solutions. When exactly they will switch depends on when the legislation takes effect and whether the customer has submitted a formal request to GTS.

Measures to increase the supply of L-gas

5. additional procurement of nitrogen: GTS has had 80,000 m^3/hour of extra nitrogen available since late December 2019. The Wieringermeer blending station has been expanded to be able to mix this additional nitrogen with high-calorific gas to make pseudo G-gas;
6. filling Norg UGS with pseudo G-gas: instead of Groningen gas, the Norg underground storage (UGS) facility can be filled (in part) with pseudo G-gas that the market cannot purchase in the summer. Since it requires no technical measures, Norg UGS has also been used to store pseudo G-gas since 1 April 2020;
7. Zuidbroek nitrogen plant II: all work relating to the construction of the Zuidbroek nitrogen plant is on schedule, and the nitrogen plant is included in the above figures from the second quarter of 2022. By the time the new GTS nitrogen plant comes into operation in 2022, production (volume) in Groningen in a normal winter is expected to be close to zero. Once the Groningen field no longer outputs volume, the entire L-gas market will be supplied with pseudo G-gas by blending nitrogen into H-gas.

To achieve the reduction in Groningen gas volumes and capacities, it is important that the demand for and supply of gas develop in accordance with the assumptions GTS has applied. One of the key assumptions is that there will at all times be sufficient volumes of high-calorific gas (H-gas) to feed the quality conversion plants. If there is not enough H-gas, more volume from the Groningen field will be required. See section 3.3 for details.

3.2.2 German market integration

By 1 April 2022, the two remaining German market areas (GASPOOL and NCG) will have to merge to form one single market area. In collaboration with German regulator BNetzA, the German TSOs plan to have this merger operational from 1 October 2021.

18 Ministry of Economic Affairs and Climate Policy: Bill to amend the Dutch Gas Act to ban the use of low-calorific gas by large industrial consumers: Reference DGETM-E2020/18285567, 2018 (in Dutch).

GTS will be looking into what impact the German market integration will have on, for example, the sale of capacity products through the Virtual Interconnection Points (VIPs). German market integration is highly likely to lead to a reduction in firm capacity and/or a shift of firm capacity. The German TSOs are using market-based instruments in looking for possible solutions.

This could lead to a limitation of the current exit capacity at the German export stations to the Netherlands. In the coming years, however, the Netherlands will need additional H-gas imports via Oude Statenzijl and other border points. This will probably require capacity expansions in the German network. The above developments could lead to shortages in the Dutch gas supply.

To prevent such issues, closer collaboration between GTS and the various German TSOs in the area of network planning will be needed. Declining utilisation of the GTS grid and the capacity released as a result can be reused to eliminate German transmission bottlenecks. The Netherlands would then be used as a transit country (using Oude Statenzijl as the entry point, for example, and Bocholtz as the exit point), so as to circumvent the issue of limited transmission capacity between the north and the south of Germany. The first capacity analyses conducted, show that a considerable part of the capacity that would become available can indeed be used for this purpose. The involved German TSOs and GTS are already in talks about this.

GTS will also periodically look into possibilities to remove all interconnection points between its system and one or multiple other entry/exit systems, so as to facilitate cross-border trading and transmission, thus further optimising the market mechanism. This could, for example, be done by setting up a trading region. Existing market models in place in the countries involved would then be maintained as much as possible, albeit that there would be one single virtual transfer point to move gas from one portfolio to the other. Facilitating this kind of market integration is one of the objectives pursued by the European Commission in Regulation 715/2009 and Directive 2009/73/EC.

3.2.3 Hydrogen backbone

In the Dutch government's vision document on hydrogen published on 30 March 2020, the minister explains that carbon-free hydrogen will be an indispensable part of the energy supply mix in the future, not only in the Netherlands, but also in Europe and even further afield, thus reinforcing the ambitions from the Dutch Climate Agreement.[19]

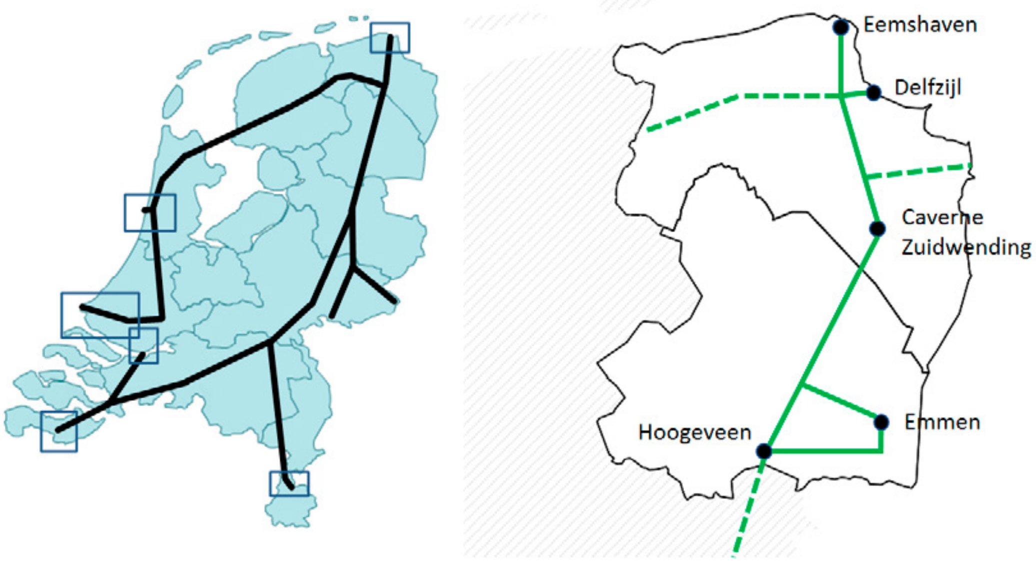
As part of the Dutch Climate Agreement, a hydrogen programme is being implemented that focuses on, among other things, having an optimum hydrogen infrastructure in place by 2030. The transmission and storage of hydrogen, like natural gas, is a cost-effective way of transporting and storing energy. Demand for regional infrastructure for hydrogen is expected to arise among industrial clusters and energy clusters in the period up to 2025. Such a network (the 'hydrogen backbone') can connect internationally with Germany (around the Ruhr area and Hamburg), Belgium (Antwerp), and with the large-scale production of energy in the North Sea.

19 *Ministry of Economic Affairs and Climate Policy: Letter to Dutch Parliament on the government's vision on hydrogen, 2020 (in Dutch).*

Properties of the hydrogen backbone

The Dutch hydrogen backbone can be largely built using the existing GTS gas infrastructure. Parts of it could possibly be made available for the transmission of hydrogen over the period leading up to 2030 as production from the Groningen field decreases and demand for low-calorific gas from Germany, Belgium and France falls. The main structure, as shown in Figure 3.4 National hydrogen backbone, and detail of the northern section, may be available by 2026, and some parts, especially in the north-east of the country, likely earlier (around 2023). The transmission capacity of the entire hydrogen backbone will be roughly between 10 and 15 GW.

Figure 3.4 National hydrogen backbone, and detail of the northern section.



An analysis by DNV-GL in 2017 showed that almost all parts of the GTS network are suitable for the transmission of hydrogen. However, pressurisation of hydrogen will require replacement of the current compressors. Furthermore, all pipes and installations would need to be cleaned and inspected prior to actual use. An important question that will need to be answered in this regard is whether hydrogen will become an integral part of the current TTF gas market or whether it will become/remain a separate market with its own dedicated infrastructure. Another important question that is yet to be answered is what role GTS will, may or can fulfil in hydrogen transmission. This question is not only relevant within the Netherlands, but also at the level of the European Union.

The total investment needed for the above hydrogen transmission network, based on the assumption that GTS' existing assets will be used for it, was estimated at €1.7 billion in 2019 (excluding any acquisition costs), which would have to be covered by the hydrogen transmission system operator that is ultimately selected to operate the hydrogen transmission network. This includes installation of new compressors. It should be mentioned, though, that the need for hydrogen transmission on a national scale is expected to develop gradually over the coming years, meaning it will be possible to work initially without compression.

Setting up a hydrogen backbone will impact the use of the current GTS network. As the hydrogen transmission network expands, the question of whether the available pipeline capacity should be used for natural gas/green gas or hydrogen will arise more frequently.

This means that capacity planning for the GTS network will become increasingly complex. In the transition phase in particular, when, in addition to conventional fossil natural gas (of varying quality), increasing volumes of other gases will be transported and stored, the capacity of the network may be temporarily limited at some points. Based on various future scenarios, GTS believes that the hydrogen transmission network can be built without incurring bottlenecks for the natural gas transmission.

Various exploratory studies, including the 2030-2050 Comprehensive Infrastructure Survey by the joint network operators, and the scenarios used for this draft IP, have shown that hydrogen has the potential to play a key role in the future energy supply. The infrastructure for hydrogen transport will therefore ultimately be regulated. GTS has identified two possible options to get to that point:

- making hydrogen transport one of GTS' duties and charging a cost-reflective tariff for hydrogen as well;
- creating a separate entity for hydrogen transport services, transferring the assets from one regulatory domain to another regulatory domain at the regulated value.

The Ministry of EZK has teamed up with TenneT and Gasunie to conduct a study entitled HyWay 27 to investigate how the existing gas grid can be used to transport hydrogen.

Development of the hydrogen backbone in north-western Europe

GTS and Gasunie are not alone in anticipating large-scale transmission of hydrogen through existing pipelines. In January 2020, the German gas TSOs published their joint vision on this topic. Around 2030, they envision a hydrogen network spanning 6000 kilometres covering the whole of Germany, with interconnections to the Dutch hydrogen backbone at the Oude Statenzijl and Zevenaar sites and via the salt cavern storage facilities at Epe in Germany. In addition, their vision includes import and export routes for hydrogen to and from France and other European countries. A coherent pan-European hydrogen transmission network is also in line with ENTSO-G's vision, which in turn is based on the European Union's Green Deal.

Blending hydrogen

The development of the hydrogen backbone described above depends on the development of the supply of and demand for hydrogen. To give the production of blue and green hydrogen the opportunity to gradually develop, independently of demand, the feasibility of injecting hydrogen into the natural gas grid is also being examined. On the basis of internal and national and international studies, injecting up to 2% hydrogen into the Dutch gas pipeline network appears to be technically feasible without the need for significant investments in the network or at connected parties.[20] However, a certain amount of investments in modifications and replacement of components must be taken into account. GTS also has a good overview of the regions where higher percentages of hydrogen can be mixed with natural gas. Pilot projects for this can be considered in consultation with the relevant connected parties.

20 For connected parties, an amendment to the Ministerial Regulation on Gas Quality will be required.

3.2.4 Green gas

In the Routekaart Groen Gas (Green Gas Roadmap), the Dutch Minister of Economic Affairs and Climate Policy underlines the need and potential for increased green gas production and presents the primary plans on how to realise the green gas ambitions formulated in the Climate Agreement.[21] One of the main objectives is to ramp up annual green gas production to 20 TWh by 2030. To be able to achieve these volumes of green gas, it is expected that a substantial part of this, approximately 10 TWh per year, will be taken up by GTS through a direct connection or transferred from the regional network to the national transmission system.

The study on the potential of local biomass and feed-in locations for green gas carried out by CE Delft on behalf of Netbeheer Nederland shows that there is sufficient techno-economically viable biomass in the Netherlands and that the national target is feasible.[22] Potential for large-scale green gas feed-in is greatest in the northernmost Dutch provinces and nearby port areas. Using biogas that has been upgraded to natural gas quality ('green gas') is an attractive route because it requires little or no investment in the existing GTS network: green gas can be transported through the existing GTS infrastructure and used by end consumers using the facilities they already have in place.

The historical growth of green gas production is modest, however. The 2030 target will be difficult to achieve at the current pace and with the current project portfolio. In order to reach the target, innovations in anaerobic digestion and gasification technology are required, as are policy measures such as extra subsidies, a blending obligation (biofuel quota) for green gas, and a solution for the growing risk of feed-in restrictions due to congestion in regional network operators' regional grids.

Solutions to feed-in restrictions in regional grids

Green gas is produced using anaerobic digestion (fermentation), a continuous process meaning a continuous supply. However, demand for gas is highly seasonal, with high demand in winter and low demand in summer. This can result in a supply/demand imbalance in the summer that leads to a shortage of feed-in capacity in regional network operators' networks. This has a negative effect on a green gas producer's business case, because there is no demand for the gas in the summer and the gas will have to be flared, which can lead to potential green gas producers deciding not to build production installations.

Where such bottlenecks arise in the regional networks, GTS' duty of providing grid connections allows GTS to offer two types of solutions:

- green gas boosters: to facilitate the feed-in of green gas, green gas boosters need to be installed between the regional and national grid. In accordance with the 'green gas assessment framework', these are built at the lowest possible societal costs.[23] In collaboration with the regional network operators in question, GTS is working on two specific (pilot) projects: a green gas booster near Garminge and a green gas booster

21 *Ministry of Economic Affairs and Climate Policy: Letter to Dutch Parliament on the green gas roadmap, 2020 (in Dutch).*
22 *CE Delft commissioned by Netbeheer Nederland: Potential of local biomass and feed-in locations for green gas: an exploration for 2030, 2020 (in Dutch).*
23 *Netbeheer Nederland: Advisory report: 'Creating sufficient feed-in scope for green gas', 2018 (in Dutch).*

near Wijster. In 2015 and 2019 respectively, bottlenecks have been identified in the regional network. Given that GTS expects more requests for a booster in the future, we launched a study in 2019 to investigate the standardisation of green gas boosters, with a view to reducing costs and shortening lead times;

- collector pipeline: a consortium made up of the Emmen local authority, ENGIE, Gasunie, Gasunie Transport Services, Ludan Energy, Combinatie Greenpark Next, Energiebeheer Nederland (EBN), Stichting New Energy Coalition and NAM has launched a study to explore the possibilities for green gas at the former GZI site and one pipeline in the GTS grid. This is a one-off opportunity to stimulate the feed-in of renewable gas by making a transmission pipeline available and operating this at a lower pressure (preferably 8 bar). In the form of an experiment or temporary duty, this concept can be expanded with intake and transmission of biogas, centralised treatment and/or centralised compression. This would enable the feed-in or transfer of approx. 5 TWh of green gas (or biogas) per year from the regional networks. As this is a substantial contribution to achieving the climate goals, GTS gladly collaborates in this study into innovative utilisation of existing assets. On top of that, an initial assessment has already shown that the total costs involved in the collector pipeline project are considerably lower than the costs involved in having to install multiple green gas boosters in the various regions.

Besides the above solutions to bottlenecks in the regional network, GTS connects parties that feed in green gas to the national grid as per its connection duty. GTS would like to see a new statutory duty for GTS included in the next amendment to the Dutch Gas Act allowing biogas (off-spec green gas) to be fed into the grid, provided that the gas quality at the exit points remains within the bandwidth defined in the Ministerial Regulation on Gas Quality.

3.2.5 Network adaptation in anticipation of declining utilisation

In recent decades, the GTS network has been developed in an integrated manner so that the continuously increasing demand for transmission capacity, both for supplying the Netherlands and for export and international transit, can be met in the long term as well. This integration creates economies of scale for larger transmission volumes. After all, the marginal costs are low, which means that transporting more gas is relatively cheap. This synergy between domestic transmission, export and transit is one of the reasons that the GTS tariffs have been among the lowest in Europe in recent years. As a result of falling demand, the synergy gains will decline over the coming years.

The transmission capacity of the national grid is not a fixed amount however: GTS can adjust grid capacity to bring it into line with the falling demand, by temporarily decommissioning compressor installations, for example, or reducing the inlet pressure. This allows GTS to realise cost savings, mainly on OPEX (including fuel gas) and maintenance. With this in mind, to minimise OPEX, GTS is currently investigating which L-gas compressors can be temporarily put on standby in the coming years. Compression may be needed again, though, to facilitate the timely implementation of the H2 backbone (see section 3.2.3), and for this reason their decommissioning will only be a temporary measure. Where possible, GTS also sells assets to third parties, including for the transmission of hydrogen.

3.3 The gas market between 2020 and 2030: further analysis

The anticipated developments in the gas market will bring new (physical) challenges for the gas market that will continue to require seasonal and daily volume and capacity flexibility. As a result of these changes, there is increasing focus, especially given the cessation of national production, on security of gas supply in the Dutch market. It is important that the success factors for the proper functioning of the Dutch gas market will be preserved amid all these changes. These success factors are the following:

1. security of supply: gas supply in the Netherlands must remain robust in the face of major supply outages, in line with EU security of supply rules;
2. successful continuation of the TTF: the TTF has meanwhile become north-western Europe's most liquid hub, which guarantees price transparency, convenience in risk management and competition, with optimal costs for end users;
3. quality-neutral gas market: this makes it possible for all shippers to trade energy units without having to factor in all sorts of physical properties of the gas (such as the calorific value). This element contributes to the TTF's liquidity;
4. retention of transit flows: offers several benefits for the Dutch gas market, such as lower transmission costs for Dutch consumers, and it contributes to the TTF's liquidity.

Sections 3.3.1 to 3.3.4 inclusive will present the results of various analyses conducted by parties such as IEA, Brattle and GTS to get an idea of the possible consequences of the developments outlined above.

3.3.1 Role of seasonal and other L-gas storage facilities between 2020 and 2030

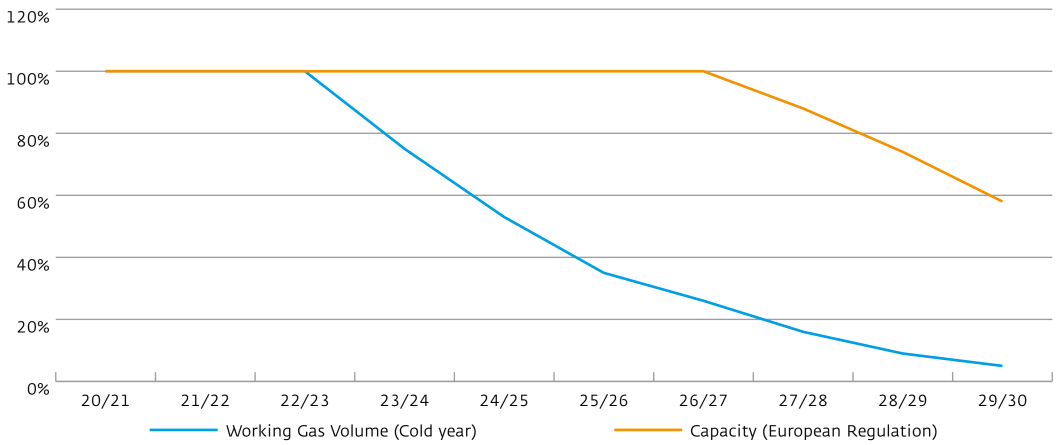
Given that GTS has a statutory task to provide maximum support in winding down gas production from the Groningen field, GTS has taken several measures, as specified above. In its advices to the Minister of Economic Affairs and Climate Policy, GTS has provided insight into the possible phase-out of production from the Groningen field.[24]

Due to the closure of the Groningen field, the Dutch and north-western European gas market becomes virtually completely dependent on H-gas production and GTS' QC assets (enriching and blending nitrogen) and, consequently, on extra supply of H-gas to the Netherlands. Such additional H-gas supply to the Netherlands must come in the form of liquefied natural gas (LNG), additional Russian gas and continuation of the supply of Norwegian gas, because domestic green gas production is still in its infancy and will remain limited. Aside from that, the required flexibility between stable supply throughout the gas year and increased demand for gas in winter, which is currently still covered by the Groningen field, will be covered by gas from gas storage facilities.

24 The advice issued most recently by GTS dates back to 31 January 2020 and is the Advice on security of supply for required Groningen volumes and capacities, 2020 (in Dutch).

Figure 3.5 Required use of storage facilities for the L-gas market, in percentage terms, shows the use (as a percentage of the estimated available capacity and volume) of all L-gas storage facilities for the L-gas market. The results in the figure are based on closure of the Groningen field as soon as possible and the agreed phase-out of L-gas exports as of 2030 (due to the switch to H-gas). The calculation is based on the formal European Union security of supply regulationand factors in the possible closure of two L-gas salt cavern storage facilities, albeit that final decisions about this have not yet been made.

Figure 3.5 Required use of storage facilities for the L-gas market, in percentage terms.



As a result, the current L-gas send-out capacity will be needed through to the 2026/2027 gas year and the required storage capacity, i.e. the orange line in the graph, can only be scaled down when capacity from the Groningen field is no longer needed. This is because the fall in demand in the market will first go towards reducing the required Groningen capacity, and only then towards lowering the storage capacity. Approximately 55% of the current L-gas capacity (including Norg) will still be needed through to 2030.

The working gas volume needed in a cold year, shown by the blue line, will drop from the 2022/2023 gas year onwards, i.e. from the moment the Groningen field all but ceases to supply volume and market demand for L-gas declines further. If L-gas storage facilities were to remain in operation for the full 100% (blue line at 100%), it would lead to a decline in the utilisation of the GTS QC assets and the required use of H-gas storage facilities, meaning that there is a reciprocal effect between these two variables.

To be able to cover falling demand for L-gas for both the Netherlands and neighbouring countries with an L-gas market (i.e. Germany, Belgium, France) through to 2030, seasonal L-gas storage facilities will continue to be needed. A key prerequisite in this respect is the possibility of sufficient H-gas supply to and storage in the Netherlands.

3.3.2 Role of seasonal and other H-gas storage facilities between 2020 and 2030

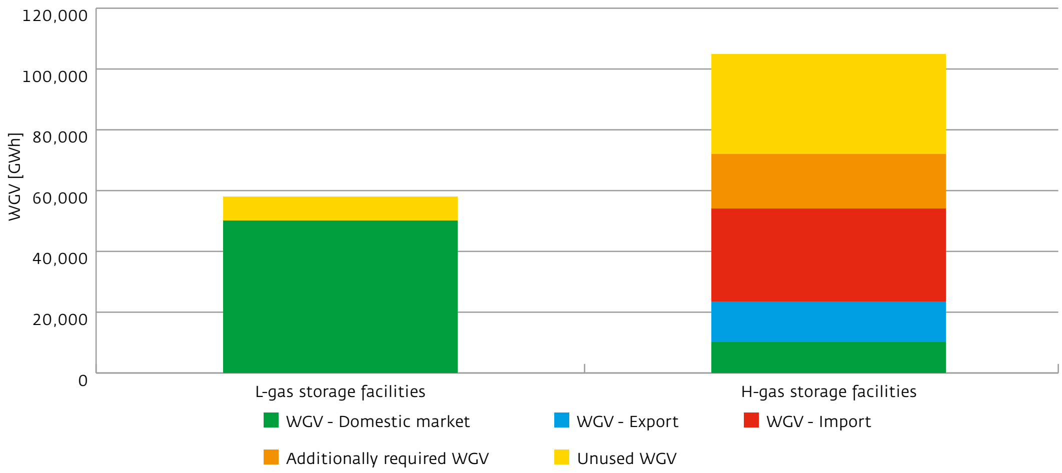
Recently, GTS has run several analyses of the amount of extra H-gas that would have to be imported and the anticipated use of H-gas storage facilities. These analyses show that the current H-gas storage facilities will still be needed for a considerable time to meet expected demand for flexibility. The results of the GTS analysis closely match those of an analysis conducted by Brattle.[25]

Brattle points out that H-gas imports (gas through pipelines or in the form of LNG) have to be stepped up over the coming 10 years to compensate for reduced domestic production, meaning that dependence on imported gas will increase. Existing Dutch infrastructure is adequate to be able to accommodate the required increase in H-gas imports (compared to currently estimated import volumes) over the 2020-2030 period, albeit with very high loads on the network at certain times. The anticipated conversion/enrichment capacity seems to be adequate to be able to handle the required conversion volumes.

H-gas storage facilities offer the Dutch system the level of flexibility needed to meet total volume demand at peak times in both the H-gas and the L-gas market. After all, part of the H-gas storage capacity is needed to provide flexibility for the international L-gas market using the GTS QC assets. Another part is used to provide flexibility in the various H-gas markets: domestic, export, transit and the part of the L-gas market that has been converted into H-gas. And finally, part of the existing storage capacity is needed to store imported gas, which almost always comes in with an hourly profile that is not in sync with hourly market demand. Brattle's analysis factors in all these components.

25 *Brattle Group: The Dutch Gas Market 2020-2030: Volume, Capacity and Flexibility Analysis, 2020.*

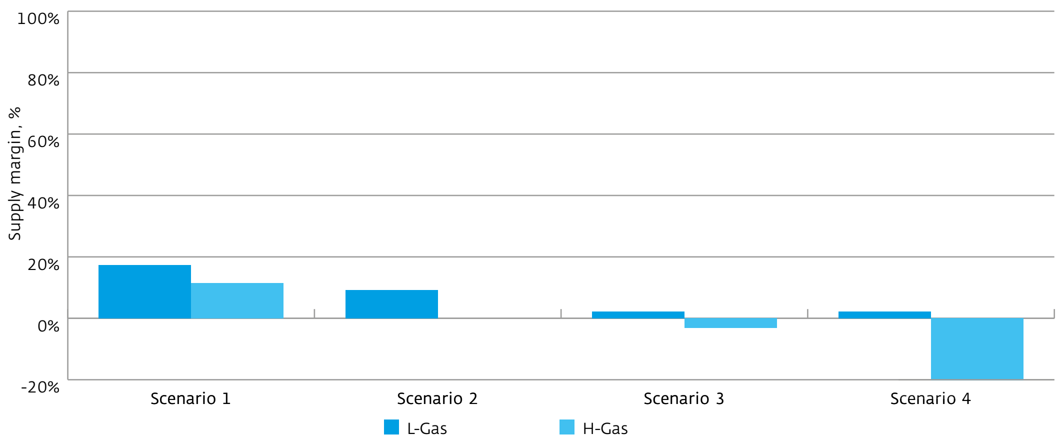
Figure 3.6 Brattle Group, required working gas volume (WGV) storage facilities in 2030 (cold year).



The analysis shows that all the available H-gas storage facilities are needed in a cold year in 2025 to be able to ensure the required level of flexibility. In 2030, this will be considerably lower for a cold year (see Figure 3.6 Brattle Group, required working gas volume (WGV) storage facilities in 2030 (cold year). The need for seasonal H-gas storage facilities depends partly on the alignment of the import profile with hourly (domestic, export and transit) market demand and future market demand for H-gas (and then especially future transit and export), as well as on the assumptions made in this respect.

Besides a volume analysis, capacity analyses were also conducted for 2025 and 2030. These show that the current H-gas storage facilities are still needed in security of supply situations. See scenarios 3 and 4, whereby it is assumed that both Norg and Grijpskerk will have been closed, in Figure 3.7 Brattle Group, capacity analysis in 2030 (peak). In scenario 4, Norwegian gas imports are taken out of the equation to create an "N-1" stress test. In both scenarios, there is a capacity shortage.

Figure 3.7 Brattle Group, capacity analysis in 2030 (peak).

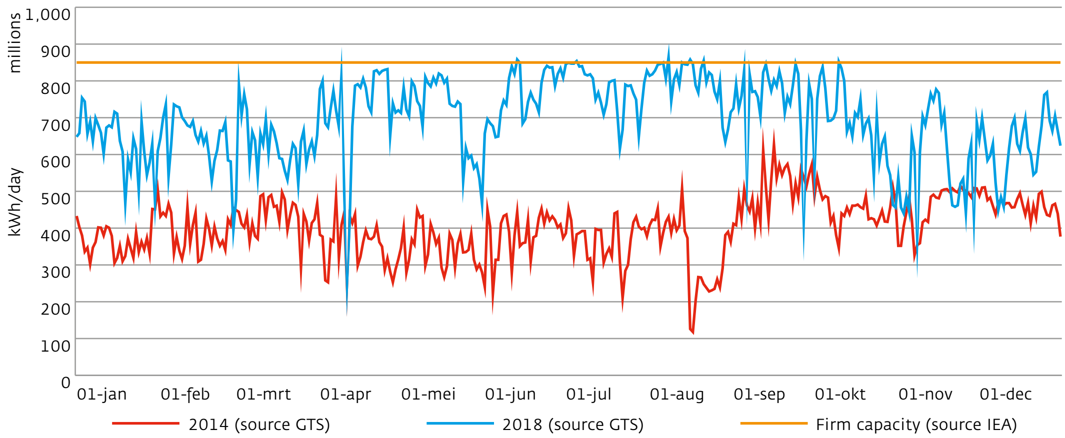


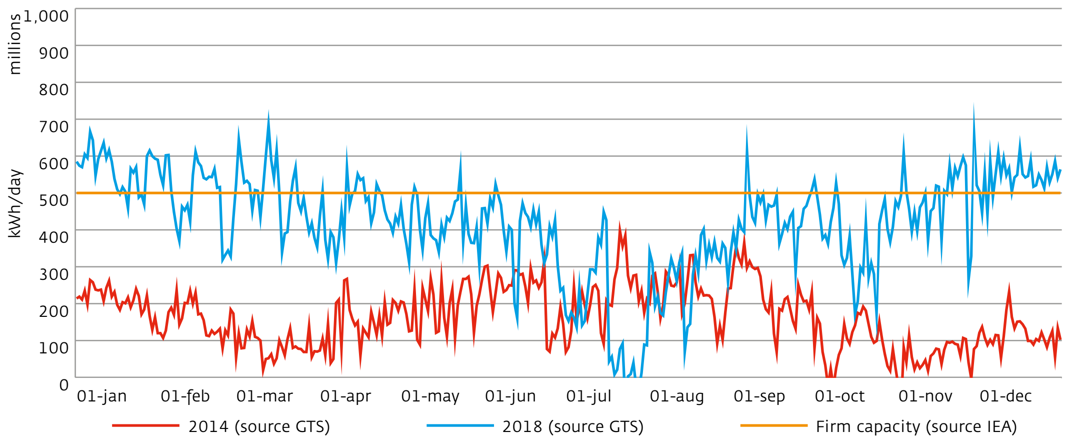
3.3.3 Guaranteeing sufficient H-gas supply to the Netherlands

As outlined above, the Netherlands needs additional H-gas imports. Analyses by GTS show that when the H-gas comes in at the GTS import stations, it can be transported across the Dutch gas grid to end users without any problems.

The question is, however, whether this additional supply can actually reach the GTS import stations. In other words, are the neighbouring grids able to deliver Norwegian and Russian gas to the GTS import stations? Measurements performed by GTS show that use of the Emden and Oude Statenzijl import points has increased significantly over the past years and that volumes at these import points are almost up to and sometimes exceed the maximum available firm capacity. See Figure 3.8 Daily flow at IP Emden and IP Oude Statenzijl: 2014 and 2018.

Figure 3.8 Daily flow at IP Emden and IP Oude Statenzijl: 2014 and 2018.[26]





26 Data GTS, IEA: *Global Gas Review 2019*, 2019 and IEA: *Presentation of Global Gas Review 2019 at GTS market session*, 2020.

In light of the anticipated growing need for imported gas, the question that looms large is whether the existing cross-border capacities are sufficient and additional gas can actually be transported to the border through the German network. IEA's conclusion:
In this context, one option to consider is to increase system flexibility of the gas infrastructure in north-western Europe through a regional approach. This includes the following measures:

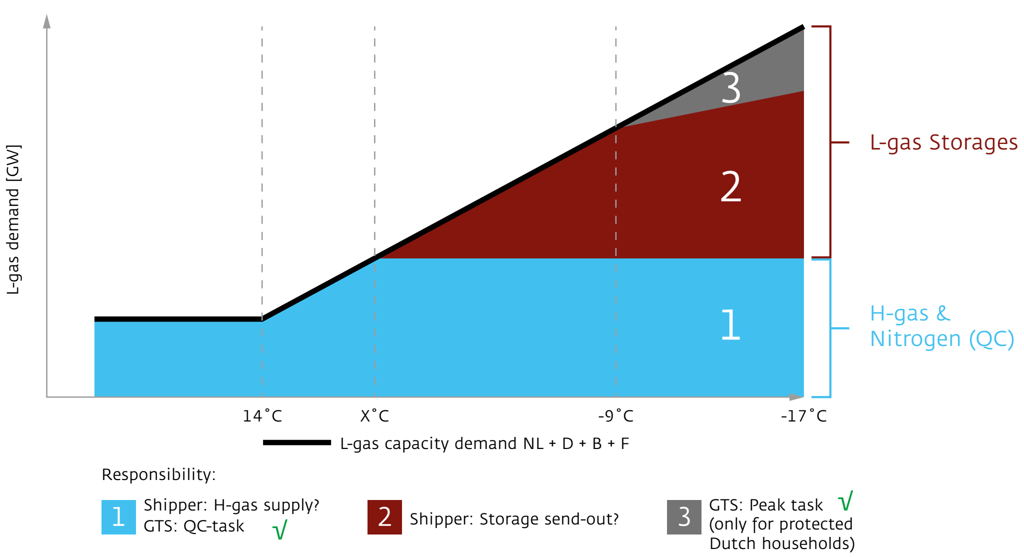
- developing additional import capacity to meet both incremental import requirements (pipeline and LNG) and the need to diversify the supply (through LNG);
- improving the connection to the border between Germany and the Netherlands in particular, either through interconnectors or through reconfiguration of existing exit/ entry capacities.

The first analyses by ENTSOG have shown that there is insufficient supply capacity from Germany to the Netherlands to enable additional H-gas supply. The task force that is monitoring L-gas conversion outside the Netherlands is currently conducting further research on this. GTS is represented on this task force, and ENTSOG and IEA are also taking part in this research. This is addressed in the section entitled "Entwicklung des Kapazitätsbedarfs am Grenzübergangspunkt Bunde/ Oude Statenzijl" of the final version of the "Netzentwicklungsplan Gas 2020–2030, Szenariorahmen".[27] A final decision will have to be made in the foreseeable future.

3.3.4 Guaranteeing the use of L-gas storage facilities after Groningen production phase-out

Figure 3.9 Temperature-driven L-gas market and the need for L-gas storage facilities, illustrates that the L-gas market is largely temperature-driven. Up to 14°C (i.e. the temperature below which people switch on the heating), demand for gas is stable, while there is a linear relation between temperature and demand for gas at temperatures below 14°C. Up to a temperature of X°C, GTS can use its QC assets and H-gas supply from shippers to supply sufficient volumes of gas to the L-gas market.

Figure 3.9 Temperature-driven L-gas market and need for L-gas storage facilities.



27 FNB Gas: Scenario Framework 2020, 2020 (in German).

At a temperature of X°C, the GTS QC assets are utilised at their maximum capacity. This temperature threshold will become increasingly lower in the years following closure of the Groningen field, as demand for L-gas diminishes.

As soon as temperatures drop below X°C, additional demand for L-gas will have to be met using gas from (seasonal) L-gas storage facilities (the pink area). In the current market model (of quality-neutral gas), there is no pressing need for shippers to use those L-gas storage facilities in particular. The question is how to guarantee the use of L-gas storage facilities after production from the Groningen field has been phased out.

3.4 Summary and way forward

The overriding conclusion to draw from all the information that is currently available and the analyses conducted by IEA, Brattle and GTS is that the current decade will bring major challenges. During this decade, natural gas will continue to play a crucial role in the energy mix, while the use of hydrogen and green gas will gradually increase.[28] The GTS network can make an essential contribution to ensuring the affordability of the energy transition.

Closure of the Groningen gas field is evident and a realistic bandwidth within which the Groningen field no longer has to play a backup role is, according to current expectations, from between mid-2025 and mid-2028.

Given that production in the Netherlands will be phased out at a faster rate than the decline in domestic gas demand in the Netherlands, it is evident that additional gas imports will be needed to compensate for cessation of production from the Groningen field. Analyses show that this additional volume is available in Europe. In their questions and comments in response to the draft investment plan submitted for consultation, several market parties indicated that, based on commodity pricing, there will be sufficient H-gas available for the Netherlands, provided there is sufficient transmission capacity. Initial analyses have shown that supply of additional volumes from Germany would require additional capacity in Germany.

GTS approaches matters such as security of supply and a well-functioning gas market from an infrastructure perspective. The analyses show that security of supply will require continued availability of seasonal L-gas storage facilities through to 2030 at least. It is important for GTS, being the advisory authority on security of supply for the L-gas market, to stress this point.

The H-gas market is more international and competitive. GTS has noticed that this market offers more alternatives. The outcomes of the analyses conducted show that H-gas storage facilities are also needed, which will give all storage providers a boost in their business model as soon as the Groningen field is closed down and other countries continue to make headway in switching to H-gas. Needless to say, the outcomes of such scenarios depend on the assumptions made. The outcomes hinge mainly on the assumption of the extent to which the import profile is aligned with hourly market demand (domestic, export, transit).

28 Ministry of Economic Affairs and Climate Policy: Letter to Dutch Parliament on the role of gas in the energy system today and in the future, 2020 (in Dutch).

What is clear, however, is that any closure of a seasonal H-gas storage facility will lead to a tight flexibility in the H-gas market. Aside from that, the fact that the current market mechanism is working so successfully is partly the result of the available infrastructure (storage facilities, LNG and supply through pipelines). GTS considers it key that this market mechanism be maintained, because a well-functioning market means better pricing and prosperity for all consumers in society. GTS therefore believes that, besides security of supply, these other success factors must also be taken into consideration in future decision-making: successful continuation of the TTF supported by supply diversification, storage facilities, a quality-neutral gas market and retention of transit flows.

This has been factored into the analyses, which show that the Netherlands, despite the loss of domestic production, will continue to play an important role in the international gas market, as long as adequate infrastructure continues to be available and supply to the Netherlands is ramped up. Given the enormously dynamic nature of the energy world, GTS proposes to repeat these kinds of analyses on a regular basis. Additionally, GTS will over the coming months, in consultation with relevant stakeholders, be looking into how to guarantee that L-gas storage facilities are used to a sufficient degree by shippers as soon as GTS has deployed all quality conversion assets.

4 Bottlenecks

4.1 Bottleneck analysis findings

The bottleneck analysis was performed separately for GTS' HTL and RTL. The transmission capacity of both networks has been assessed for all three scenarios: CA, AT and FSI. Calculations have been made for the reference years 2020, 2025 and 2030. For the current gas year 2020, a delta analysis using new figures and comparing these to the figures from the regular bottleneck analysis from last year has been carried out.

HTL

For the HTL, the bottleneck analysis is based on the complete set of high transmission load situations that result from the method for capacity testing as described in section 1.3.2. The transmission calculations have shown that, in all three scenarios, all transmission situations can be accommodated.

In all scenarios, available capacities at the entry and exit points are equal to or above the values as currently foreseen for the period considered and investments are not necessary. Even in the FSI scenario, where part of the pipelines of the network will be dedicated to transport of hydrogen, the available capacities are above the presently needed capacities.

RTL

The RTL capacity analysis has not revealed any bottlenecks under any of the three scenarios. However, in the AT scenario in particular, it is expected that a number of green gas boosters must be connected to facilitate green gas feed-in from the regional grids. Locations of some of these booster are known at this moment. The situation and works will be assessed and coordinated on a case-by-case basis.

4.2 Quality assurance system findings

Various bottlenecks have been identified using the quality assurance system. The table below only shows the three bottlenecks that lead to an investment of more than €5 million or investments that fall under the Rijkscoördinatieregeling (National Coordination Scheme (RCR)) for which no FID has yet been made. These are investments of national importance, for which the national government coordinates decision-making (including permits and exemptions).

Table 4.1 Overview of bottlenecks.

Bottleneck identification number	Name	Location	Bottleneck source (quality assurance system or scenario)	Explanation of bottleneck (cause, term and circumstances)
I.013799	Study into conversion of A-605 GZI into collector pipeline	A-605, Emmen-Ommen	Market demand, Alternative Transition scenario	In the areas of Hoogeveen, Emmen and Ommen, a large volume of green gas is fed into the RTL and regional network operators' networks of Rendo, Coteq and Enexis. In this area, on the regional network operators' networks and even the RTL system in this area, future gas consumption will likely be too low to use all the green gas produced. Green gas producers can feed in via the proposed GZI green gas collector pipeline, and regional network operators can feed off green gas. If consumption is lower than production throughout the area, at the Ommen facility the green gas can be processed centrally, compressed and injected into the HTL .
I.020002	Merging Accountable (A) and Telemetry (T) networks	Entire Netherlands	Quality assurance system	GTS currently has two separate systems for collecting metering data (accountable data and telemetry data) from the field. The system software for accountable data will no longer be supported in the long term. This system needs to be replaced so that we can continue to fulfil our statutory duties, ensure effective business operations and prevent security risks.
I.013709	G-H conversion (name confidential)	Confidential	Article 10i of the Dutch Gas Act and industry request	In order to cease gas production from the Groningen field as quickly as possible, the Dutch Ministry of EZK has implemented a change to the Dutch Gas Act, limiting the demand for low-calorific gas from major customers. From 1 October 2022, the purchase of 0.98 TWh per year (100 million m^3 per year) or more per year of low-calorific gas is prohibited. The customers in question need to convert to H-gas and need an H-gas connection.

* *Green gas production, and the resulting capacity shortage is market driven. Therefore regional network operators and GTS can only give an indication of the capacity shortage in both the first year and in 2030.*

Relevant statutory duty	Year in which bottleneck occurs	For quality bottleneck: Risk classification (red, orange, yellow)	For capacity bottleneck: amount of shortfall in first year	For capacity bottleneck: amount of shortfall in 2030	Pressure level
Connection of feeders and grid connection (Art. 10(6b) and Art. 10(3a) of the Dutch Gas Act)	2022		0.1 TWh per year*.	0.78-1.56 TWh per year. This is dependent on the number and size of the production installations.	66 bar (operate pipeline at low pressure 8 bar)
Balancing and informing the programme-responsible party (Art. 10a(1b and 1e) of the Dutch Gas Act)	2021	Red	-	-	-
Conversion duty (Article 10i of the Dutch Gas Act)	2022	Red	-	-	40/66 bar

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Bottleneck identification number	Name	Location	Bottleneck source (quality assurance system or scenario)	Explanation of bottleneck (cause, term and circumstances)
I.013710	G-H conversion (name confidential)	Confidential	Article 10i of the Dutch Gas Act and industry request	In order to cease gas production from the Groningen field as quickly as possible, the Dutch Ministry of EZK has implemented a change to the Dutch Gas Act, limiting the demand for low-calorific gas from major customers. From 1 October 2022, the purchase of 0.98 TWh per year (100 million m^3 per year) or more per year of low-calorific gas is prohibited. The customers in question need to convert to H-gas and need an H-gas connection.
I.013711	G-H conversion (name confidential)	Confidential	Article 10i of the Dutch Gas Act and industry request	In order to cease gas production from the Groningen field as quickly as possible, the Dutch Ministry of EZK has implemented a change to the Dutch Gas Act, limiting the demand for low-calorific gas from major customers. From 1 October 2022, the purchase of 0.98 TWh per year (100 million m^3 per year) or more per year of low-calorific gas is prohibited. The customers in question need to convert to H-gas and need an H-gas connection.
I.013712	G-H conversion (name confidential)	Confidential	Article 10i of the Dutch Gas Act and industry request	In order to cease gas production from the Groningen field as quickly as possible, the Dutch Ministry of EZK has implemented a change to the Dutch Gas Act, limiting the demand for low-calorific gas from major customers. From 1 October 2022, the purchase of 0.98 TWh per year (100 million m^3 per year) or more per year of low-calorific gas is prohibited. The customers in question need to convert to H-gas and need an H-gas connection.
I.013713	G-H conversion (name confidential)	Confidential	Article 10i of the Dutch Gas Act and industry request	In order to cease gas production from the Groningen field as quickly as possible, the Dutch Ministry of EZK has implemented a change to the Dutch Gas Act, limiting the demand for low-calorific gas from major customers. From 1 October 2022, the purchase of 0.98 TWh per year (100 million m^3 per year) or more per year of low-calorific gas is prohibited. The customers in question need to convert to H-gas and need an H-gas connection.

Relevant statutory duty	Year in which bottleneck occurs	For quality bottleneck: Risk classification (red, orange, yellow)	For capacity bottleneck: amount of shortfall in first year	For capacity bottleneck: amount of shortfall in 2030	Pressure level
Conversion duty (Article 10i of the Dutch Gas Act)	2022	Red	-	-	66 bar
Conversion duty (Article 10i of the Dutch Gas Act)	2022	Red	-	-	80 bar
Conversion duty (Article 10i of the Dutch Gas Act)	2022	Red	-	-	80 bar
Conversion duty (Article 10i of the Dutch Gas Act)	2022	Red	-	-	66 bar

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Bottleneck identification number	Name	Location	Bottleneck source (quality assurance system or scenario)	Explanation of bottleneck (cause, term and circumstances)
I.013716	G-H conversion (name confidential)	Confidential	Article 10i of the Dutch Gas Act and industry request	In order to cease gas production from the Groningen field as quickly as possible, the Dutch Ministry of EZK has implemented a change to the Dutch Gas Act, limiting the demand for low-calorific gas from major customers. From 1 October 2022, the purchase of 0.98 TWh per year (100 million m^3 per year) or more per year of low-calorific gas is prohibited. The customers in question need to convert to H-gas and need an H-gas connection.
I.013717	G-H conversion (name confidential)	Confidential	Article 10i of the Dutch Gas Act and industry request	In order to cease gas production from the Groningen field as quickly as possible, the Dutch Ministry of EZK has implemented a change to the Dutch Gas Act, limiting the demand for low-calorific gas from major customers. From 1 October 2022, the purchase of 0.98 TWh per year (100 million m^3 per year) or more per year of low-calorific gas is prohibited. The customers in question need to convert to H-gas and need an H-gas connection.

Relevant statutory duty	Year in which bottleneck occurs	For quality bottleneck: Risk classification (red, orange, yellow)	For capacity bottleneck: amount of shortfall in first year	For capacity bottleneck: amount of shortfall in 2030	Pressure level
Conversion duty (Article 10i of the Dutch Gas Act)	2022	Red	-	-	66 bar
Conversion duty (Article 10i of the Dutch Gas Act)	2022	Red	-	-	66 bar

5 Investments intended for 2020-2030

This section provides insight into the size and structure of the portfolio of planned investments over the next 10 years.

5.1 General

In the information request sent to GTS by the ACM for the purpose of assessing the draft IP 2020, the following categories are used:

- regular investments: replacement and expansion investments amounting to less than €5 million other than connections, relocations and investments for which the necessity has been determined under a different process;
- major investments: replacement and expansion investments amounting to €5 million or more, and RCR investments other than connections, relocations and investments for which the necessity has been determined under a different process;
- connections: investments in existing and new connections initiated by third parties, including green gas connections;
- relocations: changes in the national gas grid at the request of third parties;
- necessity under a different process: investments already determined (or which will be determined) as being necessary under a different process.

Expansion investments

Expansion investment are investments a) leading to an increase in length, capacity or functionality of the gas grid; and b) are based upon external demand.

Replacement investments

The assets in the national gas grid originate from different periods, the oldest assets being approximately 55 years old. Given this fact, regular and major maintenance investments are made to keep the transmission system operating safely, reliably, and in a risk-efficient manner. The maintenance investments mainly consist of corrective measures (performance of assets compared to the standard), replacements in line with policy concerning, for example, obsolete parts (e.g. electronics), regularly scheduled activities (e.g. civil maintenance), and CSR (footprint).

Available data

GTS can provide a full list of projects only for the years 2020 and 2021, which concerns projects that have already been approved or are already in the preparatory phase. Aside from that, data with respect to ongoing investments for 2022 and 2023 is included in the following categories:

- regular expansion investments;
- major investments;
- connections.

For the new investments and investments in relocations and IT in 2022 and the following years, the investment levels as calculated for the Investment Outlook are assumed; this is GTS' estimate of the investment levels over the next 15 years based partly on the past data. This investment level is used to, among other things, determine GTS' financing needs.

Technical investments of more than €5 million and IT investments of more than €4 million for which no FID has yet been made, are accounted for by using a societal cost-benefit analysis.

The reference date for the investment portfolio is 18 May2020, meaning that information provided with respect to things such as an investment's status or financial forecast is valid as at 18 May 2020.

Notes to the tables

The following sections include tables showing cumulative and annual expected costs (forecast). The 'forecast – cumulative' is the anticipated total costs based on the costs already incurred plus the costs expected in 2020 and beyond.

The forecast costs are aggregated at asset category level. In many cases, an investment can be allocated to a single asset category. However, where an investment relates to several categories of assets, this is listed under the designation 'multiple asset categories'.

5.2 Regular and major investments

This paragraph describes various replacement and expansion investments that are key to the size and structure of the investment portfolio in the coming years.

Conversion projects

In 2018, the Minister of Economic Affairs and Climate Policy announced that gas production from the Groningen field would be phased out completely as soon as possible.[29] As a result, GTS has been given the statutory duty to help minimise use of G-gas by means of quality conversion and to facilitate the switch of industries from G- to H-gas.[30] The projects being executed in this context are listed below. Any future measures for the closure of the Groningen field may lead to amendments to the IP.

1. Zuidbroek nitrogen plant
   This project comprises:
   - a nitrogen production plant with maximum nitrogen production capacity of 180,000 m^3/h;
   - injection compression to fill the existing Heiligerlee cavern;
   - reducing station and blending station for the conversion of H-gas to G-gas; and
   - various connections and civil engineering facilities.

   The preparations for the construction of the nitrogen plant are on track, and it is expected that the plant can start operations in the first quarter of 2022. This plant will be able to produce between 68 and 98 TWh per year of pseudo-Groningen gas by blending imported high-calorific gas with the nitrogen produced. The required permits have been obtained, and the engineering is almost complete. Furthermore, contracts have been awarded for the construction of both the nitrogen plant and the blending station, and the construction site has been set up, meaning construction is started early 2020.

29 *Ministry of Economic Affairs and Climate Policy: Letter to Parliament on the termination of gas production in Groningen, 2018 (in Dutch).*
30 *Converting H-gas to G-gas by injecting nitrogen.*

2. Extra nitrogen and modifications at Oudelandertocht and Wieringermeer
   This project comprises:
   - contracting 80,000 m³/h of additional nitrogen capacity from an external producer;
   - overhauling blending station 1 and replacing blending station 2;
   - relocating G-gas reducing stations and enlarging control valves;
   - dismantling reducing stations R-010 and Y-010 at Oudelandertocht;
   - modifying and adding filter separators; and
   - various connections and civil engineering facilities.

   This project was successfully implemented at the end of 2019 and will be rounded off in 2020. Thanks to the 80,000 m³/h of extra nitrogen at the Wieringermeer blending station, Groningen production can be reduced by approximately 24 TWh per year.

3. G to H conversion at large industrial sites
   For the further reduction of Groningen production the Ministry of EZK has introduced a ban on the purchase of more than 0.98 TWh per year (100 million m³ per year) of low-calorific gas per industrial site after October 2022. The aim of this is to limit gas production from the Groningen field, with the intended effect of reducing earthquakes and increasing safety for Groningen residents. Further information is provided in the societal cost-benefit analysis appendix IV.

4. GTG Nord connection to OSZ H-gas
   The reason for this plan is the conversion of the GTG network in Germany from G-gas to H-gas from 2020 in accordance with the German Netzentwicklungsplan (grid development plan). In Q1 of 2020, a new connection between the new GTG pipelines and the GTS H-gas system at Oude Statenzijl was completed for this grid connection.

GNIP

The large-scale preventive replacement programme GNIP was launched partway through 2011. The Quality and Capacity Document 2017 states that the condition of the assets being replaced will be assessed while the programme is being carried out. These investments have been proven to be useful and necessary but have also shown that the condition of the grid may be better than anticipated. As a result, the risk for the remaining part of the system could be downgraded significantly and the maintenance strategy for that group could be switched to a condition-based strategy.[31] Over the 2020-2021 period, approx. 50 valve set-ups and a limited number of gas receiving stations and metering and regulating stations will be replaced every year

Peak shaver

Since 2017, GTS has been the owner of the peak shaving facility at Maasvlakte Rotterdam. This 'peak shaver' has an important function in ensuring the security of supply and transmission security in the G-gas market. As a result of the changing Dutch gas market (decrease in demand for G-gas and growing need for conversion capacity), GTS is, based on its statutory duty to minimise production from the Groningen field and its QC duty, changing how the peak shaver site will be used in the period leading up to 2023. After a short transition period spanning several years, we will convert the peak shaver site into a

31 The QCD 2017 still assumed the replacement of approx. 150 valve stations per year.

blending station that can convert high-calorific gas from the grid to Groningen quality (low-calorific) gas. The annual costs involved in the operation and maintenance of the plant will consequently drop significantly from 2023. As a result, the facility can be used as a backup to support the other conversion resources GTS manages under its regulated QC duty. By around 2023, the peak shaver site will have been completely repurposed as a QC site. For this conversion project, combined with keeping the peak shaver available in the interim, an investment of approximately €2.5 million per year (regular + major) will be taken into account in 2020-2021.

Acquisition of ZEBRA network

Enexis, Enduris and GTS have investigated whether the Zebra gas pipeline and the extra high-pressure networks in the south-western part of the Netherlands, can become part of the GTS national grid and the TTF market area. In 2019, a purchase agreement was concluded between the parties for the transfer of the assets to GTS; the acquisition will be completed in 2020. In 2020, technical modifications will be made to integrate the Zebra network (main pipeline and several branch pipelines) and the associated extra high-pressure networks into the GTS grid. In 2021 and beyond, further, yet-to-be-determined modifications are expected with a view to ensuring that the system can be maintained and operated. Where these concern investments, relevant measures are included under regular investments for 2021 and beyond.

5.2.1 Regular investments for 2020-2021

The regular investments concern all investments in the national grid amounting to less than €5 million per investment. This includes the completion of specific investments in green gas projects, namely green gas boosters.

Table 5.1 Regular investments per asset category for 2020–2021.

Regular (mln. €)	Forecast cumulative	Forecast 2020	Forecast 2021
Valve stations	122.2	27.4	37.2
Compressor stations	33.4	8.1	5.0
Export stations	2.5	0.6	0.1
Delivery stations	28.0	8.4	6.3
Pipelines	21.4	6.3	3.5
LNG	20.5	1.6	0.2
M&R	19.4	0.4	4.1
Multiple asset categories	5.3	1.8	1.4
Multiple asset categories boosters	6.7	0.9	2.2
Blending stations	1.2	0.2	0.4
Other	11.1	4.6	1.8
Pressure regulating stations	1.0	0.1	0.3
Nitrogen plants	6.9	1.4	0.9
Total	279.7	61.7	63.5

Appendix III details the underlying regular investments for the period 2020-2021. A complete list of these is provided in the confidential Appendix VIII.

5.2.2 Major investments for 2020-2021

Major investments comprise all investments in the national gas grid amounting to €5 million or more per investment, and RCR investments for the maintenance and development of the national gas grid.

Table 5.2 Major investments per asset category for 2020-2021.

Major (mln. €)	Forecast cumulative	Forecast 2020	Forecast 2021
Valve stations	31.7	0.6	0.0
Compressor stations	31.5	1.7	0.2
Pipelines	14.7	0.4	0.4
LNG	5.2	0.8	0.2
Multiple asset categories	171.5	19.3	10.2
Other	15.0	0.0	0.0
Nitrogen plants	484.9	192.2	91.6
Total	754.6	215.1	102.7

Appendix III details the underlying major investments for the period 2020-2021. A complete list of these is provided in the confidential Appendix VIII.

5.2.3 Regular and major long-term investments

The Investment Outlook shows an annual investment level of approximately €60 to €66 million for the regular and major replacement investments. Given the declining demand in the G-gas market, GTS has investigated the consequences for the utilisation of the transmission grid capacity and it has emerged that the use of G-gas compression stations in particular can be reduced. These will completely or partially shut down (possibly temporarily). This will reduce the level of maintenance investments starting partway through 2025 and onwards.

GTS also takes into account regular and major investments to enable the injection of green gas into the grid. The draft IP includes a number of definite investments for boosters and the study into the GZI collector pipeline. For the longer term, an estimate has been made of the annual investment level for these specific green gas investments. For the time being, gradual growth moving up to €9 million per year from 2026 has been assumed. In the draft IP 2022, this path and level will be recalibrated.

Table 5.3 Regular and major long-term investments per project.

Regular and major long term investments per project											
(mln. €)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Investments (regular + major)	64	66	66	65	65	60	60	60	60	60	60
Zuidbroek N2 plant	188	87	12								
Extra N2 adjustment OLT + W'meer	2.7										
H-gas connection OSZ GTG	0.7										
Conversion G to H-gas	5	10	48	77	2						
Zebra integration and acquisition	14.8	0.4	1.6								
Green gas boosters and collector pipelines	1	3	5	5	7	7	9	9	9	9	9

The expected replacement investments (regular + major) totalling approximately €65 million per year for the 2020-2024 period break down as follows by asset category.

Table 5.4. replacement investments (regular + major) per asset category.

Replacement investments per asset category					
Forecast (mln. €)	2020	2021	2022	2023	2024
Total	64	66	66	65	65
Valve stations	27.4	37.2	32	32	32
Compressor stations	9.9	5.2	7	6.5	6.5
Export stations	0.6	0.1	0.5	0.5	0.5
Delivery stations	7.9	6.3	7	7	7
Pipelines	6.7	3.4	5	5	5
LNG	2.3	0.4	2	1.5	1.5
M&R	0.4	4.1	1.6	1.6	1.6
Multiple assets categories	1.8	1.4	1.6	1.6	1.6
Blending stations	0.2	0.4	0.5	0.5	0.5
Other	4.6	1.8	3.5	3.5	3.5
Pressure regulating stations	0.1	0.3	0.3	0.3	0.3
Nitrogen plants	2.7	5.3	5	5	5

5.3 Connections

This concerns investments in existing and new connections, including green gas connections.

Table 5.5 Investments in connections per asset category for 2020-2021.

Connections (mln. €)	Forecast cumulative	Forecast 2020	Forecast 2021
Valve stations	1.7	0.3	0.5
Delivery stations	0.5	0.4	0.0
Pipelines	0.1	0.0	0.0
Multiple asset categories	16.7	0.4	4.1
Total	19.0	1.2	4.6

Appendix III details the underlying investments in connections for the period 2020-2021. A complete list of these is provided in the confidential Appendix VIII.

In the long term, an annual average investment level of €6 million is expected for the modification or construction of new connections.

Table 5.6 Investments in connections over the long term.

Investments in connections over the long term											
(mln. €)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Connections	1	5	10	6	6	6	6	6	6	6	6

As a result of the negotiations held in 2018 relating to NC TAR, GTS has investigated whether it is possible to take over the connection pipeline from eight connected parties. The reason is that, as a result of a change in the law, since January 2020 GTS has had to realise the full connection again (including the connection pipeline). The eight current connected parties would therefore be the only ones for which GTS manages only the connection point and not the connection pipeline. Around the summer of 2020, GTS expects to have checked whether it is feasible to take over the connection pipelines, and what this would cost. The preliminary view is that this would be feasible in four cases. GTS will then discuss with the ACM the next steps and how to proceed in line with the regulation.

At the request of Liander, GTS is examining in a separate process whether it is possible to take over three high-pressure connection pipelines. The reason for this request is that Liander must take extra measures because, in their system, these high-pressure pipelines are exceptions. It is expected that the feasibility of the process of taking over these pipelines will be determined also around summertime 2020.

Because these initiatives are still at an early stage, the costs of connecting these pipelines have not been included in the tables above. See the confidential appendix for further details.

5.4 Relocations

Developments relating to spatial planning by third parties (e.g. municipalities, Rijkswaterstaat) can result in GTS assets having to be moved to a different location. This mainly concerns pipelines and, once every two to three years on average, a gas delivery station. The party requesting the relocation pays GTS compensation of, on average, two-thirds of the costs; the actual amount depends on the legal position. The amounts shown in Table 5.6. Investments in relocations for 2020-2021 and the confidential Appendix VIII do not include contributions from third parties, where applicable.

In the QCD 2017 two major relocation projects were reported: the Rijnland Route and the A15. These projects have now been completed and are in the aftercare phase.

Compared to previous years, the 2020-2021 relocation portfolio is modest, with €5.8 million in 2020 and €10.0 million in 2021.[32] The level of investment depends in part on economic developments and the current discussions around nitrogen deposition and PFAS.

Table 5.7 Investments in relocations per asset category for 2020-2021..

Relocations (mln. €)	Forecast cumulative	Forecast 2020	Forecast 2021
Delivery stations	4.7	0.1	1.9
Pipelines	75.7	5.8	8.1
Total	80.3	5.8	10.0

Appendix III details the underlying major investments in relocation projects. A complete list of these is provided in the confidential Appendix VIII.

In the long term, an annual investment level of €15 million is expected for the relocation of assets.[33]

Table 5.8 Relocations over the long term.

Relocations over the long term (mln. €)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Relocations	6	10	15	15	15	15	15	15	15	15	15

32 *Excl. third-party contributions.*
33 *Excl. third-party contributions.*

5.5 Grid-related IT investments

IT investments are divided into three types: auction-to-publication systems, energy transmission systems, and other systems.

Table 5.9 IT investments for 2020-2021.

IT-investments (mln. €)	Forecast cumulative	Forecast 2020	Forecast 2021
Auction-to-publication systems	5.5	3.4	2.1
Energy transport systems	7	4	3
Other systems	9.5	3.5	6
Total	22	10.9	11.1

A provisional item of €6 million has been included under 2021 for 'other systems'. Part of this provisional item will be allocated in 2021 to the categories 'auction-to-publication systems' and 'energy transmission systems'. Inclusion of this provisional item was prompted by the fact that the moment when support for software (e.g. for cybersecurity) will expire can only be predicted to a limited extent. Additionally, new solutions become available at a rapid tempo and GTS wants to make use of the most efficient (often the most recent) solutions.

Appendix III details the underlying IT investments. A complete list of these is provided in the confidential Appendix VIII.

In the long term, an annual investment level of €11 million is expected for grid-related IT investments.

Table 5.10 IT investments over the long term.

IT investments over the long term (mln. €)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
IT	11	11	11	11	11	11	11	11	11	11	11

5.6 'Necessity under different process' investments

These are investments already determined (or which will be determined) as being necessary in relation to a different process – required under national or European legislation, for example. This concerns connecting small fields and facilitating cross-border transmission (incremental capacity).

Small fields

In accordance with Article 54a of the Dutch Gas Act, GTS must take in gas from small fields. Production from small fields (onshore) has been declining for years and there is little likelihood that new feed-in points for small fields will be arranged even in the short and medium term. Any investments are not expected to extend beyond modifying existing connections.

Incremental capacity

In line with EU Regulation 2017/459 (Network Code on Capacity Allocation Mechanisms; NC CAM), the incremental capacity process has been introduced. This is an EU-wide harmonised process to identify the market demand for incremental capacity by TSOs.

In the 2019-2021 market demand for incremental capacity process, GTS received one non-binding request for 10.7GW for the period 2025-2040 on the border between TTF and Trading Hub Europe. GTS is currently taking stock of the necessary measures and costs involved in realising this capacity expansion on the Dutch side of the border. The measures identified on both sides will then be discussed in joint consultation by the TSOs in the market. This consultation is scheduled for August 2020. After the consultation, the final project proposals are submitted to the relevant regulatory authorities, including the ACM, and the requested capacity is offered at the auction. The outcome of this auction, in combination with an economic test, ultimately determines whether the proposed projects will be implemented.

In short, there are no investments foreseen in the category Different Process because no investments are expected in small fields and the technical measures for the incremental capacity process 2019-2021 are not yet established.

5.7 Total investments (2020-2030)

Up to and including 2023, GTS' investment portfolio will be largely determined by measures to accelerate the phase-out of gas production from the Groningen field, i.e. the construction of the Zuidbroek nitrogen plant, the contracting and production of additional nitrogen, and facilitate the switch of industrial companies from G-gas to H-gas. Another noteworthy investment is the acquisition and integration of the Zebra network. The investments in this period amount to between €170 and €295 million per year. Total investment in 2020 will amount to €295 million, whereby €16.4 million of this figure is yet to be allocated through a final investment decision (FID). Total investment in 2021 will reach €192 million, of which €88.7 million is yet to be allocated through an FID.

From 2024 onwards, as the Groningen measures are set to be completed, the total annual investment level is expected to fall sharply to approximately €100 million, which is the normal level needed to maintain the transmission network, through to 2030.From 2024, no additional investments, other than for measures aimed to bring about the energy transition (green gas), are planned. Investments required for the energy transition cannot be determined with any accuracy at this time, but are expected to result in additional costs in the long term.

Table 5.11 Total investments per project over the long term.

Total investments per project over the long term											
(mln. €)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Regular + Major											
Investments (regular + major)	64	66	66	65	65	60	60	60	60	60	60
Zuidbroek N2 plant	188	87	12								
Extra N2 adjustment OLT + W'meer	2.7										
H-gas connection OSZ GTG	0.7										
Conversion G to H-gas	5	10	48	77	2						
Zebra integration and acquisition	14.8	0.4	1.6								
Green gas boosters and collector pipelines	1	3	5	5	7	7	9	9	9	9	9
Connections	1	5	10	6	6	6	6	6	6	6	6
Relocations	6	10	15	15	15	15	15	15	15	15	15
IT	11	11	11	11	11	11	11	11	11	11	11
Total	295	192	169	179	106	99	101	101	101	101	101

With respect to the investments in 2020 and 2021, the status of the pre-FID on the reference date of 18 May 2020 is as follows:

Table 5.12 Investments in 2020 and 2021 pre-FID at reference date of 18 May 2020.

Category (mln. €)	2020 Total	Of which pre-FID	2021 Total	Of which pre-FID
Regular + Major Investments (regular + major) Zuidbroek N2 plant Extra N2 adjustment OLT + W'meer H-gas connection OSZ GTG Conversion G to H-gas Zebra integration and acquisition Green gas boosters and collector pipelines	277	14.1	166	61.9
Connections	1	0.7	5	3.8
Relocations	6	1.6	10	9
IT	11	0	11	11
Total	295	16.4	192	88.7

Appendices

Appendix I: References

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CE Delft commissioned by Netbeheer Nederland: Potentieel van lokale biomassa en invoedlocaties van groen gas: een verkenning voor 2030 (Potential of local biomass and feed-in locations for green gas: an exploration for 2030), 2020.

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Ministry of Economic Affairs and Climate Policy: Kamerbrief over kabinetsvisie waterstof (Letter to Parliament on government vision on hydrogen), 2020.

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Bulletin of Acts and Decrees of the Kingdom of the Netherlands, 2018, 109: Wet van 9 april 2018 tot wijziging van de Elektriciteitswet 1998 en van de Gaswet (voortgang energietransitie) Act of 9 April 2018 on the amendment of the 1998 Dutch Electricity Act and the Dutch Gas Act (progress of the energy transition) 2018.

Appendix II: Terms and abbreviations

ACM	Netherlands Authority for Consumers and Markets
ALARA	As low as reasonably achievable
AT	Alternative Transition (scenario)
bcm	Billion cubic metres
BNetzA	BundesNetzAgentur (German regulator)
CA	Dutch Climate Agreement (scenario
CAPEX	Capital Expenditure
CBG	Coal before gas (TYNDP 2018) (scenario)
CCS	Carbon Capture and Storage
C&EO	Climate and Energy Outlook
CID	Commercial Investment Decision
CSR	Corporate Social Responsibility
CV	Centrale Verwarming (the Dutch term for central heating)
DG	Distributed Generation (TYNDP 2018)
DNV-GL	Det Norske Veritas- Germanischer Loyd, consultancy firm
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSOG	European Network of Transmission System Operators for Gas
ETM	Energy transition model
EUCO	European Commission (TYNDP 2018) (scenario)
EZK	Dutch Ministry of Economic Affairs and Climate Policy
FID	Final investment decision
Fluxys	Belgian TSO
FSI	Foundation for System Integration (scenario)
GASPOOL	Market area in Germany
GBC	Gas Before Coal (TYNDP 2018) (scenario)
GNIP	Gasunie Network Improvement Plan
GTG-Nord	German TSO
GTS	Gasunie Transport Services
GW	Gigawatt (capacity)
H-gas	High-calorific gas
HP	Heat pump
HTL	High-pressure gas grid
IP	Investment plan
L-gas	Low-calorific gas
LNG	Liquid natural gas
MCA	Multi-Case Approach, GTS simulation software for network planning based on the pressure drop calculation for the gas grid. MCA is highly suited to calculations relating to adding nitrogen to natural gas.
M&R	Measuring and control station

NCG	Net Connect Germany, market area in Germany
Netbeheer Nederland	Industry organisation for all network and grid operators
OPEX	Operational Expenditure
P50	Indication of probability. See footnote 9 for a more detailed explanation.
P90	Indication of probability. See footnote 9 for a more detailed explanation.
P2H	Power-to-Heat
PAS	Programma Aanpak Stikstof (Dutch government's Integrated Approach to Nitrogen)
PBL	PBL Netherlands Environmental Assessment Agency
PV	Photovoltaics
QC	Quality conversion
RCR	Rijkscoördinatieregeling (National Coordination Scheme)
RES	Regional Energy Strategies
RFO	Ready for Operation
RTL	Regional distribution network
SCBA	Societal cost-benefit analysis
SDE	Dutch subsidy scheme designed to promote the production of sustainable energy
SMR	Steam Methane Reforming
ST	Sustainable transition (TYNDP 2018) (scenario)
TenneT	National grid operator for electricity
TES	Thermal Energy Storage
TSO	Transmission System Operator
TTF	Title Transfer Facility
TWh	Terawatt hour (volume)
TYNDP	Ten Year Network Development Plan
UBI	Expansion investment
UGS	Underground Storage facility
VVI	Replacement investment
WoZ	Wind op Zee (offshore wind energy)

Appendix III: Overview of investments

III.1 Investment classification and available information

For the assessment of GTS' draft IP 2020, ACM has drawn up the document Kader Informatiebehoefte Investeringsplannen 2020 [2020 Information Requirement Framework for Investment Plans]. In this document, investments are grouped under the following classifications:

Table III.1. Investment classification.

Investment classification	Period
Regular maintenance investment	2020-2024
Major investments	2020-2030
Connections	2020-2024
Relocations	2020-2024
Grid-related investments	2020-2030
Investments already determined as being necessary under a different process	2020-2030

GTS notes that a complete overview can only be provided of the projects already approved or in preparation for the years 2020 and 2021. For 2022 and later, the investment levels assumed are those used for the '15-year investment outlook'. This is because the portfolio for those years is largely determined by corrective measures and/or external factors, the necessity of which is determined only after the draft IP has been presented. Where possible, details are given for the years 2022 and beyond.[34]

Table III.2. Available information.

Years	2020 and 2021	2022-2030
Basis of information	Portfolio overview	15-year investment outlook

Due to the way in which GTS records project information in its data systems, the information available for the period 2020-2021 does not always line up perfectly with ACM's information requirements. Often only limited information is available in the early stages of a project, with the amount of information increasing as a project progresses. GTS therefore feels it necessary to specify the information for certain projects in a more general or, in some cases, more detailed way.

34 The 15-year investment outlook is an estimate of the investment level over the next 15 years for GTS' financing needs, among other things.

III.1.1 Notes to the tables

In the table below, GTS explains both the choices made when collecting the data and the terminology.

Table III.3. Notes to the investment tables.

Information		Notes
Status	OPEN	Project under study
	VBAU / VBMD	Project under preparation (incl. preparation budget)
	FREE	Project approved in full; FID made
	TAFS / BLOK	Project completed; technically complete
sset category		Certain projects include more than one asset category. The dominant category is given as a label, or the description 'multiple asset categories' is stated.
Pressure level (40, 66 or 80 bar)		Certain projects include more than one pressure level. Either the dominant pressure level or multiple pressure levels are stated.
Classification expansion investment or replacement investment		Expansion investment is abbreviated to UBI, replacement investment is abbreviated to VVI.
Explanation of why investment addresses the bottleneck		Obsolete: the equipment in question is no longer in production / no longer maintainable and out of date. Integrity bottlenecks: these are bottlenecks in which the performance of equipment no longer meets the standard and the investment is efficient in terms of reducing the risk or, in accordance with legislation or regulation, is required to resolve the bottleneck.
Numbers of individual assets or kilometres per year		Certain projects include several individual assets. The actual number is specified where possible; otherwise the designation 'multiple' or 'km TBD' is used.
Relocation investments: classification according to partial or complete replacement		Certain projects include partial and full replacement of assets. This is indicated where applicable.
Major/other process: year the investment was/will be brought into operation.		The technically complete (TC) date has been used for this or the AM3 date. AM3 is the agreed milestone (date) when the measure will be put into technical use.
Investment amounts per year (2020/2021)		The amounts are approved budgets (or approved budgets for preparations) and forecast amounts, excluding risk premiums; see explanation of budget methodology. Exception: I.012900 - Zuidbroek nitrogen plant expansion; approved budget is the P90 budget.
Investment amounts per year (2022/2030)		The amounts are forecast amounts based on '15-year investment outlook'.

III.2 Regular investments

The data for 2022 and 2023 should be regarded as an indication which can still be altered. No data is available for 2024 unfortunately.

Project	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
Total							
I.013008	AFSL	Quality	Valve station	66	Replacement	1	
I.013030	AFSL	Quality	Valve station	66	Replacement	1	
I.013250	AFSL	Quality	CS	66	Replacement	1	
I.013902	AFSL	Quality	Other	nvt	Replacement	N/A	
I.012569	BLOK	Capacity	Nitrogen plant	66	Expansion	1	-
I.012748	BLOK	Quality	CS	66	Replacement	1	
I.013814	BLOK	Quality	Pipelines	40	Replacement	multiple	
I.013305	OPEN	Quality	CS	80	Replacement	1	
I.013761	OPEN	Quality	CS	66	Replacement	1	
I.013788	OPEN	Quality	LNG	66	Replacement	1	
I.013808	OPEN	Quality	CS	66/80	Replacement	multiple	
I.013809	OPEN	Quality	CS	66	Replacement	1	
I.013827	OPEN	Quality	Nitrogen plant	66	Replacement	1	
I.013828	OPEN	Quality	Multiple asset categories	nvt	Replacement	N/A	
I.013829	OPEN	Quality	Multiple asset categories	nvt	Replacement	N/A	
I.013839	OPEN	Quality	Delivery Station	40	Replacement	1	
I.013842	OPEN	Quality	Delivery Station	40	Replacement	1	
I.013846	OPEN	Quality	Delivery Station	40	Replacement	1	
I.013848	OPEN	Quality	Delivery Station	40	Replacement	1	
I.013849	OPEN	Quality	Valve station	66	Replacement	1	
I.013850	OPEN	Quality	Delivery Station	66	Replacement	1	
I.013851	OPEN	Quality	M&R	66	Replacement	1	
I.013858	OPEN	Quality	Delivery Station	40	Replacement	1	
I.013880	OPEN	Quality	M&R	66	Replacement	1	
I.013882	OPEN	Quality	CS	66	Replacement	multiple	
I.013886	OPEN	Quality	CS	66/80	Replacement	1	
I.013887	OPEN	Quality	CS	66	Replacement	1	
I.013900	OPEN	Quality	Reducing station	66/80	Replacement	1	
I.013901	OPEN	Quality	CS	66	Replacement	1	
I.013904	OPEN	Quality	Pipelines	40	Replacement	multiple	
I.013905	OPEN	Quality	Blending station	66	Replacement	1	
I.013922	OPEN	Quality	Reducing station	66	Replacement	1	
I.013946	OPEN	Quality	Pipelines	80	Replacement	multiple	
I.013947	OPEN	Quality	Valve station	40	Replacement	1	
I.013950	OPEN	Quality	Delivery Station	80	Replacement	multiple	
I.013953	OPEN	Quality	Delivery Station	40	Replacement	1	
I.013972	OPEN	Quality	CS	66	Replacement	1	
I.013980	OPEN	Quality	Delivery Station	40	Replacement	1	
I.013981	OPEN	Quality	Delivery Station	40	Replacement	1	
I.013984	OPEN	Quality	Delivery Station	40	Replacement	1	

Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022 (Expansion projects)	Forecast 2023 (Expansion projects)
	223,795,446	279,732,704	61,717,430	63,485,306	32,000	-
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III.2 Regular investments continued previous page

Project	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
I.013986	OPEN	Quality	Blending station	66	Replacement	1	
I.014348	OPEN	Quality	Multiple asset categories	nvt	Replacement	N/A	
I.014349	OPEN	Quality	Multiple asset categories	nvt	Replacement	N/A	
I.0xxxxx	OPEN	Quality	Valve station	40	Replacement	N/A	
I.012149	TAFS	Quality	Valve station	40	Replacement	multiple	
I.012164	TAFS	Quality	Valve station	40	Replacement	multiple	0.51
I.012292	TAFS	Quality	Delivery Station	40	Replacement	1	
I.012465	TAFS	Quality	Delivery Station	40	Replacement	1	
I.012475	TAFS	Quality	Other	nvt	Replacement	1	
I.012485	TAFS	Capacity	Multiple asset categories for booster	40	Expansion	1	
I.012522	TAFS	Quality	Valve station	40	Replacement	multiple	0.5
I.012576	TAFS	Quality	Valve station	40	Replacement	multiple	
I.012583	TAFS	Quality	Valve station	40	Replacement	multiple	
I.012586	TAFS	Quality	Valve station	40	Replacement	multiple	0.315
I.012587	TAFS	Quality	Valve station	40	Replacement	multiple	0.05
I.012588	TAFS	Quality	Valve station	40	Replacement	multiple	
I.012616	TAFS	Quality	Valve station	40	Replacement	1	
I.012686	TAFS	Quality	M&R	66	Replacement	1	
I.012687	TAFS	Quality	M&R	66	Replacement	1	
I.012689	TAFS	Quality	Valve station	40	Replacement	1	
I.012697	TAFS	Quality	Valve station	40	Replacement	1	
I.012757	TAFS	Quality	Pipelines	40	Replacement	1	0.557
I.012761	TAFS	Quality	Pipelines	40	Replacement	multiple	0.968
I.012763	TAFS	Quality	Pipelines	40	Replacement	multiple	5.7
I.012771	TAFS	Quality	CS	66	Replacement	1	
I.012795	TAFS	Quality	Delivery Station	40	Replacement	1	
I.012824	TAFS	Quality	Valve station	40	Replacement	1	
I.012834	TAFS	Quality	Valve station	40	Replacement	1	
I.012902	TAFS	Quality	Delivery Station	40/66	Replacement	multiple	
I.012907	TAFS	Quality	M&R	66	Replacement	1	
I.012914	TAFS	Quality	Other	nvt	Replacement	1	
I.012930	TAFS	Quality	M&R	66	Replacement	multiple	
I.012953	TAFS	Quality	Valve station	40	Replacement	multiple	0.6
I.012955	TAFS	Quality	Valve station	40	Replacement	multiple	
I.012959	TAFS	Quality	Valve station	40	Replacement	multiple	0.09
I.012961	TAFS	Quality	Valve station	40	Replacement	multiple	
I.012964	TAFS	Quality	Valve station	40	Replacement	multiple	0.45
I.012981	TAFS	Quality	CS	66	Replacement	multiple	
I.013033	TAFS	Quality	Valve station	66	Replacement	1	
I.013117	TAFS	Quality	Pipelines	40	Replacement	1	
I.013126	TAFS	Quality	Valve station	40	Replacement	1	
I.013159	TAFS	Quality	LNG	66	Replacement	1	
I.013171	TAFS	Quality	LNG	66	Replacement	1	
I.013242	TAFS	Quality	Reducing station	66	Replacement	1	

Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022 (Expansion projects)	Forecast 2023 (Expansion projects)
Partial						
N/A						
N/A						
N/A						
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III.2 Regular investments continued previous page

Project	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
I.013244	TAFS	Quality	CS	66	Replacement	2	
I.013245	TAFS	Quality	CS	66	Replacement	2	
I.013291	TAFS	Quality	Reducing station	66	Replacement	1	
I.013363	TAFS	Quality	LNG	66	Replacement	1	
I.013365	TAFS	Quality	Blending station	80	Replacement	1	
I.013380	TAFS	Quality	Pipelines	40	Replacement		0.75
I.013389	TAFS	Capacity	Valve station	80	Expansion	1	-
I.013464	TAFS	Quality	Valve station	40	Replacement	1	
I.013559	TAFS	Quality	Delivery Station	66	Replacement	1	
I.013589	TAFS	Quality	Valve station	66	Replacement	1	
I.013623	TAFS	Quality	Reducing station	66/80	Replacement	1	
I.013639	TAFS	Quality	Delivery Station	40	Replacement	1	
I.013689	TAFS	Quality	LNG	66	Replacement	1	
I.013702	TAFS	Quality	Pipelines	40	Replacement	1	
I.013744	TAFS	Quality	Delivery Station	40	Replacement	1	
I.013865	TAFS	Quality	Other	nvt	Replacement	1	
I.012416	VBAU	Quality	Valve station	40	Replacement	1	
I.012722	VBAU	Quality	Valve station	40	Replacement	1	
I.013208	VBAU	Quality	Pipelines	66	Replacement	1	
I.013328	VBAU	Quality	Other	nvt	Replacement	1	
I.013336	VBAU	Quality	Blending station	80	Replacement	1	
I.013359	VBAU	Quality	Other	nvt	Replacement	1	
I.013462	VBAU	Quality	Valve station	40	Replacement	1	
I.013483	VBAU	Quality	Valve station	40	Replacement	1	
I.013496	VBAU	Quality	Valve station	40	Replacement	1	
I.013580	VBAU	Quality	Valve station	40	Replacement	1	
I.013582	VBAU	Quality	Valve station	40	Replacement	1	
I.013596	VBAU	Quality	Valve station	40	Replacement	1	
I.013631	VBAU	Quality	Valve station	66	Replacement	1	
I.013656	VBAU	Quality	Valve station	40	Replacement	1	
I.013660	VBAU	Quality	Delivery Station	40	Replacement	1	
I.013700	VBAU	Quality	Valve station	40	Replacement	1	
I.013704	VBAU	Quality	Valve station	66	Replacement	1	
I.013735	VBAU	Quality	Valve station	40	Replacement	1	
I.013755	VBAU	Quality	CS	66	Replacement	1	
I.013759	VBAU	Quality	Valve station	40	Replacement	1	
I.013766	VBAU	Quality	M&R	66	Replacement	1	
I.013772	VBAU	Quality	Valve station	40	Replacement	1	
I.013805	VBAU	Quality	Valve station	40	Replacement	1	
I.013826	VBAU	Quality	Valve station	40	Replacement	1	
I.013830	VBAU	Quality	Valve station	40	Replacement	1	
I.013832	VBAU	Capacity	Multiple asset categories for booster	40	Expansion	1	
I.013840	VBAU	Quality	Valve station	40	Replacement	1	
I.013841	VBAU	Quality	Valve station	40	Replacement	1	

Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022 (Expansion projects)	Forecast 2023 (Expansion projects)
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III.2 Regular investments continued previous page

Project	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
I.013859	VBAU	Quality	Valve station	40	Replacement	1	
I.013862	VBAU	Quality	Valve station	40	Replacement	1	
I.013868	VBAU	Quality	Valve station	40	Replacement	1	
I.013875	VBAU	Quality	LNG	66	Replacement	1	
I.013913	VBAU	Quality	Valve station	40	Replacement	1	
I.013928	VBAU	Quality	Valve station	40	Replacement	1	
I.013929	VBAU	Quality	CS	66	Replacement	multiple	
I.013961	VBAU	Quality	Pipelines	40	Replacement	1	
I.012215	VBMD	Quality	Delivery Station	40	Replacement	1	
I.012336	VBMD	Quality	Valve station	40	Replacement	1	
I.012414	VBMD	Quality	Valve station	40	Replacement	1	
I.012425	VBMD	Quality	Valve station	40	Replacement	1	
I.012519	VBMD	Quality	Valve station	40	Replacement	multiple	0.3
I.012611	VBMD	Quality	Valve station	40	Replacement	1	
I.012724	VBMD	Quality	Valve station	40	Replacement	1	
I.012912	VBMD	Quality	M&R	66	Replacement	1	
I.013143	VBMD	Quality	Valve station	40	Replacement	2	
I.013362	VBMD	Quality	Other	nvt	Replacement	1	
I.013468	VBMD	Quality	Valve station	40	Replacement	1	
I.013470	VBMD	Quality	Valve station	40	Replacement	1	
I.013471	VBMD	Quality	Valve station	40	Replacement	1	
I.013473	VBMD	Quality	Valve station	40	Replacement	1	
I.013515	VBMD	Quality	Valve station	40	Replacement	1	
I.013516	VBMD	Quality	Valve station	40	Replacement	1	
I.013634	VBMD	Quality	CS	80	Replacement	1	
I.013635	VBMD	Quality	CS	66	Replacement	1	
I.013636	VBMD	Quality	CS	66	Replacement	1	
I.013637	VBMD	Quality	CS	80	Replacement	1	
I.013662	VBMD	Quality	Valve station	66	Replacement	1	
I.013714	VBMD	Quality	Delivery Station	80	Replacement	1	-
I.013718	VBMD	Quality	Valve station	66	Replacement	1	
I.013722	VBMD	Quality	Valve station	40	Replacement	1	
I.013756	VBMD	Quality	Other	nvt	Replacement	1	
I.013789	VBMD	Quality	Valve station	40	Replacement	1	
I.013790	VBMD	Quality	Valve station	40	Replacement	1	
I.013791	VBMD	Quality	Valve station	40	Replacement	1	
I.013792	VBMD	Quality	Valve station	40	Replacement	1	
I.013793	VBMD	Quality	Valve station	40	Replacement	1	
I.013794	VBMD	Quality	Valve station	40	Replacement	1	
I.013795	VBMD	Quality	Valve station	40	Replacement	1	
I.013800	VBMD	Quality	Valve station	66	Replacement	1	
I.013836	VBMD	Quality	Delivery Station	40	Replacement	1	
I.013854	VBMD	Quality	Valve station	40	Replacement	1	
I.013908	VBMD	Quality	Valve station	40	Replacement	1	

Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022 (Expansion projects)	Forecast 2023 (Expansion projects)
Complete						
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III.2 Regular investments continued previous page

Project	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
I.013909	VBMD	Quality	Valve station	40	Replacement	1	
I.013923	VBMD	Quality	Valve station	40	Replacement	1	
I.013930	VBMD	Quality	Valve station	40	Replacement	1	
I.013936	VBMD	Quality	Valve station	40	Replacement	1	
I.013944	VBMD	Quality	Valve station	40	Replacement	1	
I.013977	VBMD	Quality	Valve station	40	Replacement	1	
I.011869	FREE	Quality	Delivery Station	40	Replacement	1	
I.012332	FREE	Quality	Valve station	40	Replacement	1	
I.012408	FREE	Quality	Valve station	40	Replacement	1	
I.012571	FREE	Quality	Valve station	40	Replacement	multiple	
I.012578	FREE	Quality	Valve station	40	Replacement	multiple	
I.012623	FREE	Quality	Valve station	40	Replacement	1	
I.012628	FREE	Quality	Valve station	40	Replacement	1	
I.012742	FREE	Quality	Other	nvt	Replacement	1	
I.012825	FREE	Quality	Valve station	40	Replacement	1	
I.012837	FREE	Quality	Pipelines	66	Replacement	1	
I.012865	FREE	Quality	Delivery Station	40	Replacement	1	
I.012889	FREE	Quality	Pipelines	40	Replacement		1.25
I.012903	FREE	Quality	Delivery Station	40/66	Replacement	multiple	
I.012904	FREE	Quality	Delivery Station	40/66	Replacement	multiple	
I.012926	FREE	Quality	Export station	66	Replacement	1	
I.012948	FREE	Quality	Valve station	40	Replacement	multiple	0.985
I.012950	FREE	Quality	Valve station	40	Replacement	multiple	
I.012956	FREE	Quality	Valve station	40	Replacement	multiple	0.265
I.012957	FREE	Quality	Valve station	40	Replacement	multiple	
I.012960	FREE	Quality	Valve station	40	Replacement	multiple	
I.012967	FREE	Quality	Pipelines	66	Replacement	1	
I.012980	FREE	Quality	CS	66	Replacement	multiple	
I.013020	FREE	Quality	Export station	66	Replacement	1	
I.013023	FREE	Quality	Export station	66	Replacement	1	
I.013037	FREE	Quality	Valve station	40	Replacement	1	
I.013045	FREE	Quality	Other	nvt	Replacement	1	
I.013066	FREE	Quality	Valve station	40	Replacement	1	
I.013068	FREE	Quality	Valve station	40	Replacement	1	
I.013151	FREE	Quality	Pipelines	66	Replacement	1	
I.013156	FREE	Quality	Delivery Station	40	Replacement	1	
I.013169	FREE	Quality	LNG	66	Replacement	1	
I.013176	FREE	Quality	LNG	66	Replacement	1	
I.013180	FREE	Quality	LNG	66	Replacement	1	
I.013218	FREE	Quality	Delivery Station	40/66	Replacement	multiple	
I.013224	FREE	Quality	CS	66/80	Replacement	multiple	
I.013239	FREE	Quality	Valve station	66	Replacement	multiple	
I.013248	FREE	Quality	CS	66	Replacement	2	
I.013258	FREE	Quality	Valve station	40	Replacement	1	

Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022 (Expansion projects)	Forecast 2023 (Expansion projects)
Complete						
Complete						
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III.2 Regular investments continued previous page

Project	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
I.013272	FREE	Quality	Valve station	40	Replacement	1	
I.013273	FREE	Quality	Valve station	40	Replacement	2	
I.013283	FREE	Quality	Pipelines	40	Replacement		0.5
I.013285	FREE	Quality	Pipelines	40	Replacement		0.06
I.013303	FREE	Quality	CS	66	Replacement	1	
I.013304	FREE	Quality	CS	66	Replacement	1	
I.013309	FREE	Quality	Valve station	40	Replacement	1	
I.013315	FREE	Quality	Valve station	40	Replacement	1	
I.013320	FREE	Quality	Delivery Station	66	Replacement	multiple	
I.013321	FREE	Quality	Delivery Station	40	Replacement	multiple	
I.013323	FREE	Quality	CS	66/80	Replacement	multiple	
I.013329	FREE	Quality	Other	nvt	Replacement	1	
I.013340	FREE	Quality	Pipelines	40	Replacement		1.3
I.013344	FREE	Quality	Nitrogen plant	66	Replacement	1	
I.013345	FREE	Quality	CS	80	Replacement	multiple	
I.013354	FREE	Quality	Valve station	66	Replacement	1	
I.013355	FREE	Quality	Valve station	66	Replacement	1	
I.013357	FREE	Quality	M&R	66	Replacement	1	
I.013383	FREE	Quality	Valve station	66	Replacement	1	
I.013386	FREE	Quality	Valve station	40	Replacement	1	
I.013397	FREE	Quality	Valve station	80	Replacement	1	
I.013465	FREE	Quality	Other	nvt	Replacement	2	
I.013490	FREE	Quality	Valve station	40	Replacement	1	
I.013498	FREE	Quality	Valve station	40	Replacement	1	
I.013500	FREE	Quality	Valve station	40	Replacement	1	
I.013502	FREE	Quality	Valve station	40	Replacement	1	
I.013504	FREE	Quality	Delivery Station	40	Replacement	1	
I.013519	FREE	Quality	Valve station	40	Replacement	1	
I.013523	FREE	Quality	Valve station	40	Replacement	1	
I.013529	FREE	Quality	Valve station	40	Replacement	1	
I.013538	FREE	Quality	Valve station	40	Replacement	1	
I.013540	FREE	Quality	Valve station	40	Replacement	1	
I.013542	FREE	Quality	Valve station	40	Replacement	1	
I.013545	FREE	Quality	Valve station	40	Replacement	1	
I.013552	FREE	Quality	CS	80	Replacement	1	
I.013554	FREE	Quality	CS	66	Replacement	1	
I.013555	FREE	Quality	Valve station	40	Replacement	1	
I.013557	FREE	Quality	CS	66	Replacement	1	
I.013562	FREE	Quality	Valve station	40	Replacement	1	
I.013563	FREE	Quality	Valve station	40	Replacement	1	
I.013565	FREE	Quality	Valve station	40	Replacement	1	
I.013567	FREE	Quality	Valve station	40	Replacement	1	
I.013588	FREE	Quality	CS	66	Replacement	2	
I.013592	FREE	Quality	Delivery Station	40	Replacement	1	

Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022 (Expansion projects)	Forecast 2023 (Expansion projects)
Complete						
Complete						
Partial						
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III.2 Regular investments continued previous page

Project	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
I.013599	FREE	Quality	Valve station	40	Replacement	1	
I.013602	FREE	Quality	Delivery Station	66	Replacement	multiple	
I.013613	FREE	Quality	CS	66/80	Replacement	multiple	
I.013614	FREE	Quality	Delivery Station	40	Replacement	1	
I.013619	FREE	Quality	CS	66	Replacement	1	
I.013620	FREE	Quality	Delivery Station	40	Replacement	1	
I.013629	FREE	Quality	Valve station	40	Replacement	1	
I.013630	FREE	Quality	Delivery Station	40	Replacement	1	
I.013633	FREE	Quality	CS	80	Replacement	1	
I.013638	FREE	Quality	Nitrogen plant	66	Replacement	1	
I.013641	FREE	Quality	CS	66	Replacement	1	
I.013661	FREE	Quality	Delivery Station	40/66	Replacement	multiple	
I.013663	FREE	Quality	Pipelines	40	Replacement		0.31
I.013668	FREE	Quality	Valve station	66	Replacement	2	
I.013681	FREE	Quality	Pipelines	66	Replacement	1	
I.013682	FREE	Quality	Valve station	80	Replacement	1	
I.013684	FREE	Quality	Pipelines	40	Replacement	1	
I.013691	FREE	Quality	Delivery Station	40	Replacement	1	
I.013698	FREE	Quality	CS	66	Replacement	1	
I.013707	FREE	Quality	LNG	66	Replacement	1	
I.013725	FREE	Quality	Valve station	40	Replacement	1	
I.013726	FREE	Quality	CS	66	Replacement	1	
I.013729	FREE	Quality	Other	nvt	Replacement	1	
I.013732	FREE	Quality	Pipelines	40	Replacement	1	
I.013742	FREE	Quality	Delivery Station	40	Replacement	1	
I.013743	FREE	Quality	Delivery Station	40	Replacement	1	
I.013747	FREE	Quality	Pipelines	40	Replacement	1	
I.013750	FREE	Quality	Other	66	Replacement	2	
I.013751	FREE	Quality	Multiple asset categories	nvt	Replacement	N/A	
I.013754	FREE	Quality	Pipelines	40	Replacement	1	
I.013758	FREE	Quality	Other	nvt	Replacement	1	
I.013763	FREE	Quality	Pipelines	66	Replacement	1	
I.013764	FREE	Quality	Delivery Station	40	Replacement	1	
I.013767	FREE	Quality	Delivery Station	40	Replacement	1	
I.013768	FREE	Quality	Pipelines	40	Replacement		0.26
I.013771	FREE	Quality	Other	nvt	Replacement	1	
I.013773	FREE	Quality	Other	nvt	Replacement	1	
I.013774	FREE	Quality	Delivery Station	40	Replacement	1	
I.013775	FREE	Quality	Other	nvt	Replacement	1	
I.013777	FREE	Quality	Pipelines	40	Replacement		0.25
I.013778	FREE	Quality	Delivery Station	40	Replacement	1	
I.013779	FREE	Quality	Delivery Station	40	Replacement	1	
I.013780	FREE	Quality	Delivery Station	40	Replacement	1	
I.013781	FREE	Quality	Delivery Station	40	Replacement	1	

Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022 (Expansion projects)	Forecast 2023 (Expansion projects)
Partial						
Partial						
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III.2 Regular investments continued previous page

Project	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
I.013782	FREE	Quality	Delivery Station	40	Replacement	1	
I.013784	FREE	Quality	Delivery Station	40	Replacement	1	
I.013786	FREE	Quality	Delivery Station	40	Replacement	1	
I.013797	FREE	Quality	Valve station	40	Replacement	1	
I.013798	FREE	Capacity	Multiple asset categories for booster	40	Expansion	1	
I.013801	FREE	Quality	Delivery Station	40	Replacement	1	
I.013804	FREE	Quality	Delivery Station	40	Replacement	1	
I.013806	FREE	Quality	Valve station	40	Replacement	1	
I.013807	FREE	Quality	CS	80	Replacement	1	
I.013811	FREE	Quality	Delivery Station	40	Replacement	1	
I.013812	FREE	Quality	Delivery Station	40	Replacement	1	
I.013813	FREE	Quality	Other	nvt	Replacement	1	
I.013816	FREE	Quality	Pipelines	40	Replacement	1	
I.013824	FREE	Quality	Delivery Station	40	Replacement	1	
I.013825	FREE	Quality	Delivery Station	66	Replacement	1	
I.013831	FREE	Quality	Pipelines	40	Replacement	1	
I.013833	FREE	Quality	Delivery Station	40	Replacement	1	
I.013834	FREE	Quality	Pipelines	40	Replacement	1	
I.013837	FREE	Quality	Other	nvt	Replacement	1	
I.013843	FREE	Quality	Pipelines	40	Replacement		0.66
I.013844	FREE	Quality	Pipelines	40	Replacement	1	
I.013847	FREE	Quality	Delivery Station	40	Replacement	1	
I.013861	FREE	Quality	Pipelines	40	Replacement	1	
I.013863	FREE	Quality	Pipelines	40	Replacement	1	
I.013864	FREE	Quality	Pipelines	40	Replacement	1	
I.013866	FREE	Quality	Pipelines	40	Replacement	1	
I.013867	FREE	Quality	Delivery Station	40	Replacement	1	
I.013877	FREE	Quality	Delivery Station	40	Replacement	1	
I.013879	FREE	Quality	Pipelines	40	Replacement	1	
I.013883	FREE	Quality	Delivery Station	40	Replacement	1	
I.013885	FREE	Quality	Export station	66/80	Replacement	1	
I.013889	FREE	Quality	Multiple asset categories	66	Replacement	multiple	
I.013934	FREE	Quality	Pipelines	40	Replacement	1	
I.013935	FREE	Quality	Delivery Station	40	Replacement	1	
I.013939	FREE	Quality	Pipelines	40	Replacement	1	
I.013940	FREE	Quality	Delivery Station	40	Replacement	1	
I.013943	FREE	Quality	Export station	66	Replacement	1	
I.013945	FREE	Quality	Pipelines	40	Replacement	1	
I.013949	FREE	Quality	Other	nvt	Replacement	1	
I.013952	FREE	Quality	Delivery Station	40	Replacement	1	
I.013957	FREE	Quality	Pipelines	40	Replacement	1	
I.013974	FREE	Quality	Pipelines	40	Replacement	1	
I.014347	FREE	Quality	Multiple asset categories	nvt	Replacement	N/A	

Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022 (Expansion projects)	Forecast 2023 (Expansion projects)
Partial						
Partial						
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III.3 Major investments

Project	Location	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Explanation of why investment addresses the bottleneck	Start year	Year in use
Total									
I.013799	Emmen	OPEN	Capaciteit	Pipelines	66	UBI	See SCBA in Section 5.2.3	2019	2024
I.008224	Ommen	TAFS	Quality	CS	66	VVI	Control panel replacement due to equipment obsolescence	2014	2017
I.012034	Ommen	TAFS	Quality	CS	66	VVI	Measures to address integrity bottlenecks in drainage system	2016	2019
I.012062	Friesland	TAFS	Quality	Valve station	40	VVI	Measures to address integrity bottlenecks in valve stations	2015	2018
I.012069	Brabant	TAFS	Quality	Valve station	40	VVI	Measures to address integrity bottlenecks in valve stations	2014	2017
I.012081	Deventer	TAFS	Quality	Other	N/A	VVI	Equipment to ensure continued gas transmission during work on projects. Equipment is replaced due to obsolescence	2015	2018
I.012085	Rotterdam	TAFS	Quality	Multiple asset categories	80	UBI	To address transport security bottleneck in Rijnmond area	2013	2016/ 2017
I.012451	Ommen	TAFS	Quality	CS	66	VVI	Control panel replacement due to equipment obsolescence	2014	2017
I.012577	Utrecht	TAFS	Quality	Valve station	40	VVI	Measures to address integrity bottlenecks in valve stations	2015	2018
I.012764	Groningen	TAFS	Quality	Pipelines	40	VVI	See Section 5.2 for details	2015	2018
I.012765	Groningen	TAFS	Quality	Pipelines	40	VVI	See Section 5.2 for details	2016	2019
I.013676	Ommen	VBMD	Quality	Nitrogen plant	66	VVI	See SCBA in Section 5.2.3	2019	2022
I.013709	Diemen	VBMD	Quality	Multiple asset categories	40/66	VVI	See SCBA in Appendix 4	2018	2023
I.013710	Rotterdam	VBMD	Quality	Multiple asset categories	66	VVI	See SCBA in Appendix 4	2018	2023
I.013711	Vlissingen	VBMD	Quality	Multiple asset categories	40/80	VVI	See SCBA in Appendix 4	2018	2023
I.013712	Klundert	VBMD	Quality	Multiple asset categories	80	VVI	See SCBA in Appendix 4	2018	2022
I.013713	Utrecht	VBMD	Quality	Multiple asset categories	40/66	VVI	See SCBA in Appendix 4	2018	2023
I.013716	Hengelo	VBMD	Quality	Multiple asset categories	66	VVI	See SCBA in Appendix 4	2018	2023
I.013717	Emmen	VBMD	Quality	Multiple asset categories	66	VVI	See SCBA in Appendix 4	2018	2022

Number of assets	km	Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022	Forecast 2023
			773,361,261	754,563,853	215,053,069	102,708,766	65,509,104	78,116,746
1		Complete						
1		Partial						
1		Partial						
multiple	1.476	Complete + Partial						
multiple	1.338	Complete + Partial						
1		Complete						
2		Complete						
1		Partial						
multiple	0.473	Complete + Partial						
multiple	13.223	Complete + Partial						
multiple	6.919	Complete + Partial						
1		Partial						
multiple	9	Complete						
multiple	9.5	Complete						
multiple	2.9	Complete						
multiple	0.5	Complete						
multiple	27.3	Complete						
multiple	1.8	Complete						
multiple	4	Complete						

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III.3 Major investments continued previous page

Project	Location	Project status	Bottleneck	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Explanation of why investment addresses the bottleneck	Start year	Year in use
I.011978	Ravenstein	FREE	Quality	CS	66	VVI	Control panel replacement due to equipment obsolescence	2017	2020
I.012548	Brabant	FREE	Quality	Valve station	66	VVI	Measures to address integrity bottlenecks in valve stations	2015	2018
I.012900	Zuidbroek	FREE	Capacity	Nitrogen plant	66	UBI	See Section 5.2 for details	2018	2022
I.013166	Rotterdam	FREE	Quality	LNG	66	VVI	Control panel replacement due to equipment obsolescence	2017	2020
I.013556	Zeeland/ Brabant	FREE	Capacity	Multiple asset categories	80	UBI	See Section 5.2 for details	2018	2020
I.013556	Zeeland/ Brabant	FREE	Capacity	Multiple asset categories	80	UBI	See Section 5.2 for details	2017	2020
I.013586	Wieringermeer	FREE	Capacity	Nitrogen plant	66	UBI	See Section 5.2 for details	2017	2020

III.4 Connections

Project	Project status	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
Total						
I.013876	OPEN	Valve station	80	Expansion	-	-
I.013917	OPEN	Multiple asset categories	40	Expansion	1	
I.013942	OPEN	Multiple asset categories	66	Expansion	1	
I.013973	OPEN	Delivery Station	66	Expansion	1	
I.013983	OPEN	Multiple asset categories	40	Expansion	1	
I.013322	TAFS	Valve station	40	Expansion	1	
I.013391	TAFS	Valve station	67	Expansion	1	
I.013585	TAFS	Delivery Station	40	Expansion	1	
I.013679	TAFS	Pipelines	40	Expansion	1	0.03
I.013740	VBAU	Valve station	40	Expansion	1	
I.013857	VBAU	Multiple asset categories	40	Expansion	1	
I.013878	VBAU	Multiple asset categories	40	Expansion	1	
I.013618	VBMD	Multiple asset categories	40	Expansion	1	
I.013667	VBMD	Multiple asset categories	66	Expansion	1	km tbd
I.013396	FREE	Multiple asset categories	40	Expansion	1	
I.013685	FREE	Multiple asset categories	80	Expansion	1	
I.013708	FREE	Multiple asset categories	40	Expansion	1	
I.013739	FREE	Delivery Station	40	Expansion	1	
I.013787	FREE	Delivery Station	66	Expansion	1	

Number of assets	km	Partial or complete replacement	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022	Forecast 2023
1		Partial						
multiple			Partial					
multiple	4		Complete					
1			Partial					
1			Complete					
1			Complete					
multiple			Partial					

	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021	Forecast 2022	Forecast 2023
	3,205,600	18,991,309	1,176,109	4,595,385	10,039,681	1,814,046

III.4 Relocations

Project	Project status	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
Total						
I.013985	OPEN	Pipelines	40	Replacement		0.35
I.011514	TAFS	Pipelines	66	Replacement		7.748
I.012195	TAFS	Pipelines	40	Replacement		0.757
I.012323	TAFS	Pipelines	40	Replacement		2.55
I.012756	TAFS	Delivery Station	40	Replacement	1	0.32
I.012919	TAFS	Pipelines	66	Replacement		1.222
I.012920	TAFS	Pipelines	66	Replacement		0.24
I.012942	TAFS	Pipelines	66	Replacement		1.304
I.012998	TAFS	Pipelines	40	Replacement		0.72
I.012999	TAFS	Pipelines	40	Replacement		0.405
I.013026	TAFS	Pipelines	40	Replacement		0.785
I.013262	TAFS	Pipelines	40	Replacement		0.255
I.013263	TAFS	Pipelines	40	Replacement		0.284
I.013302	TAFS	Pipelines	66	Replacement		0.34
I.013332	TAFS	Pipelines	40	Replacement		0.36
I.013371	TAFS	Pipelines	40	Replacement		0.29
I.013374	TAFS	Pipelines	66	Replacement		0.91
I.013378	TAFS	Pipelines	40	Replacement		0.19
I.013395	TAFS	Pipelines	40	Replacement		reintegration
I.013621	TAFS	Pipelines	40	Replacement		0.346
I.013632	TAFS	Pipelines	40	Replacement		0.56
I.013606	VBAU	Pipelines	40	Replacement		0.315
I.013607	VBAU	Pipelines	40	Replacement		0.73
I.013608	VBAU	Pipelines	40	Replacement		0.465
I.013609	VBAU	Pipelines	40	Replacement		0.515
I.013611	VBAU	Pipelines	40	Replacement		0.315
I.013612	VBAU	Pipelines	40	Replacement		0.43
I.013731	VBAU	Pipelines	66	Replacement		1.2
I.013745	VBAU	Pipelines	40	Replacement		0.43
I.013818	VBAU	Delivery Station	40	Replacement	1	0.1
I.013852	VBAU	Pipelines	40	Replacement		km tbd
I.013932	VBAU	Pipelines	40	Replacement		0.3
I.013955	VBAU	Pipelines	66	Replacement	1	
I.013622	VBMD	Pipelines	40	Replacement		0.91
I.013680	VBMD	Pipelines	40	Replacement		0.2
I.013721	VBMD	Pipelines	40	Replacement		0.445
I.013819	VBMD	Pipelines	40	Replacement		0.18
I.013860	VBMD	Pipelines	40	Replacement		0.1
I.013399	FREE	Pipelines	40	Replacement		0.4
I.013400	FREE	Pipelines	40	Replacement		0.36
I.013672	FREE	Pipelines	40	Replacement		0.355
I.013724	FREE	Pipelines	40	Replacement		0.34

Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021
71,887,316	80,339,199	5,846,655	9,998,565

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III.4 Relocations continued previous page

Project	Project status	Asset category	Pressure level 40/66/80	Expansion or replacement investment	Number of assets	km
I.013741	FREE	Pipelines	40	Replacement		0.44
I.013765	FREE	Pipelines	40	Replacement		0.025
I.013817	FREE	Pipelines	40	Replacement	1	x

III.5 Grid-related IT investments

"Reason (>= EUR 4 million identification number)"	Category	Description
Changes to laws and regulations	Auction-to-publication systems	VIPs, NC-TAR, Anti-fraud measures
	Energy transmission systems	Blackout measures
	Other	Tendering projects and GDPR-related measures
Obsolete system components	Auction-to-publication systems	Technical IT upgrade projects
	Energy transmission systems	Technical IT upgrade projects
	Other	Technical IT upgrade projects
Sum total		

III.6 Studie aansluiting

Code	regional network operators	Activity	Location	Pipeline number
	Liander (1)	Industry	x	?
	Liander (2)	Industry	x	?
	Liander (3)	Industry	x	N/A

In 2020 GTS studies the technical aspects of acquisition of Liander assets.
The takeover of assets and conditions still has to be negociated, after which a more precise cost level can be determined.

	Aproved Budget	Forecast Cumulative	Forecast 2020	Forecast 2021

	How does the investment address the bottleneck?	Investments per year in millions of euros	
		2020	2021
	Compliance with laws and regulations	1.0	
	Compliance with agreements	0.4	
	Compliance with laws and regulations	0.4	
	Offering continuity and process improvement	2.4	2.1
	Offering continuity and process improvement	3.6	3.0
	Offering continuity and process improvement	3.1	6.0
		10.9	11.1

	Length [km]	Diameter [inch]	Year of construction	Explanation
	0,8	6	1987 (?)	Regarding a pipeline from GOS N-xxx
	1,4	8 (?)	1990 (?)	Regarding a pipeline from GOS W-xxx
	0	x	1995 (?)	Regarding a second pressure stage in GOS N-xxx

Appendix IV: Societal cost-benefit analysis

This draft IP provides a further explanation in the form of a societal cost-benefit analysis of two technical investments and one IT investment. The draft IP submitted for consultation contained a third technical investment 'Project I.013676 - N2 chiller in relation to phase-out of R507 Ommen.' Given that an FID has meanwhile been made for this project, it is not part of this draft IP that will be submitted to the minister and ACM.

Societal cost-benefit analysis	
Identification number	G to H conversion large industries
Name and location of asset	See confidential appendix
Pressure level	66-80 bar
Investment classification	Replacement investments
Starting year	2018
Brought into operation	2022-2023
How does the investment address the bottleneck?	For the further reduction of Groningen production a ban has been introduced on the offtake of more than 0.98 TWh per year (100 million m^3 per year) of G-gas per industrial site after October 2022. The aim of this is to limit gas extraction from the Groningen field, with the intended effect of reducing earthquakes and increasing safety for Groningen residents. In anticipation of a new statutory duty, GTS has started preparations for switching nine industrial consumers from G-gas to H-gas. This SCBA concerns seven of the nine industrial consumers.No SCBA is required for the other two investments because one switch comes under GTS' OPEX and the investment amount for the other investment is less than € 5 million. Measures for the purposes of this switch include the construction or modification of metering and regulating stations, gas delivery stations and valve stations, and laying new pipelines. Implementation of several of these measures has been pushed back beyond the target date set by the Ministry of EZK (October 2022), because the legislative process has turned out to take more time than the Ministry initially anticipated. GTS is also confronted with the current discussion regarding nitrogen deposition (in the context of PAS, the government's integrated approach to nitrogen). Both situations have resulted in adjustments having to be made to the timetable and, consequently, to the financial projections for each year.
No action	Doing nothing is not an option. As soon as the statutory duty comes into effect and the industrial consumer in question has submitted a request for conversion, GTS will be under an obligation to proceed with the conversion requested.

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Societal cost-benefit analysis continued previous page

Societal cost-benefit analysis	
Alternatives	Various alternatives have been assessed for each industrial consumer: • transmission using existing connection pipelines and stations and the building of new assets for connection to the HTL for H-gas; • switching the current connection from G-gas to H-gas, including minor modifications to accommodate the change in gas quality; • an entirely new connection to the H-gas HTL (connection pipeline and GDS).
Differences analysis	In assessing the various options, GTS went by the following criteria: • costs; • minimum technical modifications; • possibility of spatial modification; • possibility of obtaining a permit; • on-time completion of measures.
Support for impact estimation	For a large number of projects, technical measures will have to be taken in or near nature reserves. Nature permits will be applied for to ensure protection of animal and plant life. The government's integrated approach to nitrogen deposition has a major impact on this. The impact of the conversion from G-gas to H-gas differs per industrial consumer. This impact will, however, not be minor, as they will have to modify systems and internal business processes for compatibility with high-calorific gas. And finally, given that modifications are made outside existing GTS systems and sites, zoning plans will have to be amended, agreements will have to be signed with land owners, and/or permits and planning permission will have to be obtained. The focus in this respect is on containing the impact/inconvenience for the local area. However, we estimate that the conversion of the industrial consumers will have hardly any impact on the required Groningen production.
Rationale for selection of proposed alternative	In selecting the technical measure for a project, GTS selects the option whereby safety can be guaranteed and the fewest possible technical modifications are needed, i.e. the most cost-effective solution. The preferred alternative is therefore transmission using existing connection pipelines and stations and the building of new assets for connection to the HTL for H-gas, and possibly acquisition of existing assets from a third party.
With capacity expansions: a sensitivity analysis	The switch from G-gas to H-gas for industrial consumers means that the capacity issue applies to the H-gas grid instead of the G-gas grid. As a result, no new bottlenecks will arise in the backbone transport network.
Notes on missing information	See the confidential Appendix VIII for further details and notes to the individual projects.

Societal cost-benefit analysis		
Identification number	Study I.013799 - Conversion A-605 GZI into collector pipeline	
Name and location of asset	GZI Green gas collector pipeline Emmen - Ommen	
Pressure level	67 bar	
Investment classification	Replacement	
Starting year	2022	
Brought into operation	2024	
How does the investment address the bottleneck?	Green gas is produced using anaerobic digestion (fermentation), a continuous process meaning a continuous supply. However, the demand for gas is highly seasonal, with high demand in winter and low demand in summer. This can result in a supply/demand imbalance in the summer. In the areas of Hoogeveen, Emmen and Ommen, a large volume of green gas is fed into the RTL and regional network operator networks of Rendo, Coteq and Enexis. In this area, on the regional network operator networks and even the RTL system in this area, future gas consumption will likely be too low to use all the green gas produced. Green gas producers can feed in via the proposed GZI green-gas collector pipeline, and regional network operator networks can feed off or exchange a surplus of green gas. If consumption is lower than production throughout the area, the green gas can be processed centrally, at the Ommen facility and then compressed and injected into the HTL.	
No action	The Dutch Climate Agreement sets a target of at least 20 TWh per year of green gas for use in the Netherlands by 2030. Although green gas feed-in is market-driven, GTS wants to facilitate this as much as possible. The producers benefit from continuous integration options for green gas. However, in the summer there is insufficient capacity in the regional network operator networks in this region. This means that doing nothing is not an option.	
Alternatives	Description	Study estimate (€ mln.)
1	construct various boosters to enable feed-in of gas from the regional network operator network into the RTL or HTL;	X
2	repurpose the existing GZI pipeline for use as a collector pipeline.	X
Differences analysis	In assessing the various options, GTS went by the following criteria: • costs; • minimum technical modifications; • possibility of spatial modification; • possibility of obtaining a permit; • on-time completion of measures. The total costs of alternative 1, the construction of various boosters are higher than the costs of alternative 2, repurposing the GZI pipeline for use as a collector pipeline. The most cost-efficient solution is therefore the preferred option.	

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Societal cost-benefit analysis continued previous page

Societal cost-benefit analysis	
Support for impact estimation	Repurposing the GZI pipeline for use as a collector pipeline will have the following impacts: • the GZI pipeline is currently being used for the transmission of H-gas. Repurposing the GZI pipeline would require that modifications be made for the transmission of H-gas for one single customer (and potentially a second as a result of the possible G to H conversion); • these modifications would take place in rural areas or at the site in Ommen, an existing GTS plant. These modifications are expected to have little or no impact on nature or local residents.
Rationale for selection of proposed alternative	The green gas collector pipeline contributes to achieving the objectives of the Dutch Climate Agreement by facilitating green gas producers in the area of Hoogeveen, Emmen and Ommen, while GTS and regional network operators accommodate this process at the lowest possible costs to society.
With capacity expansions: a sensitivity analysis	-
Notes on missing information	The study is still in the preparation phase, therefore that not all the requested information is available, such as a sensitivity analysis.

Societal cost-benefit analysis		
Identification number	I.020002 Merging Accountable (A) and Telemetry (T) networks	
Name and location of asset	N/A – IT system	
Pressure level	N/A	
Investment classification	Replacement investment	
Starting year	2019	
Brought into operation	2022	
How does the investment address the bottleneck?	GTS currently has two separate systems for collecting metering data (accountable data and telemetry data) from the field. This data is used for balancing the grid. The system software for accountable data will no longer be supported in the long term. This system needs to be replaced so that we can continue to fulfil our statutory duties, ensure effective business operations and prevent security risks. GTS has started a study into the various alternatives for replacing the system for accountable data.	
No action	If we do nothing, GTS cannot fulfil its statutory duties, and this also poses security and operational risks. This is not acceptable.	
Alternatives	Description	Study estimate (€ mln.)
1	add functionality for accountable data to the current functionality for telemetry;	X
2	one-on-one replacement of the existing software and, by extension, the related hardware.	X

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Societal cost-benefit analysis continued previous page

Societal cost-benefit analysis	
Differences analysis	GTS uses the following criteria when assessing the various options: • costs (TCO: the TCO is an estimate of the costs for the investment and the costs for management and maintenance compared to the benefits over a period of 15 years in the case of IT investments); • minimal technical adjustments; • future proof; • timely delivery of measures. At the time of drafting the draft IP 2020, the project is still in the preparation phase at the end. The preliminary results of the study lead to a preference for alternative 1 (expanding telemetry with accountable functionality). The TCO of alternative 1 is significantly lower than the TCO of alternative 2, which, despite a relatively low investment, leads to a higher TCO due to costs for management and maintenance. In addition, alternative 1 offers the opportunity to set up data communication in a future-proof manner, so that costs can be saved when the equipment is replaced.
Support for impact estimation	See above
Rationale for selection of proposed alternative	The FID has yet to be taken. The study shows that the TCO for alternative 1 is lower, therefore this alternative is preferred. This alternative also opens the possibility of lowering future replacement investments in the field for both Telemetry and Comptable.
With capacity expansions: a sensitivity analysis	-
Notes on missing information	This project is still in the preparation phase, meaning not all requested information is available yet.

Appendix V:
Report on delivery and security of supply

Article 52a of the Dutch Gas Act stipulates that the Minister must submit an annual report on the delivery and security of supply to the European Commission. Pursuant to the Decree on the performance of duties under Article 52a of the Dutch Gas Act dated 1 July 2011, the Minister has assigned this responsibility to GTS. Most of the topics are included in this draft IP. The two remaining topics, peak supply and supply in the event of a licence holder's insolvency, are addressed below.

To guarantee the supply of gas to small users, GTS has been assigned two statutory duties: firstly, it must ensure the supply to small users during peak periods, and secondly, it must take certain actions in the event that a licence holder can no longer meet its financial obligations and the supply to small users is endangered as a result.

Peak supply

Pursuant to the Security of Supply (Gas Act) Decree dated 13 April 2004, GTS has a statutory obligation to take measures to allow licence holders to continue to supply small users (consumer category G1A and G2A) with natural gas during 'peak supply periods'. A peak supply period is deemed to be a period during which the mean effective 24-hour temperature is minus 9°C or lower. GTS provides all necessary facilities to enable licence holders to continue to supply all small users in the Netherlands during such periods, including gas purchasing, flexibility services and gas transmission over the national gas grid. The measures taken and facilities provided must be such that peak supply can be provided on a day with a mean effective 24-hour temperature of minus 17°C, as measured at the Royal Netherlands Meteorological Institute in De Bilt.

Each year, GTS determines the capacity and volume required for peak supply for this service. The required volume and capacity is determined on the basis of historical temperature data series and consumption information for the previous winters at the relevant exit points. GTS arranges gas procurement and the procurement of flexibility services by tender; the required transmission capacity is reserved by GTS.

For the winter of 2019-2020, GTS has procured flexibility services with a capacity of 22GW and a volume of 816GWh. The winter of 2017-2018 was the last winter in which a mean effective 24-hour temperature of minus 9°C or lower occurred.

GTS charges the transmission costs (entry and exit) it reserves for peak supply during the months of December, January and February to the licence holders in these winter months in proportion to their market share in the small user segment. The licence holders are charged the peak production tariff on a monthly basis, also in proportion to their market share in the small user segment.

Supply in the event of a licence holder's insolvency

When a licence holder is no longer able or deemed to be able to meet its financial obligations, ACM can make a decision to revoke that holder's licence. The decision will take effect no later than twenty working days after the decision is made. GTS can be asked to guarantee the payment of the procurement of gas for supply to small users during this period.

If, on the tenth working day after the decision has been made, not all small users of the licence holder have been transferred to another licence holder, GTS will assign the remaining small users to another licence holder. GTS will provide the receiving licence holder with the relevant data of the allocated small users.

The Dutch Energy Data Exchange Association (NEDU) has drawn up a description of the processes relating to the administrative handling of a case of insolvency of a licence holder and the distribution of small users among the other licence holders.

A protocol has been drawn up by ACM, TenneT and GTS for mutual cooperation and for cooperation with EDSN (Energie Data Services Nederland) in the event that the supply by a licence holder is endangered.

The situation in which a licence holder has become insolvent and their licence withdrawn has arisen several times in the past. Pursuant to the Security of Supply (Gas Act) Decree, GTS has guaranteed payment for the procurement of gas for supply to small users. Based on these experiences, in consultation with TenneT, GTS has drawn up sample texts that can be used for the guarantees. GTS is currently refining the process relating to guarantees and payments under guarantees. In another case, in collaboration with TenneT and EDSN, GTS allocated the small users of a licence holder to other licence holders. This method was successful and can be used again should such a situation arise in the future.

Appendix VI: Capacity on border stations

			GW						
NAME VIP/IP	NWP	DIRECTION	okt.-20	okt.-21	okt.-22	okt.-23	okt.-24	okt.-25	okt.-26
VIP-TTF-NCG-L	301544	entry	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		exit	36.0	31.5	26.7	21.9	17.2	12.4	11.6
underlying IPs:									
Winterswijk (OGE)	300133								
Zevenaar (OGE)	300132								
Tegelen (OGE)	300138								
Haanrade (Thyssengas)	300141								
Dinxperlo (BEW)	300140								
VIP-TTF-NCG-H	301545	entry	19.0	19.0	19.0	19.0	19.0	19.0	19.0
		exit	26.0	26.0	26.0	26.0	26.0	26.0	26.0
underlying IPs:									
Bocholtz TENP (OGE - Flx TENP)	300139								
Bocholtz Vetschau (Thyssengas)	301368								
Oude Statenzijl (OGE]	300147								
VIP-BENE	301546	entry	13.8	13.8	13.8	13.8	13.8	13.8	13.8
		exit	33.4	33.4	31.8	31.8	31.8	31.8	31.8
underlying IPs:									
's Gravenvoeren (Fluxys)	300143								
Zandvliet (Fluxys-H)	301184								
Zelzate (Fluxys)	301111								
VIP-TTF-GASPOOL-L	301547	entry	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		exit	7.3	7.0	7.0	7.0	7.0	7.0	3.0
underlying IPs:									
Oude Statenzijl (GTG Nord-G)	300136								
Oude Statenzijl (GUD-G)[OBEBG]	300144								
Oude Statenzijl (GTG NORD-H)	301550								
Rotterdam (Gate)									
VIP-TTF-GASPOOL-H	301548	entry	17.9	17.9	17.9	17.9	17.9	17.9	17.9
		exit	12.2	12.2	12.2	12.2	12.2	12.2	12.2
underlying IPs:									
Oude Statenzijl (GUD-H)[OBEBH]	300146								
Oude Statenzijl (Gascade-H)	300147								
HILVARENBEEK (FLUXYS)	300131	entry	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		exit	24.8	24.8	24.8	24.8	21.1	17.4	13.6
VLIEGHUIS (RWE)	300142	entry	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		exit	3.0	3.0	3.0	3.0	3.0	3.0	3.0
EMDEN EPT (GASSCO)	301113	entry	40.2	40.2	40.2	40.2	40.2	40.2	40.2
		exit	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ROTTERDAM (GATE)	301345	entry	17.4	17.4	17.4	17.4	17.4	17.4	17.4
		exit	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	okt.-27	okt.-28	okt.-29	okt.-30	okt.-31	okt.-32	okt.-33	okt.-34	okt.-35	okt.-36	okt.-37	okt.-38	okt.-39	okt.-40
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	7.6	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0	19.0
	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0	26.0
	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8	31.8
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9
	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	9.9	6.2	2.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2	40.2
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix VII: Consultation matrix

Nr	Party	Consultation response
1.1	Energie Nederland	Vertrouwelijkheid van gegevens Energie-Nederland vindt het een goede stap dat netbeheerders investeringsplannen vóór definitieve publicatie ter consultatie voorleggen aan de markt. In algemene zin merkt Energie-Nederland op dat sommige bijlagen van het IP als vertrouwelijk zijn aangemerkt. Dat maakt een volledige beoordeling van de inhoud van het plan gecompliceerd, zo niet onmogelijk.
1.2		Verwijderingskosten In de investeringsplannen wordt alleen rekening gehouden met investeringen in het net. Hierbij wordt niets vermeld over verwijderingskosten en desinvesteringen. Aangezien het netgebruik de komende jaren zal dalen verwachten wij wel desinvesteringen en verwijderingskosten. Waarom zijn die niet terug te vinden in de investeringsplannen?
1.3		Investeringen De komende jaren voorziet GTS forse investeringen. Vanaf 2024 zijn deze op een tamelijk stabiel, maar nog steeds hoog niveau. Dat is niet in lijn met het dalende gebruik van het netwerk. Energie-Nederland is van mening dat met een dalend gebruik van het net ook de investeringen zouden moeten dalen.
1.4		Stikstoffabriek Zuidbroek Zoals te zien in het verloop van de geplande investeringen zijn de kosten voor de stikstoffabriek significant. De investeringen in deze fabriek zijn het resultaat van een politieke beleidsbeslissing. Wij zijn van mening dat de kosten van deze investeringen niet voor rekening van de netgebruiker horen te komen en dus buiten de tarieven gehouden moeten worden.
1.5		Kruissubsidiëring waterstof Kosten als gevolg van investeringen die gedaan worden ten behoeve van energiestransitie, zoals van waterstof, moeten ook doorberekend worden aan de toekomstige gebruikers van waterstof en niet aan de huidige netgebruiker. Kruissubsidiering tussen verschillende netgebruikers van aardgas en waterstof én kruissubsidiering in de tijd moeten vermeden worden.
1.6		Waterstof backbone GTS voorziet Investeringen in waterstof tot 1.7 miljard euro om waterstof te faciliteren. GTS lijkt een aparte activabasis te overwegen en dus aparte tarieven voor waterstof aan gebruikers van waterstof in rekening te brengen, maar hoe waterstof gereguleerd zal gaan worden is nog steeds onbekend. Energie-Nederland wil er nogmaals op wijzen dat er bewust moet worden gekeken dat deze investeringen niet vooraf in de tarieven voor aardgas zullen zitten, en niet eerder dan het moment en voor zover er marktvraag is om het te transporteren (geen kruissubsidie in de tijd). In dit verband is het uiterst relevant dat de vergoeding bekend wordt die GTS heeft ontvangen voor de leiding die inmiddels wordt gebruikt voor het transport van waterstof van Dow naar Yara. Energie-Nederland roept op tot volledige transparantie bij overdracht van activa die zullen worden gebruikt voor het transport van waterstof.
1.7		H-gas aanbod GTS spreekt de zorg uit of er voldoende H-gas voor Nederland beschikbaar zal komen. Energie-Nederland deelt deze zorg niet, omdat de markt dit zal oplossen zolang er voldoende capaciteit is.
1.8		Marktintegratie Op bladzijde 7 en in de laatste alinea van 3.2.2 gaat GTS in op een periodiek onderzoek inzake markt-integratie. Energie-Nederland is voor marktintegratie, maar vindt wel dat er een zorgvuldige marktconsultatie plaats moet vinden. De inbreng vanuit de markt moet hierin ook daadwerkelijk meegenomen worden.
1.9		Systeemdiensten aan Duitse TSO's Het lijkt erop dat een deel van het Nederlandse net gebruikt gaat worden om bottlenecks in het Duitse netwerk op te lossen. Dit kan positief en efficiënt zijn vanuit een geïntegreerd marktperspectief, maar zolang er gescheiden markten zijn moeten dergelijke transportdiensten van GTS ook inkomsten genereren voor GTS. Dit lijkt nu niet het geval lijkt te zijn. Zonder deze inkomsten zullen de Nederlandse netgebruikers ten onrechte de kosten van deze diensten moeten betalen.

GTS' response	Method of processing
GTS aims to disclose no confidential company information in the draft IP. Appendix VIII to the draft IP is confidential because it provides cost projections per project, specifying names and locations. Potential suppliers or contractors could use that information to their advantage when submitting their quotations. This is in the interest of neither GTS nor the network users.	
Since divestments are not covered by the disclosure requirements for the draft IP. GTS will, however, look into the possibility of providing greater insight into divestments in future draft IP. That said, GTS does not actually expect any large-scale divestments involving considerable dismantling expenses over the coming years.	GTS investigates if divestments can be part of the next draft IP.
Despite decreasing demand for natural gas, GTS still has to maintain the network. There is, therefore, still a need for (replacement) investments in the network. The way GTS is regulated actually incentivises GTS to invest as efficiently as possible. The need for each investment is therefore considered critically.	
GTS has a statutory duty to minimise gas production from the Groningen gas field, which includes the Zuidbroek nitrogen plant. Regulation dictates that these kinds of investments be recouped through the tariffs.	
The Dutch Gas Act does not currently allow GTS to invest in hydrogen infrastructure. Within the current legal framework, there will therefore not be any cross-subsidisation.	
See our response to 1.5. It must also be noted that the sale of the pipeline for hydrogen transport from Dow to Yara constituted a transfer from GTS to the unregulated domain. This transfer was concluded at a value that is comparable to the remaining standardised asset value (GAW). See our response to 1.5.	
ENTSOG simulations show that capacity limitations may arise in northern Germany under certain conditions. Although the required volume can still be produced amid such issues, the gas would then not be able to reach the Netherlands. No capacity bottlenecks are anticipated in the GTS grid.	
GTS agrees on this. It has also been recorded in Gas TSO Transmission Code Article 2.1.1a.	
GTS goes by the basic principle that it charges for the transmission services it provides. This includes transmission through the Netherlands to circumvent the north-south bottleneck in Germany. In the current situation, this is arranged through a capacity booking on the Oude Statenzijl entry point and an exit booking for Bocholtz. If GTS were to merge its TTF market area with, for example, the German market area, the current virtual interconnection points between both countries would cease to exist. Transmission services would then be charged for through the tariff model selected and/or an inter-TSO compensation model, much like the one GTS currently has with BBL Company.	

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Appendix VII Consultation matrix continued previous page

Nr	Party	Consultation response
1.10		Stranded assets Op dit moment wordt steeds duidelijker dat het GTS net overgedimensioneerd is. Omdat voor deze overcapaciteit geen gebruikers zijn, is een deel van de kosten van GTS inefficiënt. Energie-Nederland is van mening dat deze inefficiënte kosten niet in de tarieven te betalen door netgebruikers terecht zouden moeten komen. Dit heeft ENL, samen met andere representatieve organisaties, ook herhaaldelijk aangegeven in het REG2022 en MORGAN/HOGAN proces dat door ACM is georganiseerd.
1.11		1.6 Realiteitszin, pagina 25 In de lijst met aspecten mist Energie-Nederland de check op redelijke tarieven. Energie-Nederland vindt dit een belangrijk punt om mee te nemen in de overweging
1.12		5.2.1 Reguliere investeringen 2020-2021, pagina 70 Er wordt verwezen naar bijlage VII, die vertrouwelijk is. Deze appendix zou het gehele overzicht van investeringen moeten laten zien, maar die kunnen we vanwege de vertrouwelijkheid niet beoordelen (zie eerder algemeen punt).
1.13		5.3 Aansluitingen, pagina 73 Er wordt gesproken over de mogelijke overname van drie hogedruk leidingen van Liander, ook hier zou er meer informatie moeten staan in de appendix, die vanwege vertrouwelijkheid niet beschikbaar is. Energie-Nederland zou graag meer info over deze mogelijke overname ontvangen.
2.1	Engie	The closure of Groningen field is a decision from the government, and the related costs, mainly the new Zuidbroek nitrogen plant, should not be paid by gas shippers. Long-term bookings have notably been made in the past under very different conditions and circumstances. ENGIE therefore requests again the possibility to adjust and/or terminate its long-term capacity contracts.
2.2		We would be careful about your statement that "from 2025 onwards, L-gas export flows will largely be replaced by additional H-gas transit flows". Given the drastic raise of GTS' tariffs expected in the coming years according to the MORGAN study and the decrease of long-term capacity booking, other routes could become more competitive and be more widely used by shippers, leading to a vicious circle of decreasing booking and increasing tariffs. In addition, we also understood that GRTgaz does not plan to increase the import capacity at Virtualys when the capacity at Taisnières B will decrease.
2.3		Figure 2.18 shows the total gas transmission through the GTS network, both for annual transmission volumes and peak capacities until 2030. When we look closely at the GTS's figures for L-gas exports assumptions available in the Excel sheet, it seems to us that the figures for L-gas exports correspond to the forecasted end users consumption of L-gas in Belgium, France and Germany as published in the L-Gas Market Conversion Review – Winter Report 20201. Could you please elaborate on this point and confirm or infirm? ENGIE would like to remind that for network flow configuration and investment planning purposes, the prevalent assumption for export-transit flows should be based on expected commercial flows made by shippers (and capacity booking), rather than on expected end users consumption in foreign countries. As explained in the L-Gas Market Conversion Review – Winter Report 2020, commercial nominations made by the shippers may differ from end user consumption and impact L-gas exports.
2.4		We would like to have more insight on the trading region concept mentioned by GTS and if currently some studies are anticipated.
2.5		ENGIE of course supports the development of hydrogen in the context of energy transition. However, we would like to insist on the fact that this development should not be made at the expense of current natural gas users. Any part of the infrastructure redirected towards H2 transport should be removed from GTS' RAB and any investment related to it should not be paid by current GTS' shippers. In particular, we see in Appendix VI that capacity on the L-gas border stations decrease gradually over the years. Could you indicate what will happen with the released capacity and in what timing?
2.6		We would like to know more about the Zebra acquisition. If it is obviously in the interest of GTS's and Zebra Gasnetwerk's shareholders, the interest of GTS' shippers is less obvious. Could you share the impact on GTS's tariffs of the acquisition itself and the related technical modification allowing the integration?

GTS' response	Method of processing
GTS does not agree that the network is overdimensioned. The network was built to meet peak capacity demand. Although demand for gas will drop over the coming years, mainly because of the end of L-gas exports, virtually the whole network will continue to be needed to be able to meet demand. Where possible, GTS will adapt network capacity to new usage levels by, for example, reducing compression. GTS furthermore believes that a future decline in utilisation does not mean that investments made in the network are not efficient.	
The way GTS is regulated greatly incentivises GTS to invest as efficiently as possible. The need for each investment is therefore considered critically.	
See the answer to question 1.1.	
GTS published this information (to the extent that it is not confidential) following a request from Energie-Nederland.	The requested information (when not confidential) is included in the draft IP.
GTS is aware of this issue. Cancellation or adjustment of transport contracts is not possible in the current legal framework. So GTS is not allowed to adjust the LT on a bilateral basis. If LT contracts were terminated, it would lead to a shift of costs to shippers who do not have long-term capacity contracts. GTS is willing to discuss potential solutions, albeit only with all relevant stakeholders, not only shippers with LT contracts.	
We do not expect L-gas export flows to largely be replaced by additional H-gas flows. As shown in figure 2.18, both L-gas export and H-gas transit are expected to decline compared to today's levels. From our analysis we conclude, however, that H-gas transit shows an increase after 2025, which is likely caused by increased H-gas demand in neighbouring countries. This increase in H-gas transit is, however, limited compared to the decline of L-gas exports.	
The figures on L-gas exports were indeed provided by the relevant governments represented on the Market Conversion Task Force. GTS uses this data in issuing advice on the required level of production from the Groningen field for security of supply (SoS). We are aware that shippers' nominations may differ from actual consumption by end users. GTS will see to it that we can accommodate these nominations to the extent that they fall within the contractual boundaries of the transport contracts.	
At this point, GTS can only refer to the available theoretical models, such as full market integration (see Germany) or trading region models: • ACER: European Gas Target Model Review and Update, 2015; • European Gas Target Model – review and update Annex 6 Tools for gas market integration and connection, 2015; • Europese Commissie: Entry-exit regimes in gas part A and B, 2015. See also question 1.7.	
See the answer to question 1.5. The impact of declining L-gas export capacity on the total transmission system is still the subject of research. We are looking at the possibility of shutting down compression or converting L-gas infrastructure into H-gas infrastructure.	
We expect this acquisition to have a neutral effect on tariffs, and it may even lead to a drop of several percentage points. This is because the acquisition adds approximately 1.5 bcm to the TTF market area and helps us improve the overall utilisation of the national grid. The costs involved in maintaining the ZEBRA network will go down, while the forecasted contracted capacities in the national grid will go up. This increase in the forecasted contracted capacities compensates for the increase in costs for GTS. This results in a neutral to minor positive effect on GTS tariffs.	

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Nr	Party	Consultation response
2.7		The level of investment, about 1.5B€ over 10 years, including 300M€ in 2020 is obviously very important. We ask GTS to be very careful about potential overinvestments, in a context where the consumption of gas, and especially natural gas, is decreasing. As pointed out in the Frontier report prepared for Energie Nederland, Nogepa and VGN2, a large part of the investments made during the first three open seasons is already stranded (between 0.75 and 1.45 B€ according to Frontier). Long-term shippers are especially already suffering from this situation, and GTS should not increase this burden.
3.1	Fluxys	We begrijpen uit het document dat, rekening houdend met deze twee gebeurtenissen, de ENTSOG TYNDP 2018 simulaties niet geldig meer zijn, en dat nieuwe berekeningen, aangevraagd door GTS aan ENTSOG in 2019, een capaciteitsbeperking in Noordwest-Europa aantonen in bepaalde situaties. Daarenboven refereert u ook naarde evolutie van de historische flowsin de interconnectiepunten Emden en Oude Statenzijl, waarbij gesteld wordt dat deze twee grenspunten mogelijk in verzadiging kunnen komen. Er wordt ook aangegeven dat deze kwestie verder geanalyseerd zal worden in de context van de interne 'L-gas monitoring Task Force' - dit onderwerp is ondertussen al geïntroduceerd in de Task Force sessie van 20 mei. Voor zover wij op de hoogte zijn, werd de ENTSOG analyse, resulterend in een mogelijke capaciteitsbeperking in Noordwest-Europa, tot nu toe niet besproken in de ENTSOG Network Model Kernel Groups (NeMo KG). Rekening houdend met het belang van dit onderwerp voor de bevoorrading van H en L gas in Noordwest-Europa, zouden wij het bijzonder nuttig vinden om inzage te krijgen in de details van de scenario's en de hypothesen die gebruikt zijn bij de berekeningen van het capaciteitstekort, bijvoorbeeld via bijkomende toelichting in het Investment Plan.
3.2		Daarnaast, rekening houdend met de verwijzing naar een eventuele bottleneck op de route van Duitsland naar Nederland, stellen we voor om in het belang van de totale markt de toekomstige importmogelijkheden, onder andere via België, samen te onderzoeken. In dit opzicht zou de totale entrycapaciteit van België naar Nederland tenminste op het zelfde niveau als vandaag gehouden moeten worden, eerder dan gereduceerd te worden zoals voorzien in uw ontwerpplannen. Fluxys heeft immers vandaag al significante hoeveelheden entry capaciteit voor gas afkomstig uit Noorwegen, LNG (verbindingen met zowel Zeebrugge als Dunkerque terminals), het VK en Duitsland, en zou dit gas ook in de toekomst verder kunnen transporteren naar de VIP BeNe. Verwijzend naar de nauw gekoppelde netten van Fluxys en GTS, stellen wij voor om deze analyse met betrekking tot de bevoorradingszekerheid samen te bespreken, in lijn met onze Europese verplichtingen om de transportcapaciteit aan beide kanten van de grens te coördineren, en dit in het belang van een optimale marktwerking in Noordwest-Europa.
4.1	Nederlandse Olie en Gas Exploratie en Productie Associatie (NOGEPA)	Algemene opmerking vooraf Het ontbreekt NOGEPA aan voldoende expertise om zich op grond van de verstrekte informatie een oordeel te kunnen vormen of de voorgestelde investeringen noodzakelijk zijn. Een complicerende factor is dat ook niet alle informatie door GTS is verstrekt, aangezien sommige bijlagen als vertrouwelijk zijn aangemerkt. Het is aan ACM en EZK om zorg te dragen dat zij de benodigde expertise in huis hebben om zich een dergelijk oordeel te vormen. Als algemene belangrijke kanttekening merken wij op dat het ons zeer verbaast dat het door GTS verwachte investeringsniveau in de periode 2024-2030 stabiel is, terwijl er sprake is van een dalende benutting van het GTS netwerk in de komende jaren.
4.2		Reikwijdte van dit investeringsplan en de goedkeuringen door ACM en EZK Tabel 5.11. laat zien dat op peildatum 31-01-2020 er nog 16,4 mln EUR pre-FID is voor 2020 en 88,7 mln EUR pre-FID voor 2021. Op het moment dat de ACM het investeringsplan ziet (01-07-2020), zullen de pre-FID bedragen lager zijn. Voor de periode tot het volgende investeringsplan (01-01-2022) zijn er dus al diverse projecten van een FID voorzien en is het is voor ons niet duidelijk waar de goedkeuring van ACM (en EZK) voor dit investeringsplan dan precies betrekking op heeft. Wellicht is het behulpzaam als de tabellen met investeringen worden voorzien van een kolom met daarin de uiterste FID-datum. Gezien de 3 maanden die beschikbaar is voor ACM en EZK voor goedkeuring van een hierop volgend investeringsplan, veronderstellen wij dat een FID-datum tot 31 maart 2022 relevant is voor de goedkeuringen voor het voorliggende investeringsplan.

GTS' response	Method of processing
See the answer to question 1.3. GTS disagrees with the comment about open seasons.	
Given that your organisation is part of the NEMO KG, we can share these files with you. We will be in touch with you about this (and about the next point).	
The flows in the import and export scenarios are based on ENTSOG calculations, but we will gladly go into greater detail on the analysis in collaboration with Fluxys.	
See the answer to questions 1.1 and 1.3.	
GTS will compile a list of all projects on which a FID was made in the period between 18 May 2020 (the reference date for the draft IP) and 1 July 2020, and send it to the ACM and the Ministry of EZK.	GTS will compile a list of all projects on which a FID was made in the period between 18 May 2020 (the reference date for the draft IP) and 1 July 2020, and send it to the ACM and the Ministry of EZK.

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Nr	Party	Consultation response
4.3		Belang van kleine velden gasproductie Aardgas zorgt op dit moment voor meer dan 40% van de Nederlandse energievoorziening. Nederland heeft de komende jaren aardgas nodig. In alle geschetste scenario's van het Planbureau voor de Leefomgeving (PBL) speelt aardgas dan ook de komende decennia een belangrijke rol. Het PBL becijfert dat we in Nederland in 2030 zo'n 30 miljard m^3 aardgas gebruiken. Het kabinet stelt daarbij: "Het kabinet geeft voorkeur aan gaswinning uit de Nederlandse kleine velden, zowel op land als op zee, omdat dit beter is voor klimaat, werkgelegenheid, economie, behoud van kennis van de diepe ondergrond en aanwezige gasinfrastructuur." NOGEPA en haar leden zetten zich in om hierin te voorzien door op een veilige en verantwoorde wijze de komende decennia gas te blijven winnen. Wij verwachten dan ook dat producenten van kleine velden in Nederland in de toekomst zullen doorgaan met het indienen van verzoeken bij GTS voor nieuwe aansluitingen.
4.4		H-gas aanbod In de laatste alinea op pagina 50 en op pagina 57 spreekt GTS de zorg uit of er voldoende H-gas voor Nederland beschikbaar zal komen. NOGEPA deelt deze zorg niet. Wij denken dat op basis van prijsvorming (commodity) er voldoende H-gas voor Nederland beschikbaar zal zijn.
4.5		Marktintegratie Op bladzijde 7 en in de laatste alinea van paragraaf 3.2.2 gaat GTS in op een periodiek onderzoek inzake marktintegratie. Met verwijzing naar de discussies rondom het verdwijnen van het Interconnectiepunt Julianadorp verzoeken wij GTS om dergelijke marktintegraties niet door te voeren. Naar ons oordeel leidt het opheffen van interconnectiepunten tot een ongeoorloofde kruissubsidiëring en tot hogere tarieven voor de netgebruikers die fysiek gas invoeden of onttrekken aan het GTS-systeem . Daarnaast zijn dergelijke marktintegraties ook helemaal niet nodig, de TTF is immers de meest liquide handelsplaats van Europa.
4.6		Duitse marktintegratie In paragraaf 3.2.2. merkt GTS op dat capaciteitsknelpunten in het Duitse netwerk kunnen worden opgelost, door het gas via Nederland te transporteren en dat GTS regelmatig overleg voert met de betrokken Duitse TSO's. We krijgen de indruk dat GTS hier een operationele dienst verleent. Naar ons oordeel betreft het hier gewoon transport door het GTS netwerk (in dit geval "transit") en dient de desbetreffende klant (ook als dat een TSO is) gewoon de van toepassing zijnde GTS entry- en exit tarieven te betalen; anders zou er sprake zijn van discriminatie. We verzoeken ACM om er op toe te zien dat er inderdaad geen sprake is van discriminatie tussen TSO's en shippers/netgebruikers.
4.7		Investeringen inzake de ontwikkeling van waterstof transport NOGEPA is van oordeel dat het de waterstof markt een separate markt is dan die van aardgas. Vermeden moet worden dat er kruissubsidie plaatsvindt waarbij de gebruikers van het aardgastransportnet betalen voor het transport voor waterstof door toekomstige gebruikers. NOGEPA pleit er voor dat assets in het aardgassysteem die niet meer nodig zijn voor het aardgas transport, maar wel zinvol zijn voor het waterstof transport in de toekomst, zo snel mogelijk uit de Regulatory Asset Base (RAB) van GTS gehaald worden en bijvoorbeeld worden overgedragen aan een nieuwe entiteit, niet zijnde GTS. NOGEPA kan op basis van de verstrekte informatie niet nagaan in hoeverre er in het voorliggende ontwerp-IP mogelijk investeringen zijn opgenomen die zorgen voor instandhouding van bepaalde assets, terwijl deze assets niet meer nodig zijn voor het aardgastransport, maar wel zinvol zijn voor toekomstig waterstof transport. Zulke investeringen horen niet thuis in het IP van GTS. NOGEPA verzoekt ACM (en EZK) om zich er van te verzekeren dat dergelijke investeringen niet zijn opgenomen in dit IP en mochten ze dat wel zijn, dan hiervoor geen goedkeuring te verlenen.

GTS' response	Method of processing
At the moment, there are no specific requests. Needless to say, GTS will attend to any future requests for a connection for gas intake from small fields.	
See the answer to question 1.7.	
See the answer to question 1.8.	
See the answer to question 1.9.	
See the answers to questions 1.5 and 6.4.	

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Nr	Party	Consultation response
4.8		Relatie investeringen en methodebesluit Er zijn nu separate trajecten voor het investeringsplan (IP) en het methodebesluit van ACM voor de komende reguleringsperiode (2022+). Investeringen van GTS kunnen invloed hebben op de hoogte van de RAB en daarmee op de hoogte van transporttarieven voor netgebruikers. NOGEPA is van oordeel dat investeringen door GTS die het gevolg zijn van beleidsbeslissingen van de overheid, niet voor rekening zouden moeten komen van de netgebruikers. Voorbeelden hiervan zijn de investeringen als gevolg van het besluit tot sluiting van Groningen, zoals de N2-installatie in Zuidbroek en de GTS investeringen om de grootste L-gas afnemers in Nederland over te schakelen naar het H-gas systeem. Ook hieraan gekoppelde operationele kosten, zoals bijvoorbeeld extra N2 inkoop te Wieringermeer, elektriciteit voor Zuidbroek en onderhoud van de desbetreffende assets, dienen niet bij de netgebruikers in rekening te worden gebracht. NOGEPA stelt voor dat GTS in overleg gaat met ACM en EZK om te bezien hoe GTS dergelijke kosten vergoed kan krijgen, bijvoorbeeld uit de algemene middelen, zonder dat deze kosten voor rekening komen van de netgebruikers. Onder verwijzing naar het onder meer door NOGEPA geïnitieerde rapport van Frontier Economics (februari 2020) merkt NOGEPA op dat GTS in het verleden investeringen heeft gedaan die inmiddels geheel of gedeeltelijk stranded zijn. NOGEPA is van oordeel dat de kosten van dergelijke stranded assets niet meer bij de netgebruikers in rekening te worden gebracht. Voor de nu voorliggende investeringen is het voor NOGEPA onduidelijk hoe lang dergelijke investeringen benut zullen worden en wellicht al op relatief korte termijn het karakter van een stranded asset zouden kunnen krijgen.
4.9		Incrementele capaciteit In paragraaf 5.6 wordt ingegaan op een niet-bindende vraagindicatie op de grens tussen TTF en Trading Hub Europe: “De uitkomst van deze veiling, in combinatie met een economische test, bepaalt uiteindelijke of de voorgestelde projecten worden gerealiseerd”. Onder verwijzing naar het hier boven genoemde rapport van Frontier Economics (februari 2020) merken wij op dat investeringen op basis van eerdere open seasons inmiddels een stranded karakter hebben gekregen. Om dit in de toekomst te vermijden, verzoeken wij GTS dringend om een zeer strenge economische test uit te voeren, bijvoorbeeld in combinatie met een zeer langlopend commitment van de desbetreffende shippers, alvorens dergelijke projecten te realiseren.
4.10		Desinvesteringen Voor een compleet overzicht voor netgebruikers, zou het helpen als GTS een overzicht geeft van de verwachte desinvesteringen gedurende de zichtperiode (2020-2030). Naast assets die wellicht in de toekomst gebruikt kunnen worden voor het transport van waterstof (zie hierboven), kunnen dit ook andere assets betreffen die voor andere doeleinden gebruikt kunnen worden (wellicht in de upstream, voor CCS of voor RNB’s?).
4.11		Transparantie richting netgebruikers inzake rekenvolumina Voor netgebruikers, zoals NOGEPA, is het van belang de tarieven voor de toekomst in te kunnen schatten. Input voor deze schatting is onder meer de onderverdeling van de geraamde transportcapaciteiten (“rekenvolumina”) naar de categorieën binnenlandse productiepunten, grenspunten, LNG en bergingen aan entry-zijde en naar de categorieën distributiebedrijven, direct aangeslotenen, grenspunten en bergingen aan exit-zijde. In aanvulling op de getoonde tabellen in 2.2.4 stelt NOGEPA voor dat extra tabellen worden opgenomen waarin de geschatte benutting in termen van “rekenvolumina” wordt weergegeven en niet alleen in de vorm van piekcapaciteit, dit voor zowel entry als exit en voor alle jaren in de periode 2020-2030.
4.12		Overname ZEBRA netwerk Op pagina 70 wordt de overname van het ZEBRA netwerk besproken en beschrijft GTS dat er naast de overname ook sprake is van investeringen voor aanpassingen in het netwerk. In eerder overleg met marktpartijen heeft GTS verzekerd dat de overnameprijs zodanig is vastgesteld dat er geen sprake is van tariefstijging voor de bestaande GTS entries en exits. Nu er extra kosten zijn, is het voor ons onduidelijk of er inderdaad geen sprake is van een tariefstijging. Wij verzoeken u aan te tonen dat er conform eerdere toezeggingen geen prijsstijging plaatsvindt.
4.13		Inzichtelijkheid in tabellen In diverse tabellen is een kolom opgenomen met “verwachting cumulatief”. Het is voor de lezer onduidelijk welke periode hier wordt bedoeld. Zo wordt bijvoorbeeld in tabel 5.6 voor verleggingen van leidingen een bedrag van 78 mln EUR genoemd. Op basis van de informatie in tabel 5.7 zien we dat deze 78 mln EUR overeenkomt met het totaal over de periode 2020-2025, maar in Bijlage III in tabel V.1. wordt een periode van 2020-2024 vermeld. Anderzijds krijgen wij op basis van de tabellen in bijlage V het idee dat de cumulatieve bedragen wellicht betrekking hebben op een periode vanuit het verleden tot en met 2021. Wij verzoeken u dit te controleren en zorg te dragen dat e.e.a. inzichtelijker wordt en dat de juiste periodes worden gebruikt. De opsomming van de investeringen in tabel V.2 is nu gebaseerd op projectnummer. Het is overzichtelijker wanneer eerst gesorteerd wordt op “status project” en vervolgens op projectnummer.

GTS' response	Method of processing
See the answers to questions 1.4 and 1.10.	
GTS does not accept the suggestion that investments based on previous open seasons have become stranded investments. GTS has a strong regulatory incentive to invest as efficiently as possible. The economic test that is part of the process for incremental capacity is designed by the ACM. Sufficient commitment from the market is always a prerequisite for implementation of projects.	
See the answer to question 1.2.	
GTS is looking into ways to make the annual estimate of forecasted contracted capacities more transparent for the market. An estimate of the forecasted contracted capacity per segment listed will, however, not be able to cover the whole 2020-2030 period due to the complexity of the changing market. GTS is of the opinion that tariff predictability would be greatly served by clear agreements as part of the Method Decision. We would also like to refer to the scenarios for future capacity sales that the ACM has developed as part of the MORGAN project.	
See the answer to question 2.6.	
Page 68 of the draft IP submitted for consultation includes an explanation of the term 'forecast – cumulative', which concerns the total costs (i.e. past, current and future costs) of ongoing and new projects. GTS has sorted the projects by status in Appendix III of the draft IP for submission. Section III 1.1 explains various abbreviations.	GTS has sorted the projects by status in Appendix III of the draft IP for submission.

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Nr	Party	Consultation response
5.1	OMV Gas Marketing & Trading GmbH (OMV Gas)	We would like to emphasize that the integration of the Zebra network does not add much benefit for transit shippers and therefore we would like to gain better understanding how the planned investment will be recovered by GTS.
5.2		We cannot comprehend the comparably large amount predicted for IT (CAPEX) investment, projected at 11 mio € per year. We are questioning this huge investment volume and would like to invite GTS to keep its IT investment scheme as efficient as possible.
5.3		We would like to raise concerns in regard to the future role of H-Gas imports. We are questioning the concept that additional H-gas import capacity into the Netherlands might be required for the purpose of gas being fed into to-be built H->G/L conversion infrastructure before it is re-exported as G/L-Gas to neighbouring countries. We assume it should not be the task of the Dutch market to finance infrastructure projects dedicated for – in fact - abroad market needs. Instead and in line with overall grid efficiency targets, we would prefer regional approaches which utilize existing (import) infrastructure also in neighbouring countries to the best extent possible to overcome potential L-Gas shortages.
5.4		OMV Gas considers the IP2020 as a valuable piece adding up to the quality and reliability of the Dutch gas market in the mid to long-term future. However, we strongly request that the recovery mechanism of investment costs and TSO costs in general needs to undergo significant changes. In particular the tariffication of transit contracts has become unduly discriminative with regard to the fact that H-Gas long-term contracts have already been cross-financing significant investments in L-Gas projects over the past years without benefitting from said projects. For the upcoming regulatory (2022 ff) period this cross-subisidization between gas qualities is expected to accelerate: the sector agreement foresees full socialization of quality conversion costs, which constitute a significant share of the IP2020 for that period. We would however invite all relevant authorities and GTS to design, in accordance with European legislation under the involvement of market parties, future tariffication schemes which are more cost-reflective with respect to gas quality issues. The desired result should be the creation of fair conditions also for the transit market which serves as the backbone to the entire TTF market area.
6.2	Vereniging Energie, Milieu en Water (VEMW)	Volgens het Ontwerpplan gaat GTS onderzoeken op welke manier de Duitse marktintegratie (GASPOOL en NCG) in 2022 de verkoop van capaciteitsproducten via het huidig aantal bestaande Virtuele Interconnectie Punten (VIP's) gaat beïnvloeden. Met de mogelijkheid één VIP te creëren om zo een 'trading region' te gaan vormen met Duitsland. Daarbij neemt GTS de mogelijkheid mee om de dalende benutting in het GTS netwerk en de daarbij vrijvallende capaciteit her te gebruiken om Duitse transportknelpunten (tussen Noord- en Zuid-Duitsland) op te lossen: Nederland als doorvoerland via bijvoorbeeld entry Oude Statenzijl en exit Bocholtz. Een eerste capaciteitsanalyse wijst volgens het Ontwerpplan uit dat een aanzienlijk deel van de vrijvallende capaciteit hiervoor kan worden ingezet. VEMW juicht dit soort doelmatigheidsopties toe onder de voorwaarde dat ze geen knelpunten opleveren in het landelijke gastransportnetwerk van GTS. Voor de eindverbruiker is de voorzieningszekerheid immers van groot belang. VEMW vraagt GTS nadere informatie hierover te verstrekken, alsmede de mogelijke consequenties voor investeringen en operationele kosten, als inschatting op te nemen in het Investeringsplan.
6.3		GTS maakt voor de balancering van het gastransportnetwerk gebruik van de systeemopslagen Norg (G-gas) en Grijpskerk (H-gas), en waar nodig gasopslagen van andere partijen. De flexibiliteit werd in belangrijke mate geleverd door het Groningenveld, maar moet door sluiting van de winning volledig worden overgenomen door de gasopslagen. Gasopslagen die volgens het Ontwerpplan mogelijk door sluiting niet langer beschikbaar zijn op het benodigde capaciteits- en volumeniveau. Zo heeft NAM bekendgemaakt dat de ondergrondse gasberging bij Grijpskerk in 2021 zal worden gesloten. In het Ontwerpplan zegt GTS te onderzoeken hoe gewaarborgd kan worden dat gasopslagen voldoende door shippers worden gebruikt vanaf het moment dat alle kwaliteitsconversiemiddelen (QC) door GTS zijn ingezet en Groningen niet meer beschikbaar is. VEMW ziet in het Ontwerpplan echter geen plan-B ingeval de – benutting van de - beschikbare capaciteit onvoldoende gaat zijn om het net te allen tijde in balans te houden. VEMW ziet in het Investeringsplan dan ook graag een inschatting van de mogelijke consequenties, zeker daar waar dat noodzakelijke investeringen betreft.

GTS' response	Method of processing
See the answer to question 2.6.	
The CAPEX investments listed are based on experience figures and include required replacement investments and investments through regulatory changes. The way GTS is regulated greatly incentivises GTS to invest as efficiently as possible. The need for each investment is therefore considered critically, first internally at GTS and subsequently by the ACM through the draft IP.	
Neighbouring countries are mostly dependent on Dutch L-gas production and QC facilities. Due to the closure of the Groningen field, L-gas can only be produced from H-gas and nitrogen. We therefore need enough H-gas to be able to serve the market. Costs will be paid on (V)IPs.	
See the answer to question 1.4. GTS would also like to emphasise that the introduction of a quality-neutral gas market has contributed greatly to the increase in shippers' trading possibilities and in the liquidity of the TTF. The quality conversion will therefore benefit all network users.	
German market integration will require extra capacity in Germany, which, as specified in the example, GTS can supply as a regular transport service. This will not require additional investments in the GTS grid.	
GTS does not have any balancing assets of its own. The storage facilities are used by the shippers, not by GTS. Our analyses and those by Brattle show that L-gas storage facilities will continue to be needed throughout this decade to guarantee security of supply in the L-gas market. Early closure of the Norg storage facility would mean that production from the Groningen field would have to continue for longer. That is, therefore, plan B as far as L-gas is concerned.	

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Nr	Party	Consultation response
6.4		Waterstof In het Ontwerpplan geeft GTS aan een deel van het landelijke gastransportnet op termijn (vanaf 2026) te willen separeren om een puur waterstof netwerk (backbone) mogelijk te maken tegen doelmatige kosten. De totale investeringen ten behoeve van dat waterstofnetwerk zijn, als gebruik wordt gemaakt van reeds bestaande assets van GTS, in 2019 geraamd op €1,7 miljard inclusief het plaatsen van nieuwe compressie en exclusief eventuele overnamekosten. Kosten die voor rekening komen van een nog door de minister aan te wijzen waterstofnetbeheerder, die mogelijkerwijs een zusterbedrijf van GTS zou kunnen zijn. Indien reeds vanaf 2026 een deel van het GTS gastransport netwerk (HTL) kan worden gesepareerd en in gebruik genomen kan worden t.b.v. waterstoftransport, dan roept dat de vraag op of het GTS gastransportnetwerk nog wel doelmatig functioneert, en de kapitaalslasten en operationele kosten die verbonden zijn aan dat deel van het gastransportnet via gastransporttarieven in rekening gebracht mogen worden bij de gasnetgebruikers. Want kennelijk is dat deel van het gastransportnet vanaf 2026 niet langer nodig voor het transport van aardgas. VEMW vraagt verduidelijking op dit punt in het Investeringsplan.
6.5		Opvallend is dat de investeringskosten voor de ombouw naar waterstof worden benoemd (€ 1,7 mrd), maar niet de overnamekosten. Die overnamekosten zouden wel al ingeschat kunnen worden als we ervan uitgaan dat ook het waterstofnetwerk (backbone) gereguleerd gaat worden, met als onderdeel van de regulering een gestandaardiseerde asset waarde (GAW). Ons inziens zou die GAW niet hoger mogen zijn dan de GAW die nu is opgenomen voor dat te separeren deel van het GTS transportnetwerk. De netgebruiker heeft voor zijn activiteiten moleculen nodig, en voor de transportkosten maakt het niet wezenlijk uit of die moleculen aardgas of waterstof zijn. VEMW beveelt aan in het Investeringsplan een inschatting op te nemen van de overnamekosten, ervan uitgaande dat de waterstofvoorziening gereguleerd gaat worden.
7.1	Vereniging Gasopslag Nederland	The important role of gas storages in the period up to 2030 VGN agrees with a number of points made by GTS in favour of the continued availability of both L-gas and H-gas storages in the Netherlands for a well-functioning gas market and security of supply. In particular, VGN supports the observations that "security of supply will require continued availability of seasonal L-gas storage facilities through to 2030 at least" and that "any closure of a seasonal H-gas facility will lead to shortages in the market for H-gas flexibility". VGN shares the view that the existing infrastructure and market mechanism should be maintained for the benefit of all consumers. Following the closing of the Groningen field, existing gas storage facilities can serve an especially important role as key providers of flexibility and security of supply for the Dutch gas market as well as for other markets in the region. VGN is interested in hearing the views of GTS on potential measures to ensure that existing storages remain operational and closures are prevented, with due consideration of the full range of benefits provided by gas storages to the functioning of the gas market and security of supply. Here, VGN would like to raise attention on the level of transport costs as a risk factor for the continued availability of storage facilities. Transport tariffs for using the GTS transmission system are projected to increase significantly over the same ten-year period until 2030 as within the horizon of the draft IP. Further investments in the GTS transmission system, and any proposals for further market integration, should be balanced against the general concern of system users on the rising level of transport tariffs. Fundamentally, VGN does not agree with placing all demand risk on system users. This is a point that has been raised by VGN in the course of ongoing discussions with GTS and the ACM on the Method Decision 2022 (de Methodebesluit). VGN also does not agree with the principle that all investments are by definition included in the regulated asset base (hereinafter: RAB) of GTS and thus automatically charged to system users. For instance, the high costs resulting from the policy decision to close the Groningen field, such as the investments for the nitrogen facility in Zuidbroek and for switching L-gas users to the H-gas system, should not be borne by system users.
7.2		Forecasted usage of the GTS transmission system VGN notes that the draft IP contains various tables on the forecasted usage of the GTS transmission system in the period up to 2030. The forecasted usage of the GTS transmission system is of interest to system users as an important element for predicting future tariffs. In that respect, VGN would like to request GTS to provide an additional table where the forecasted usage up to 2030 is translated into the expected "Rekenvolume" for the eight segments corresponding to GTS transport tariffs (being for Entry: Border, Storage, Production, LNG; and for Exit: LDC, Industrial, Border and Storage).

GTS' response	Method of processing
Gasunie is currently looking into how to develop hydrogen infrastructure, which will include the use of existing gas infrastructure, possibly through asset unbundling. The idea is that the users of the hydrogen infrastructure will largely be parties that currently still use natural gas and have a connection to the national gas grid. 'Switching' these parties to hydrogen would therefore be necessary to generate sufficient demand and utilise the existing gas infrastructure.	
GTS is currently not able to give an estimation of any acquisition costs that would be involved in creating hydrogen infrastructure. This is because 1) it is not yet clear which assets would have to be selected for possible acquisition, and 2) the Dutch Gas Act dictates that GTS must use a price for such acquisitions that is in keeping with market rates. This price can be either higher or lower than the standardised asset value. In fact, the current regulation method dictates that the standardised asset value be used for asset transfers between regulated network operators.	
See the answer to question 1.4.	
See the answer to question 4.11.	

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Nr	Party	Consultation response
7.3		Investments for the development of hydrogen infrastructure The Dutch Climate Agreement (het Klimaatakkord) includes a programme for hydrogen, and the development of a market for hydrogen is one of the policy goals for the Dutch government. As such, the draft IP also takes into account demand scenarios for hydrogen and the possibilities for developing hydrogen infrastructure using existing natural gas infrastructure. On this point GTS refers to a previous analysis which concluded that almost all parts of the GTS network are suitable for the transmission of hydrogen with additional investments (estimated at €1.7 billion in 2019 excl. any acquisition costs. GTS further refers to the question of whether hydrogen will become an integral part of the current gas market or whether it will constitute a separate market with its own dedicated infrastructure. While there can be a future role for hydrogen in the Netherlands and in parts of Europe, VGN believes that natural gas and hydrogen can only be complementary components of the energy mix and do not constitute perfect substitutes. It is therefore important that there is no cross-subsidization of hydrogen investments via transport tariffs charged to natural gas system users. The proposed hydrogen system should be clearly separated from the existing natural gas system, whereby users of the natural gas system are not exposed to the costs of developing the hydrogen market and infrastructure. Similarly, where existing parts of the natural gas infrastructure are made available for hydrogen, such parts should be sold at a market price and the proceeds taken out of the RAB. In order to ensure transparency and safeguard the ability of interested parties to respond to the proposed investments, GTS should make clear which investments are linked to which types of gas. VGN notes that there are no hydrogen investments included in the current draft IP. In the future, separate overviews of the investments planned for hydrogen, natural gas, and other types of gas should be included in the IP (as appropriate) or otherwise provided to all interested parties.
7.4		Implications of the draft IP procedure for the Method Decision 2022 VGN has concerns regarding the separation between the process for finalizing and/or amending the draft IP, and the process for finalizing the Method Decision 2022 where discussions led by the ACM are still ongoing. The method decisions set out the calculation methodology for natural gas transport tariffs, including the determination of the RAB. As such, the outcome of the Method Decision 2022 is of central importance to system users, including VGN, who are concerned about the significant increase expected in the level of transport tariffs over the coming period up to 2030. This is a result of the sharp decrease in forecasted capacity bookings and existing GTS gas infrastructure becoming stranded. Therefore, VGN is of the opinion that system users should be given the opportunity to consider the necessity of the investments of GTS within the wider context of the total RAB, regardless of whether the draft IP has been finalized. VGN would like to invite GTS and the ACM to provide additional clarity to system users on the relationship between the separate processes for the draft IP and the Method Decision 2022, especially with regard to the status of concrete investments outlined in the draft IP in case of a re-determination of the total RAB. As a final note, we assume that the draft IP represents the best available forecast of GTS investments and will also be taken into account in the Method Decision 2022.

GTS' response	Method of processing
See the answers to questions 1.5, 6.4 and 6.5.	
GTS considers the draft IP to be a guiding document when it comes to assessing the necessity for investments in the Netherlands. The Method Decision provides for the compensation of efficient capital costs (including those involved in new investments).	

Colophon

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