Advise on the required Groningen production and capacity to ensure the Security of Supply

Consultation on planning assumptions for gas year 2021/2022 and later

Content

- Legal framework
- Recap methodology
- Evaluation gas year 2019/2020
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Legal framework

- Since January 1st, 2019, GTS has the legal obligation to advise the Minister of Economic Affairs and Climate Policy regarding the Groningen production before February 1st of each year
- This advice concerns:
  - The required Groningen volume and capacity for the next gas year
    - A formula describing the relation between temperature and required Groningen volume, the so-called degree day formula
    - A formula describing the relation between temperature and the total L-gas demand
  - Outlook for the coming ten years regarding:
    - The required Groningen volume and capacity
    - The total L-gas demand and the demand of protected customers in the Netherlands
  - Consultation of the planning assumptions with market parties is a requirement
- After the gas year GTS must report before November 1st of each year:
  - Usage of the blending facilities
  - Usage of storages and LNG
  - Green gas production
  - *Progress on the conversion of largest L-gas industries/power plants to H-gas*
- Finally, during the gas year, GTS must report significant deviations which could affect the required Groningen production

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Recap methodology (update)

Modelling required Groningen volume (simplified)

Our volume model is an energy balance for every hour in a gas year

Step 1. Determine the demand for a temperature profile (gas year)

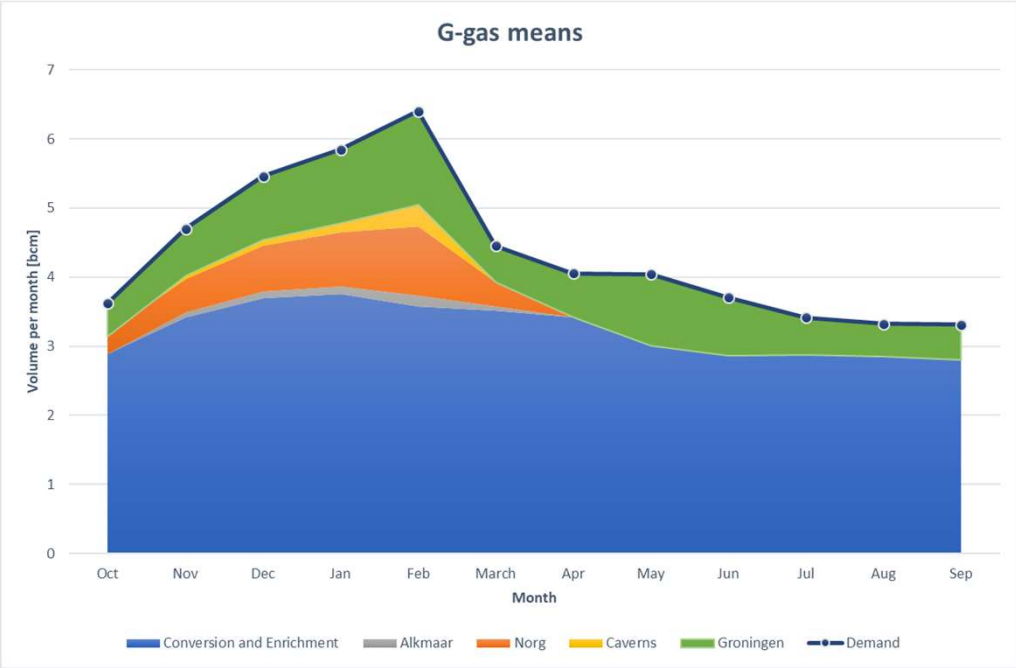
Step 2. Model the usage of quality conversion

Step 3. Model the usage of seasonal storages

Step 4. Model the usage of caverns

Step 5. Determine the required Groningen volume (remaining volume)

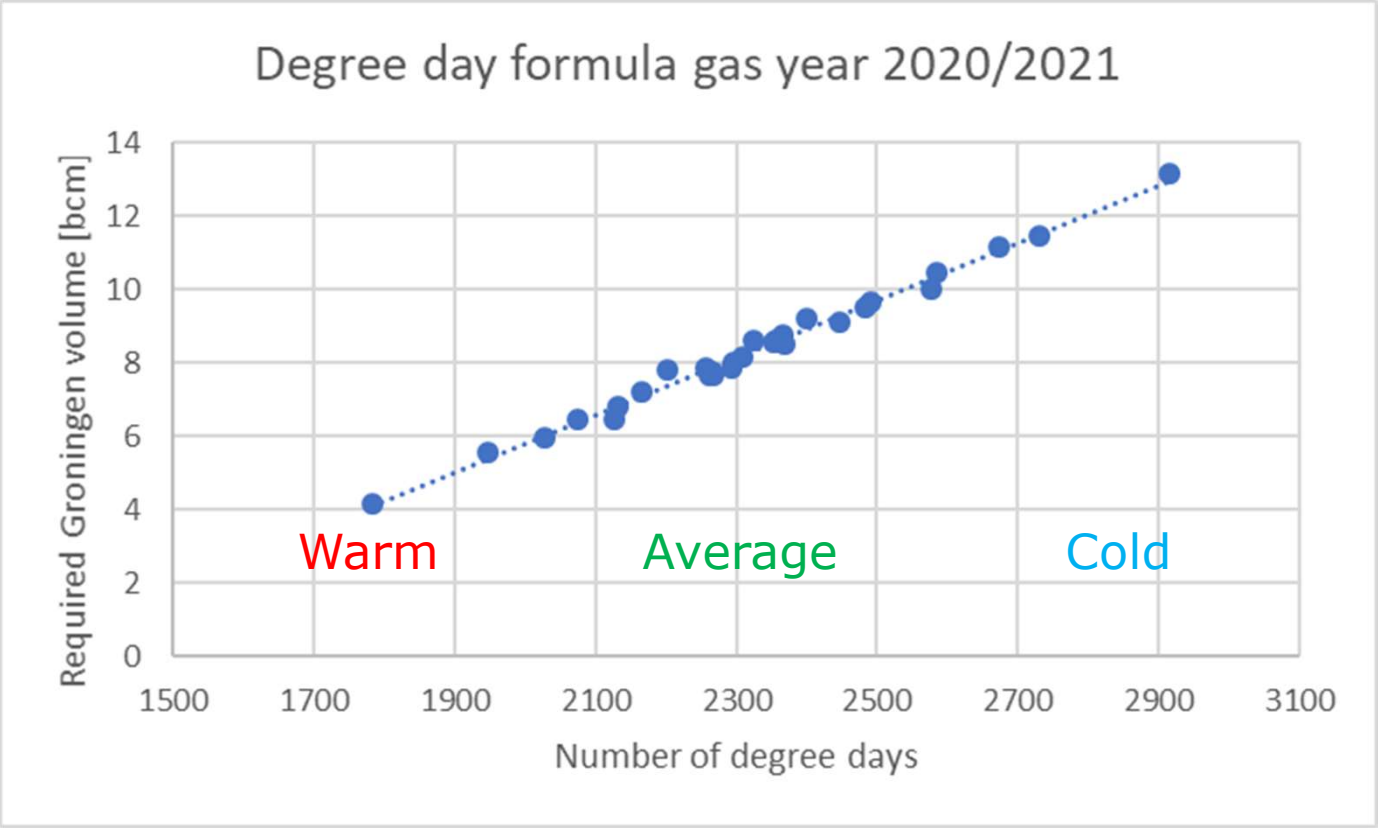
Step 6. Repeat for Step 1. to 5. for the remaining 29 temperature profiles



Example: average gas year 2020/2021

Recap methodology (update)

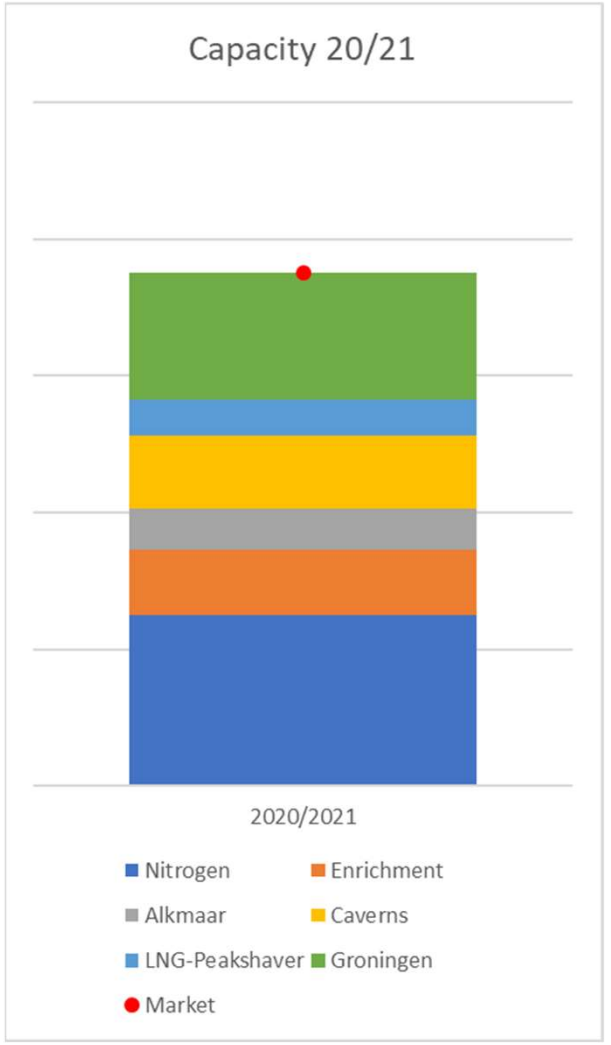
Temperature vs Groningen supply, September 2020



Recap methodology (update)
Modelling required Groningen capacity

- Assumption:
  - Required Groningen capacity based on European regulation, to safeguard the security of gas supply (25 Oct 2017, 2017/1938), article 5 Infrastructure standard, clause 1
  - Single largest infrastructure (capacity) = UGS Norg
  - Once in 20 years is translated to a daily average temperature of -15.5°C

- Method:
  - Determine the market demand at a temperature of -15.5°C
  - Use all (including back-up) facilities at their technical capacity excluding UGS Norg and excluding Groningen
  - Use Groningen to close the gap between demand and supply



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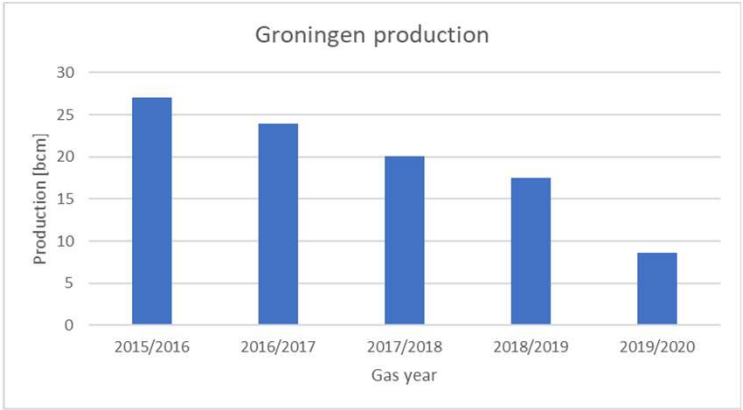
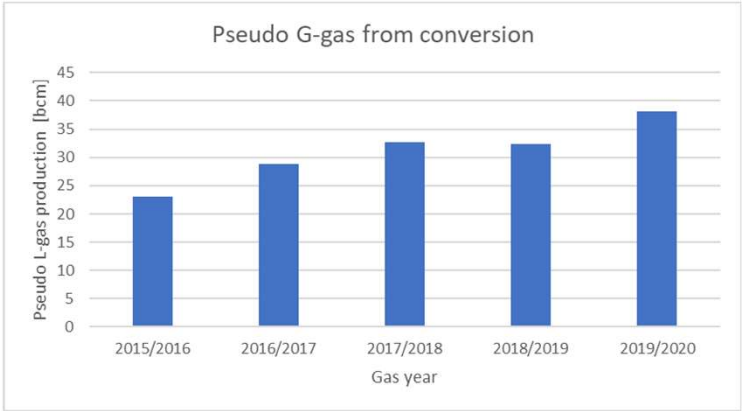
Evaluation gas year 2019/2020

Realisation closely in line with modelling results

- Realised number of degree days: 2057
  - Warmer than average (~2300-degree days)
- Calculated market 47.7 bcm, realised market 47.3 bcm
- Calculated and realized Groningen production 8.7 bcm
- Average nitrogen utilization 100%
  - Corrected for planned maintenance and for the size of the market and transport limitations
- In total GTS has produced 38.2 bcm pseudo G-gas via enrichment and nitrogen blending
  - Nitrogen blending 29.0 bcm, enrichment 9.2 bcm
- Modelled Wobbe-index slightly higher than realised Wobbe-index
  - Realised 51.5 MJ/m^3 and modelled 51.8 MJ/m^3
- Storages (seasonal and caverns) are almost volume neutral
  - With exception of Norg which has produced 0.6 bcm G-gas (net result of sent-out and send-in)





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Planning assumptions
Demand

- Realised hourly temperature profiles
  - Last 30 temperature profiles at weather station de Bilt (KNMI)
  - In order to calculate severe but realistic scenarios over the past 30 years
  - As required by the Dutch Gas Act
    - Gas year *1990/1991 until 2019/2020* instead *of 1989/1990 until 2018/2019*
- Domestic consumption
  - Klimaat- en Energieverkenning 2020 *instead of the Klimaat- en Energieverkenning 2019*
  - Conversion of largest L-gas industries/power plants to H-gas
    - *Based on the most recent conversion planning*
- L-gas export
  - Market reduction based upon information supplied by concerned MEA (MEAs of Germany, Belgium and France via Task Force L-gas Market Conversion Monitoring)

Planning assumptions
Supply

- Planned nitrogen utilization set to 100% of base load nitrogen facilities, were the base load nitrogen facilities are:
  - Ommen (cap. 146,000 m3/h N_2)
  - Wieringermeer (cap. 295,000 m3/h N_2)
  - Zuidbroek II per April 1st 2022 (cap. 180,000 m3/h N_2)
- Blending station Pernis and Heiligerlee are considered as backup facilities
  - In order to guarantee the base load nitrogen capacity
- There is sufficient H-gas available (import and storages)
  - To feed the blending stations
- Groningen is the balancing source in the merit order
  - *Capacity minimum flow will be based on information from NAM and/or EZK*
- Wobbe-index based on data provided by small field producers

Planning assumptions
Supply

- Norg and Alkmaar are available in all years and volume neutral by definition
  - *Norg is filled (partially) with pseudo G-gas, working gas volume 4 bcm*
- Caverns are volume neutral by definition
  - Default in base case: 2 out of 4 caverns available for all gas years
  - Consultation question: Is this a reasonable assumption?
- Conversion of Grijpskerk to G-gas
  - *Base case of additional scenario dependent on results study GTS and NAM*
- LNG-PS available for all scenarios and years
  - LNG-PS will be converted to a blending station

Planning assumptions
Sensitivity analysis

- Delay Zuidbroek II and lower then expected availability of Zuidbroek II
  - 120,000 m^3/h N_2 instead of 180,000 m^3/h N_2
- Reduced market conversion in Germany, Belgium and France
- No market reduction in the Netherlands
- Caverns
  - 4 caverns instead of 2 caverns available in all gas years
- Higher and lower Wobbe index towards blending stations
- Grijpskerk to G-gas, dependent on study “Conversion of Grijpskerk to G-gas”

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Consultation process

- Consultation question
  - We would like to ask your opinion/feedback on all planning assumptions
- Start consultation on November 20th, 2020
  - GTS published the slide pack discussed today
- Workshop on November 25th, 2020
  - where GTS presents the planning assumptions to market parties
- Consultation ends on December 10th, 2020
  - last day for market parties to give their written view to gasmarket@gastransport.nl
  - all written views are treated as non-confidential unless otherwise indicated
- Written views will be considered in the advice GTS sends to the Minister of Economic Affairs and Climate Policy
  - Advice will be sent before February 1st, 2021