North West Europe Gas System Performance Report

November 2018

Executive Summary

1. **Gas prices:** Prices fell by 5% month-on-month to ~€25/MWh, as the milder Asian winter continued to keep Asian demand for LNG muted, allowing redirection of cargoes to Europe. The merging of the French TRS and PEG Nord price zones on November 1st meant that the spread of all North West European prices to NBP was less than 5%. **See slides 4 and 5.**

2. **Consumption:** Gross consumption across NW Europe was down 18% year-on-year, driven by a 3.7 bcm decrease in Germany, a 0.3 bcm decrease in GB and a 1.2 bcm decrease in consumption in France. **See slides 6 -7.**

3. **Supply:** LNG imports increased by 1.8 bcm year-on-year, causing LNG's share of gas supply to increase from 4% to 10%, at the expense of storage withdrawals, which saw their share of supply decrease from 15% to 1% across the same time period. Norwegian imports declined by 0.6 bcm, whilst Russian pipeline imports only increased by ~0.4 bcm year-on-year. **See slides 8 - 12.**

- **Indigenous production:** Dutch production continued to be down year-on-year (26%), despite the start of the new gas year on 1st October, since the production cap is lower than last year (19.6 bcm vs. 21.4 bcm). Signs of increased production due to the increase financial activity in the UK North Sea were not evident, as production was down 13% year-on-year.

Executive Summary

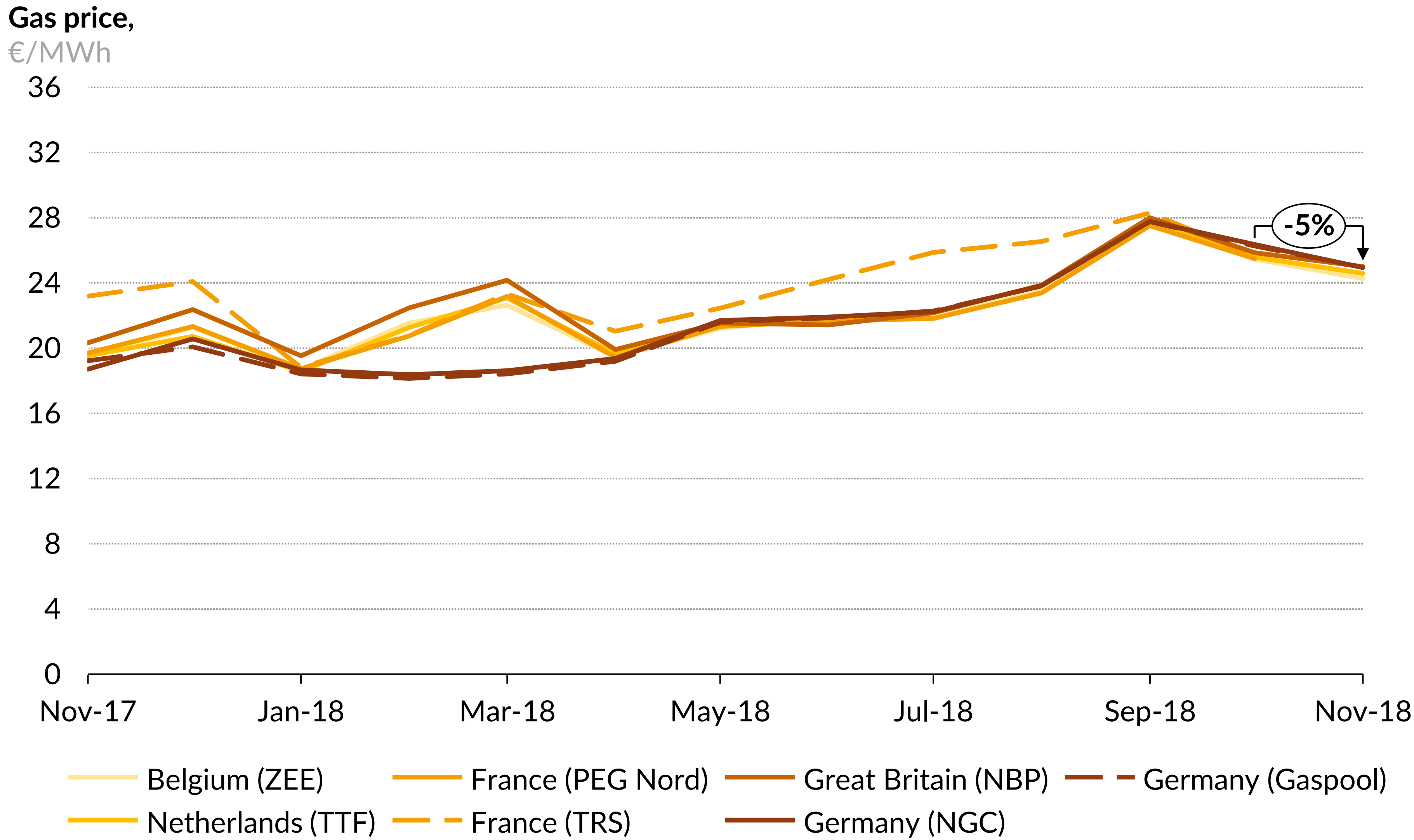
- **Pipeline imports:** Total pipeline imports declined slightly, with a 0.1 bcm each decrease in the Polish and Nord Stream routes being compensated by a 0.2 bcm increase through the Czech route. Flows through the Austrian route increased by 0.3 bcm.

- **LNG:** Cheaper LNG imports caused Dutch, French and Belgian LNG imports and terminal utilisation to remain elevated for the second month in a row. LNG imports in France compensated for a combined 0.4 bcm decrease in imports through Germany and Norway, whilst LNG imports in Belgium compensated for 0.6 bcm declines in imports from the Netherlands into Belgium. Dutch LNG imports continued to compensate for declining indigenous production.[1]

4. **Storage:** Storage levels remained above the prevailing 5-year minimum, despite the continuing vast differences across countries. **See slides 13 – 14.**

Notes: 1. Year-on-year changes in imports are available at daily granularity on EOS

North West European gas price development

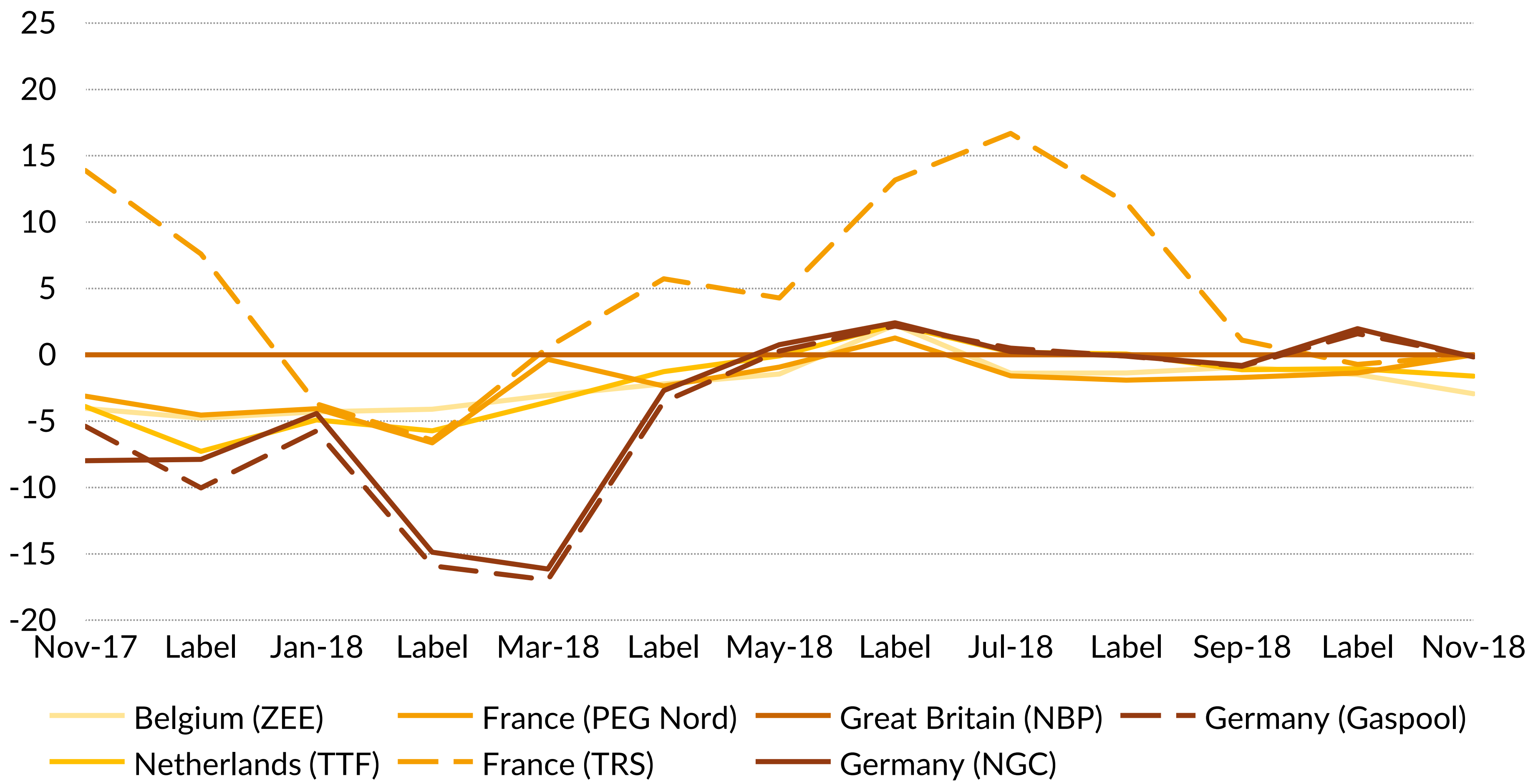


Notes: Monthly prices are the averages prices of each month's daily prices. Prices are converted in € using the monthly averages of the daily exchange rates.

Sources: Thomson Reuters, Aurora Energy Research EOS

% Price spreads against NBP

Price spread against NBP,
%



Notes: Using the monthly averages prices of daily prices and the monthly averages of daily exchange rates.

Sources: Thomson Reuters, Aurora Energy Research EOS

North West Europe monthly consumption[1]

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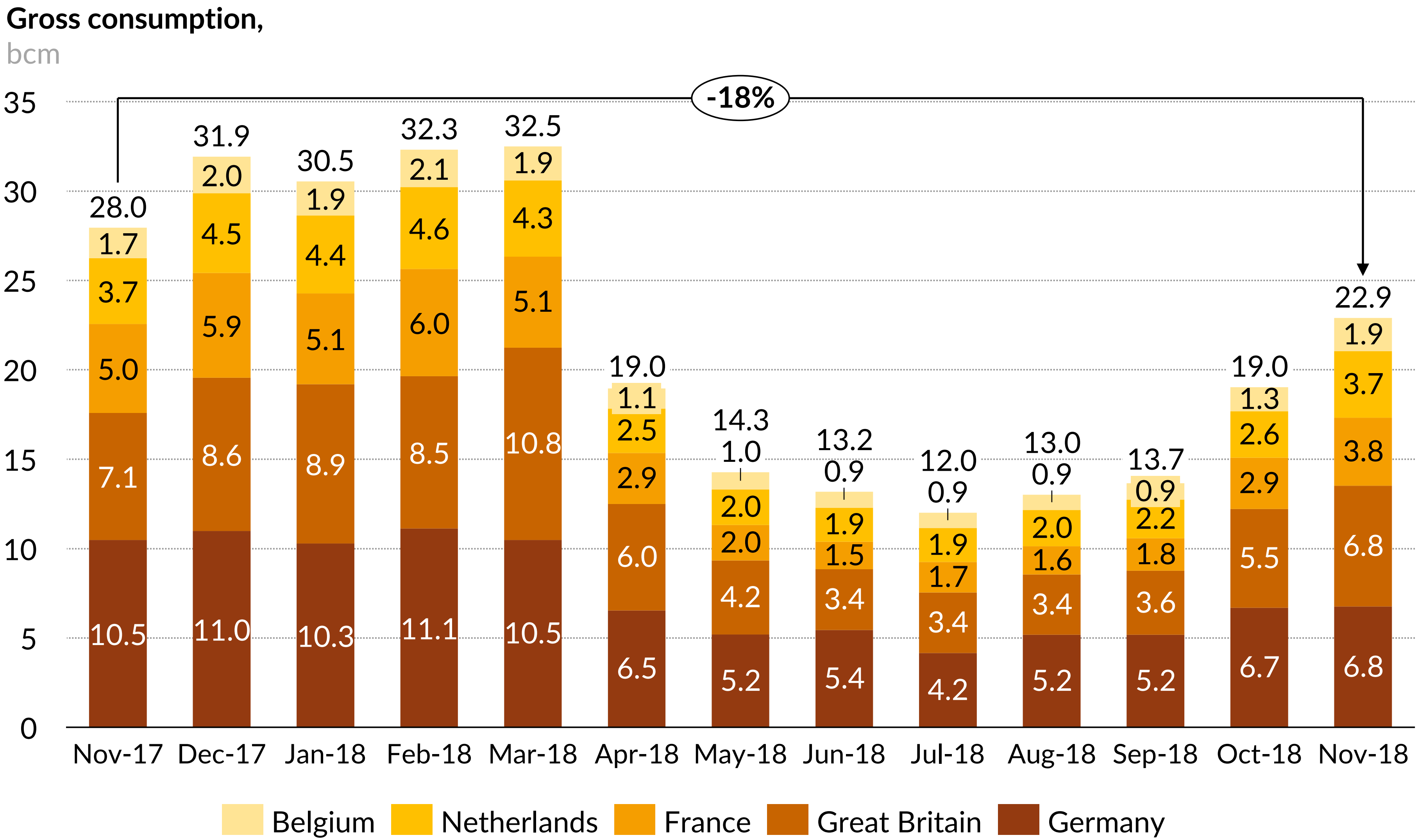
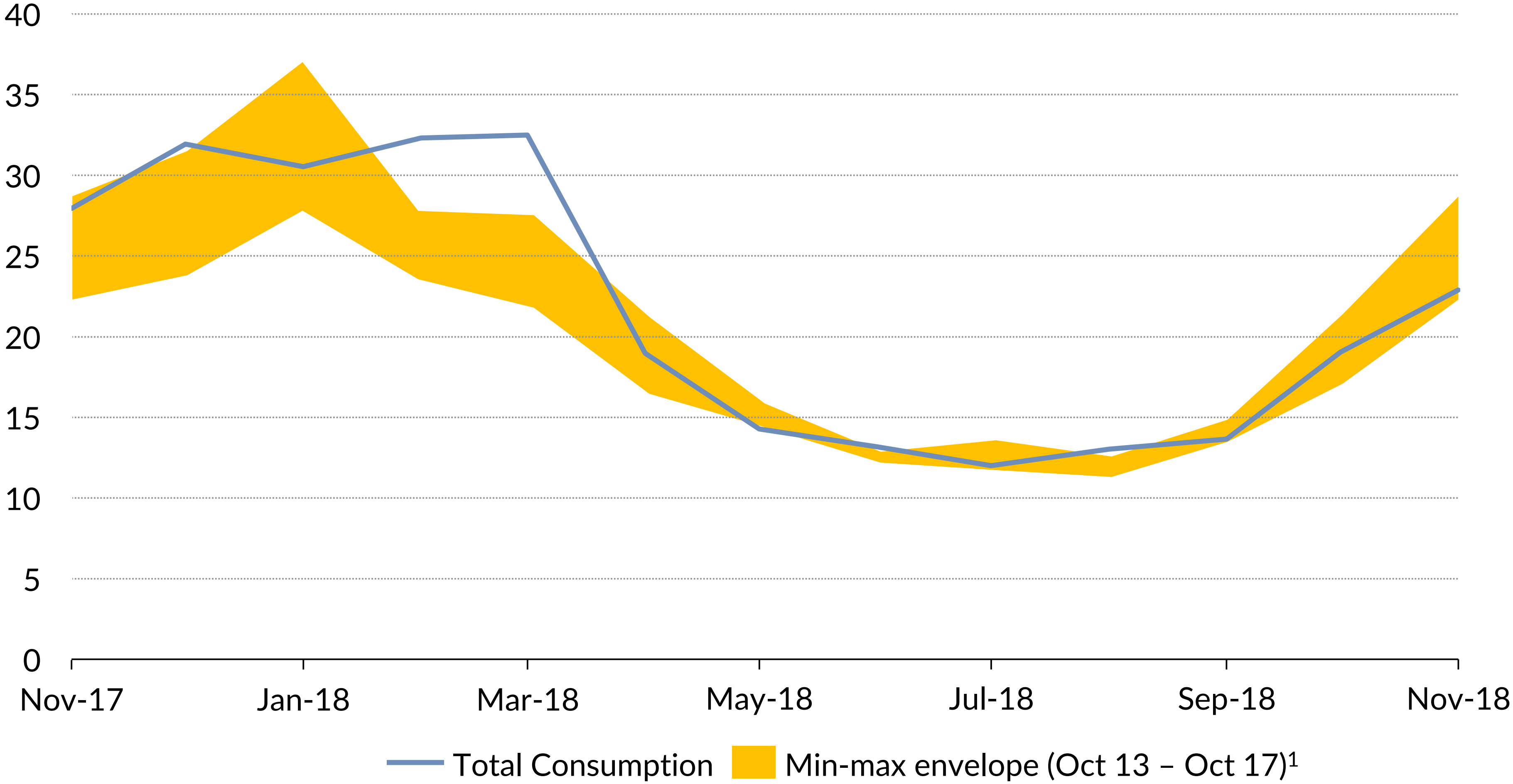


Notes: 1. Consumption excludes demand from interconnectors.

Sources: Aurora Energy Research EOS

North West Europe consumption in min-max envelope

NW Europe consumption,
bcm

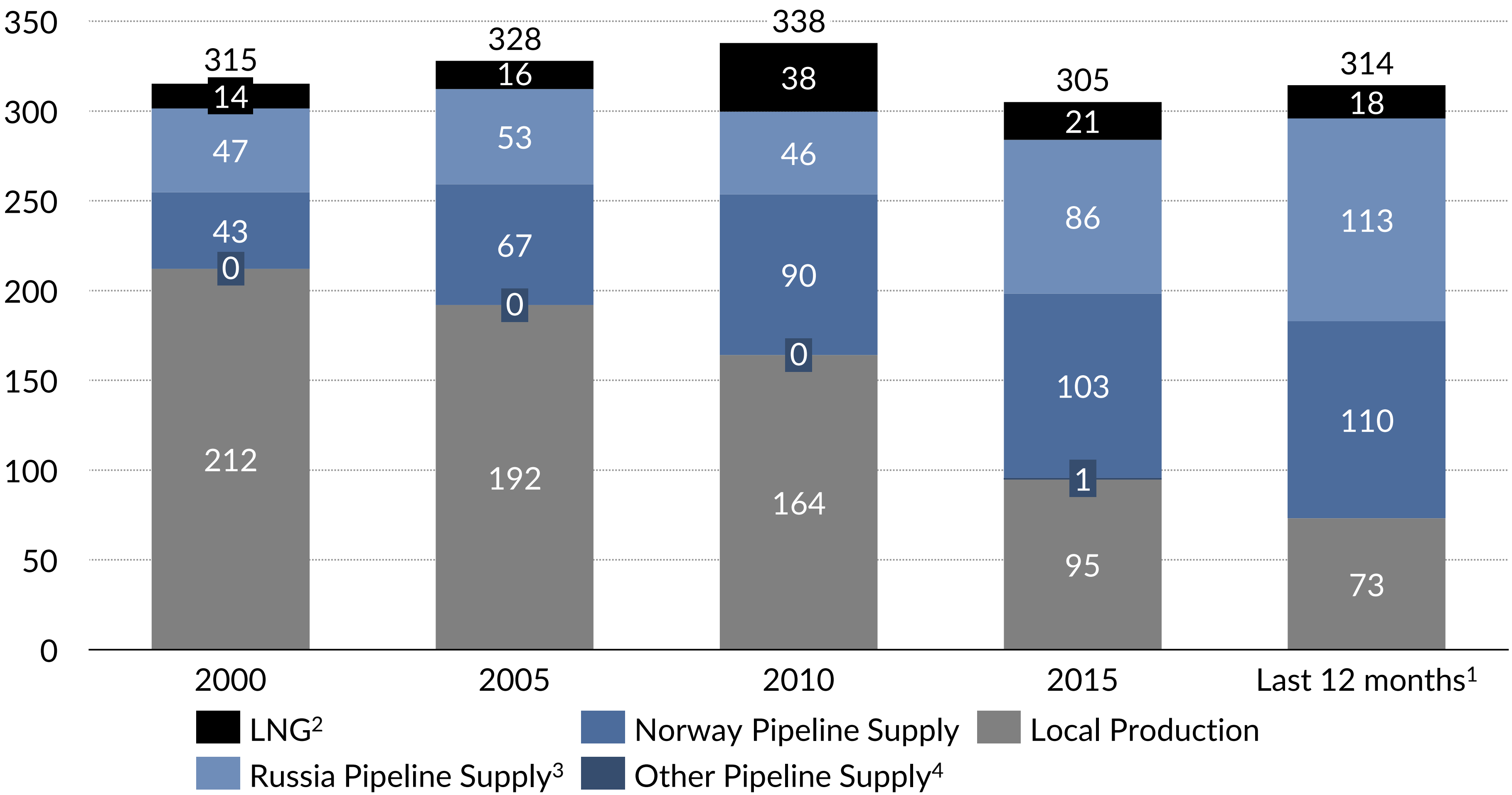


Notes: 1. Envelopes are calculated by taking the maximum and minimum monthly values since October 2013.

Sources: IEA, Aurora Energy Research EOS

North West Europe annual gas supply

NW Europe supply,
bcm

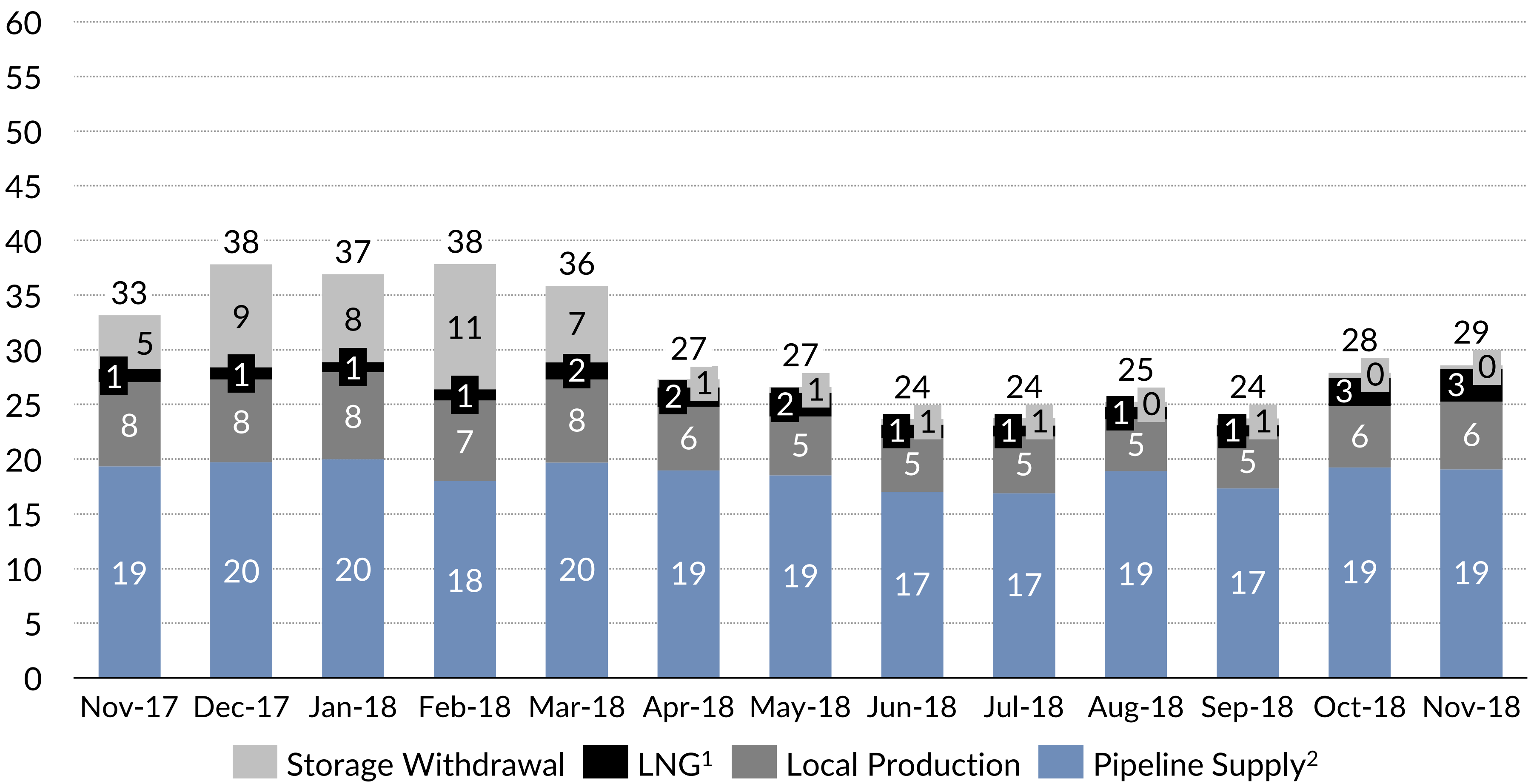


Notes: 1. Previous years are calendar years. 2. LNG reflects regasification send-out to the high pressure network. 3. Russia pipeline supply includes pipe imports via Poland, Czech Republic, and Austria. 4. Other pipeline supply includes Denmark, Spain and Switzerland.

Sources: Aurora Energy Research EOS, IEA

North West Europe monthly gross gas supply

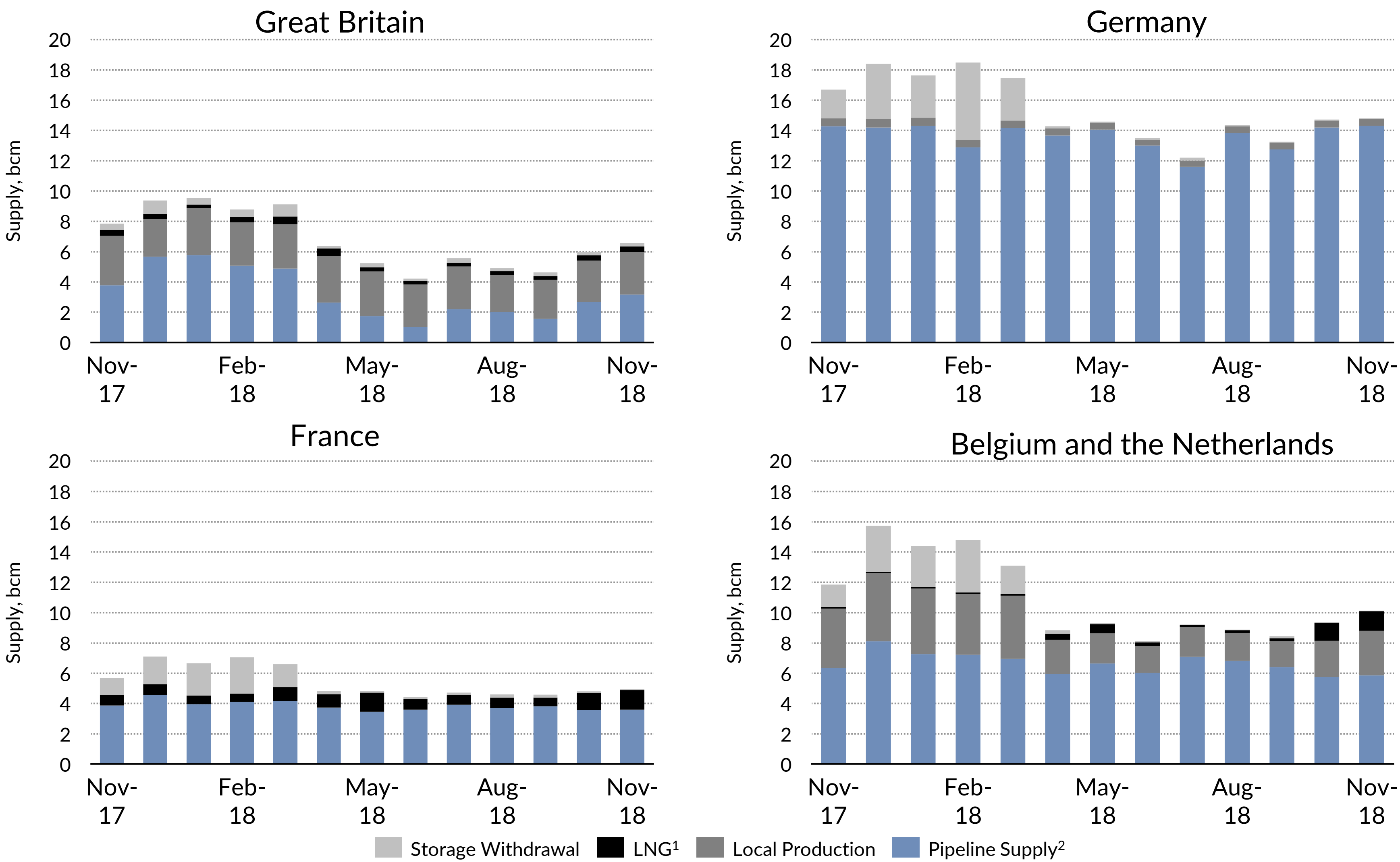
NW Europe supply,
bcm



Notes: 1. LNG reflects regasification send-out to the high pressure network. 2. Pipeline supply is from Russia (including via Poland, Czech Republic, and Austria), Norway, Denmark, Spain and Switzerland

Sources: Aurora Energy Research EOS

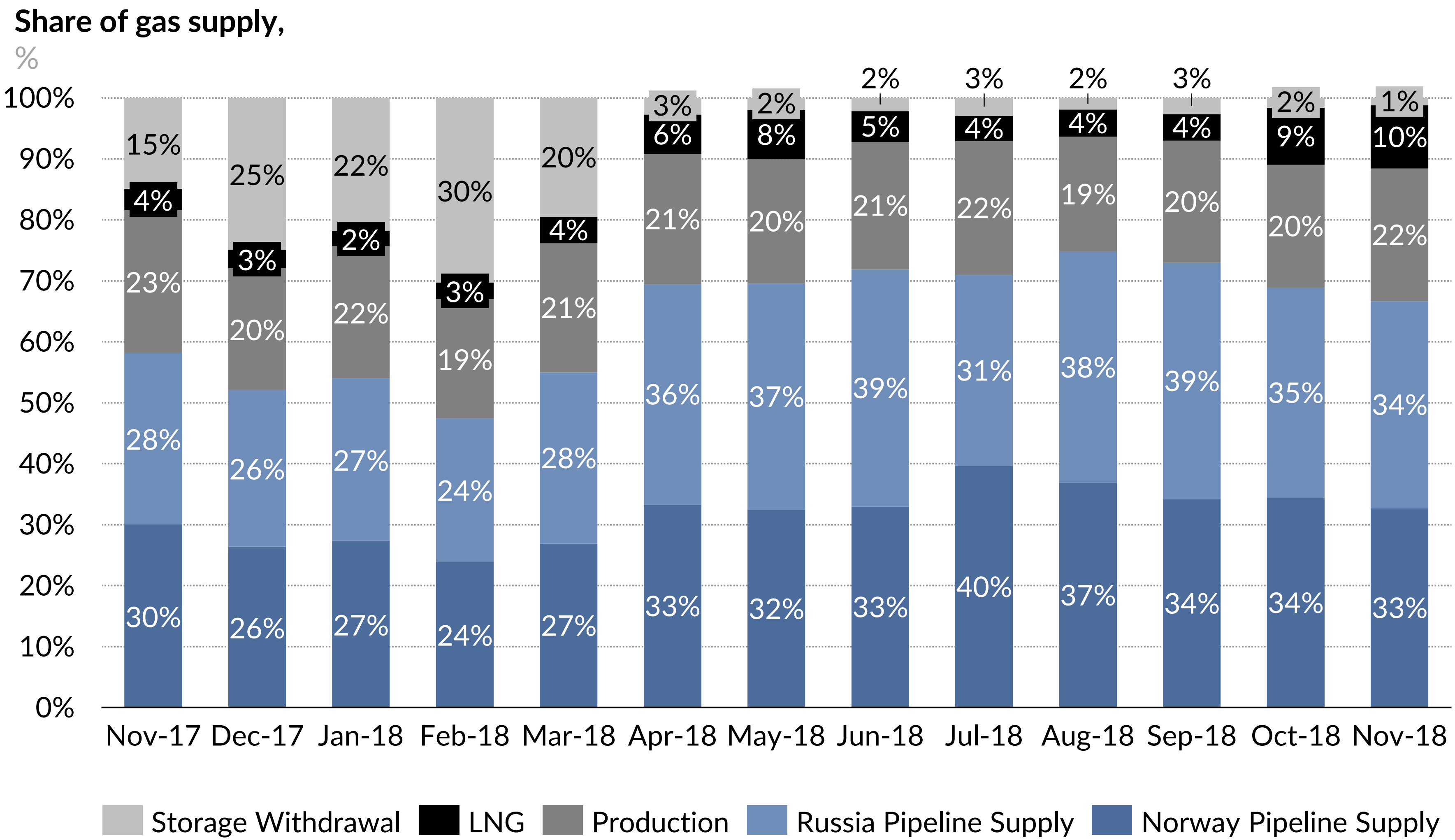
Monthly gross gas supply by country



Notes: 1. LNG reflects regasification send-out to the high pressure network. 2. Pipeline supply is from Russia (including via Poland, Czech Republic, and Austria), Norway, Denmark, Spain and Switzerland

Sources: Aurora Energy Research EOS

North West Europe share of monthly gas supply

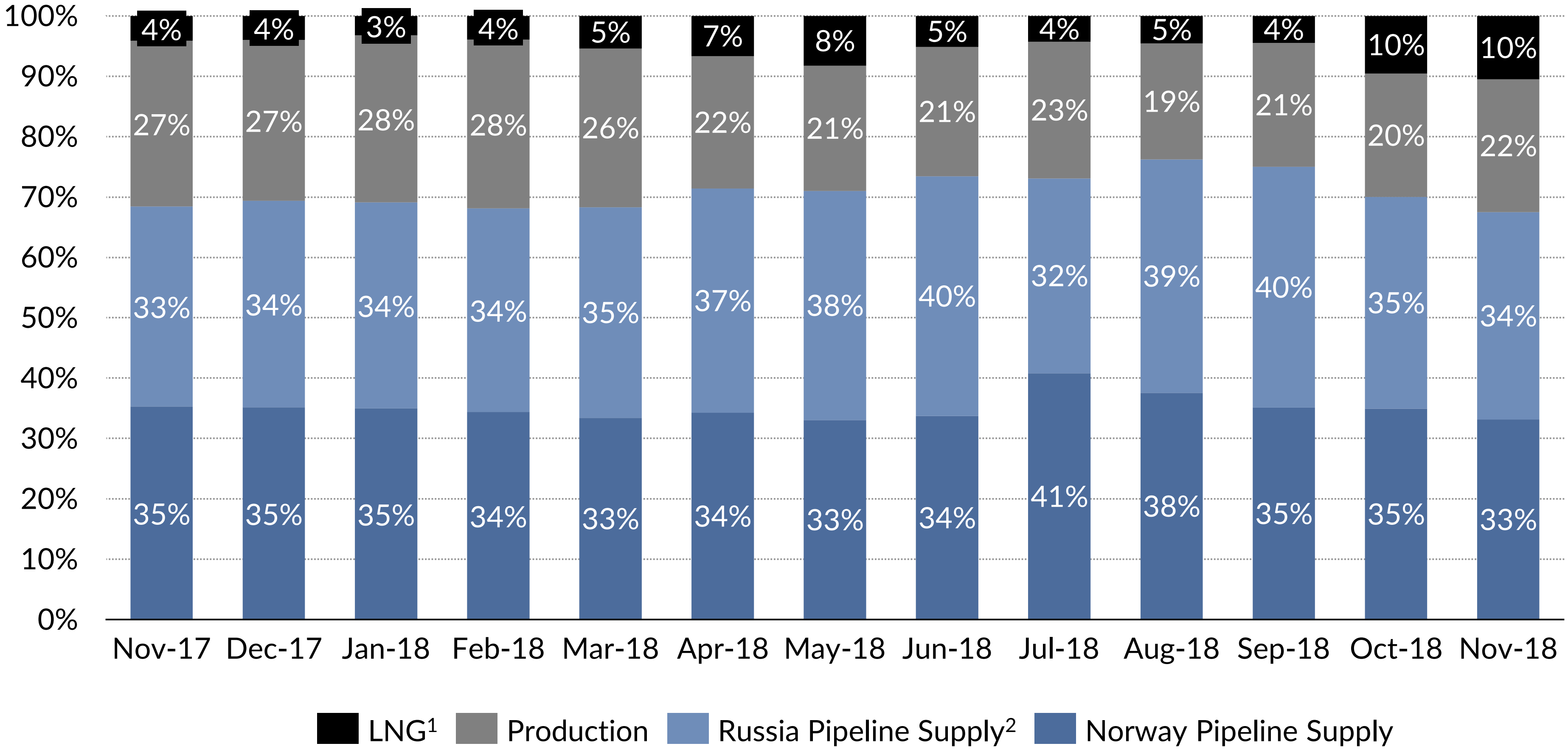


Notes: 1. LNG reflects regasification send-out to the high pressure network. 2. Russia pipeline supply includes pipe imports via Poland, Czech Republic, and Austria. 3. Other pipeline supply includes supply from Denmark, Spain and Switzerland.

Sources: Aurora Energy Research EOS

North West Europe share of monthly gas supply – excluding storage withdrawal

Share of gas supply
- exc. Storage withdrawal,
%

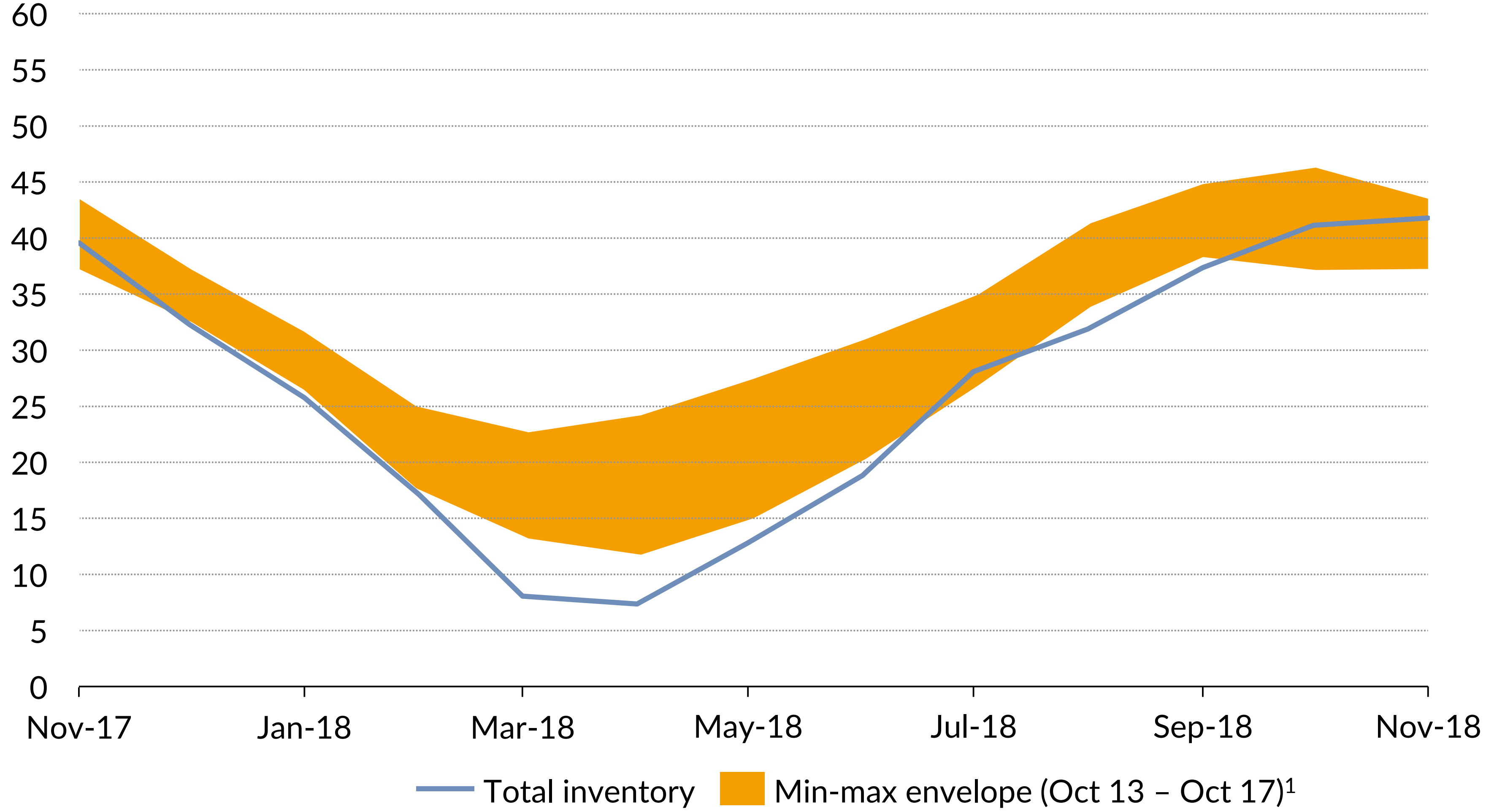


Notes: 1. LNG reflects regasification send-out to the high pressure network. 2. Russia pipeline supply includes pipe imports via Poland, Czech Republic, and Austria. 3. Other pipeline supply includes supply from Denmark, Spain and Switzerland.

Sources: Aurora Energy Research EOS

North West European storage inventory

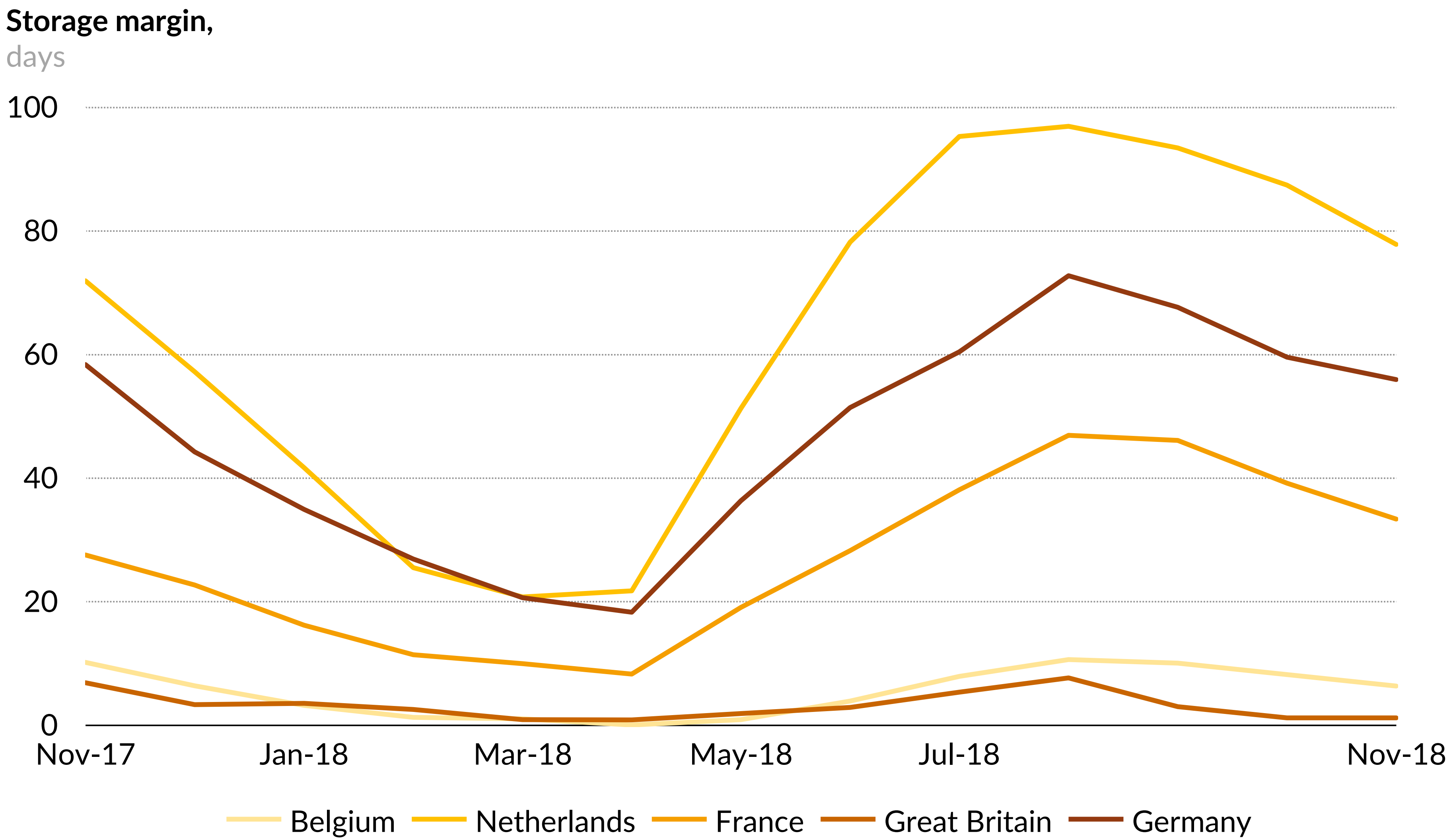
NW Europe storage inventory,
bcm



Notes: Storage data is based on net daily flows. 1. Envelopes are calculated by taking the maximum and minimum monthly values since October 2013.

Sources: IEA, Aurora Energy Research EOS, AGSI

Storage margin (days of demand in store)[1]



Notes: 1. Days of Demand in store is defined as the number of days that the storage inventory could potentially solely satisfy, all contractual constraints left aside. Future demand is defined as today's demand adjusted with last year's profile. The analysis shown is our most up-to-date estimate but may be subject to revision as historical data gets confirmed. The values shown indicate the storage margin at the ned of each month.

Sources: Aurora Energy Research EOS

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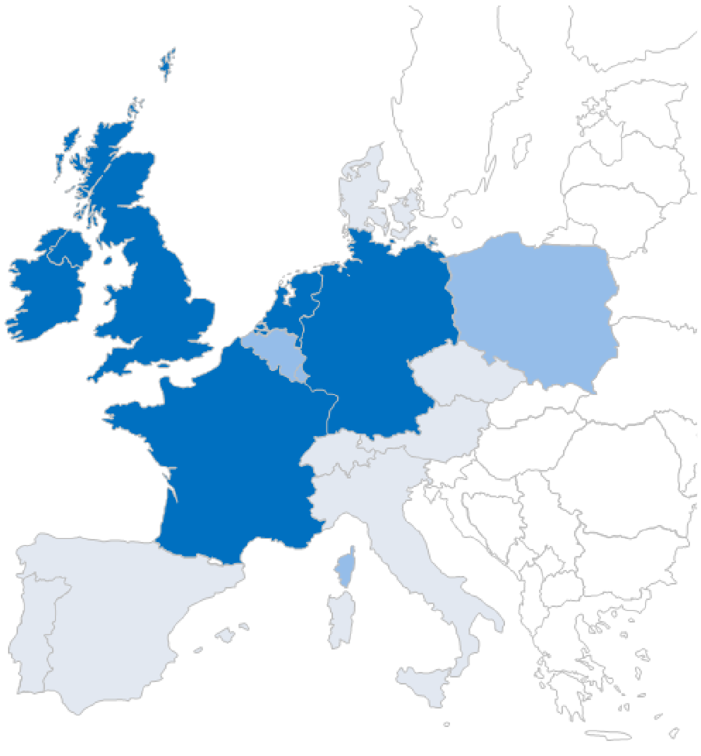

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Source: Aurora Energy Research

European Gas Market Service

Market analysis and forecasts for all participants in the European gas market

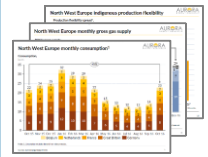
1 European Gas Market Forecasts

- European gas market development until 2040 including hub prices, seasonal and regional spreads, demand evolution, supply development within Europe and in key supplying regions, LNG and pipeline import flows
- Key modelling assumptions result from in-depth market research drawing on our unparalleled expertise across the energy, policy, environmental and financial sectors, and are further refined through a detailed consultation process across private and public sector players
- Forecasts are produced with our in-house European gas flow dispatch model that includes 430+ pipelines, all storages and LNG import facilities as well as detailed modelling of demand zones
- Comprehensive annual report (~120 pages) with full review and outlook of the market; quarterly updates (~20 pages) focusing on changes in forward prices, geopolitical and technology developments
- Additionally, a presentation with all exhibits plus underlying data in xls is provided

2 Global Energy Market Forecasts

- Aurora's long-term forecasts for oil, gas and coal markets presents a fully consistent view on fuel prices, production, and consumption by major countries and regions
- Identifies key areas of long-term uncertainty in global energy markets
- Provides central, high, low, and P10/P90 price sensitivity analyses, based on historical variation in key sources of uncertainty
- Produced with our in-house global energy market model, which provides full substitution among the commodities and regions (e.g. impact on European gas price if China's growth slumps or India builds more coal power stations)
- Our global energy market model is used to underpin BP's Energy Outlook and the scenarios they present
- The annual main report (~160 pages) provides a full outlook on the expected supply and demand balance going forward, published once a year with quarterly updates

3 Monthly market summaries



- Monthly summary on key performance parameters of the European gas market that set the market results into perspective for management to stay on top of the developments
- North West European Gas System Performance Summary: monthly snapshot of key operating characteristics of the gas market. Key statistics include hub prices, volumes, trade, suppliers market share, indigenous production flexibility and storage provision for security of supply

4 Analytics and data platform EOS

AURORA EOS

- Access to detailed historical and real-time European gas market data
- Data with daily granularity includes
  - Demand, supply and production
  - Pipeline flows and imports/exports
  - Storage utilisation and LNG sent-outs
  - Regional gas prices and commodity price data
- Data can be viewed, charted and downloaded

5 Bilateral meetings & analyst support

- Bilateral workshops with senior members and subject experts of Aurora' team to discuss Aurora's analyses and views on the market
- Short-notice support by our analysts on questions arising from our research

6 Invitation to Aurora's annual Spring Forum

- In our by-invitation-only annual Spring Forum industry leaders discuss the challenges of the energy industry of tomorrow
- Being held at distinguished venues at the University of Oxford
- Key note speakers of our 2018 Forum included Clair Perry MP (Minister State, BEIS), Magnus Hall (CEO, Vattenfall), Spencer Dale (Chief Economist, BP) and Steven Fries (Chief Economist, Shell)

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