North West Europe Gas System Performance Report

November 2019

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Executive Summary

1. **Gas prices:** GB prices rose by 47% month-on-month due to increased gas demand for heating and power, but fell by 40% year-on-year due to the supply glut caused by ample LNG cargoes, bringing the highest LNG consumption to 2.0 bcm since February 2013 when EOS data began. **See slides 4 and 5.**
2. **Consumption:** Gas consumption in NW Europe was up 16% compared to November last year, leading to staying the 5 year trailing maximum. A 0.8 bcm decrease in France was largely offset by a 0.8 bcm increase in GB and a 3.7 bcm increase in Germany. **See slides 6 and 7.**
3. **Supply:** The prevailing global LNG glut caused by flooded spot cargoes resulted in LNG imports to Europe increasing by 2.4 bcm year-on-year, pushing up the share of LNG in total gas supply by 7%-points which directly lowered storage withdrawals by 1.1 bcm compared to the same period last year. **See slides 8 - 11.**

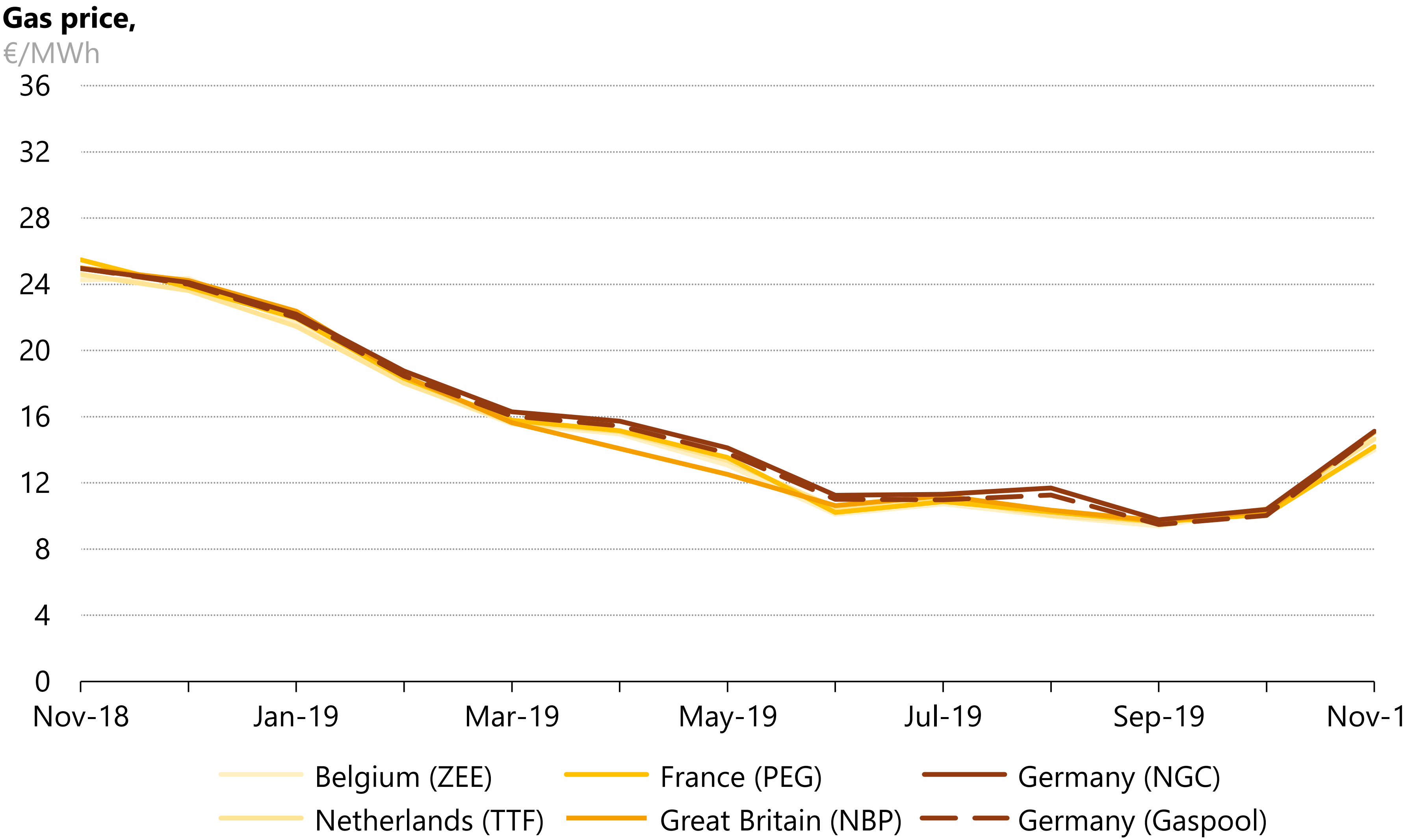
- **Indigenous production:** GB production was down 3% month-on-month due to strong Norwegian gas flows. Dutch production rose by 71% month-on-month to meet higher consumption in the residential sector due to colder weather.

Executive Summary

- **Pipeline imports:** NW European pipe imports were 0.7 bcm lower year-on-year. Norwegian flows remained constant to 9.5 bcm compared to last November, whilst Russian flows fell by 0.7 bcm. Within Russian flows, the Czech route and the Austria route saw a 0.7 bcm decrease and a 0.2 bcm decrease respectively, which offset a 0.1 bcm higher flow via Nord Stream.
- **LNG:** NW European LNG send-outs from regasification terminals rose by 67% year-on-year due to an increase of LNG imports driven by global LNG surplus. France saw the biggest increase (1.1 bcm higher year-on-year) with 90% utilisation rate on average (69% higher year-on-year). The Zeebrugge LNG terminal in Belgium also saw 256% higher terminal utilisation rate compared to last November.

4. **Storage:** Storage withdrawals were down 42% year-on-year as increased LNG imports contribute to meet high winter demand as marginal supply in the NW gas system. **See slides 12.**

North West European gas price development

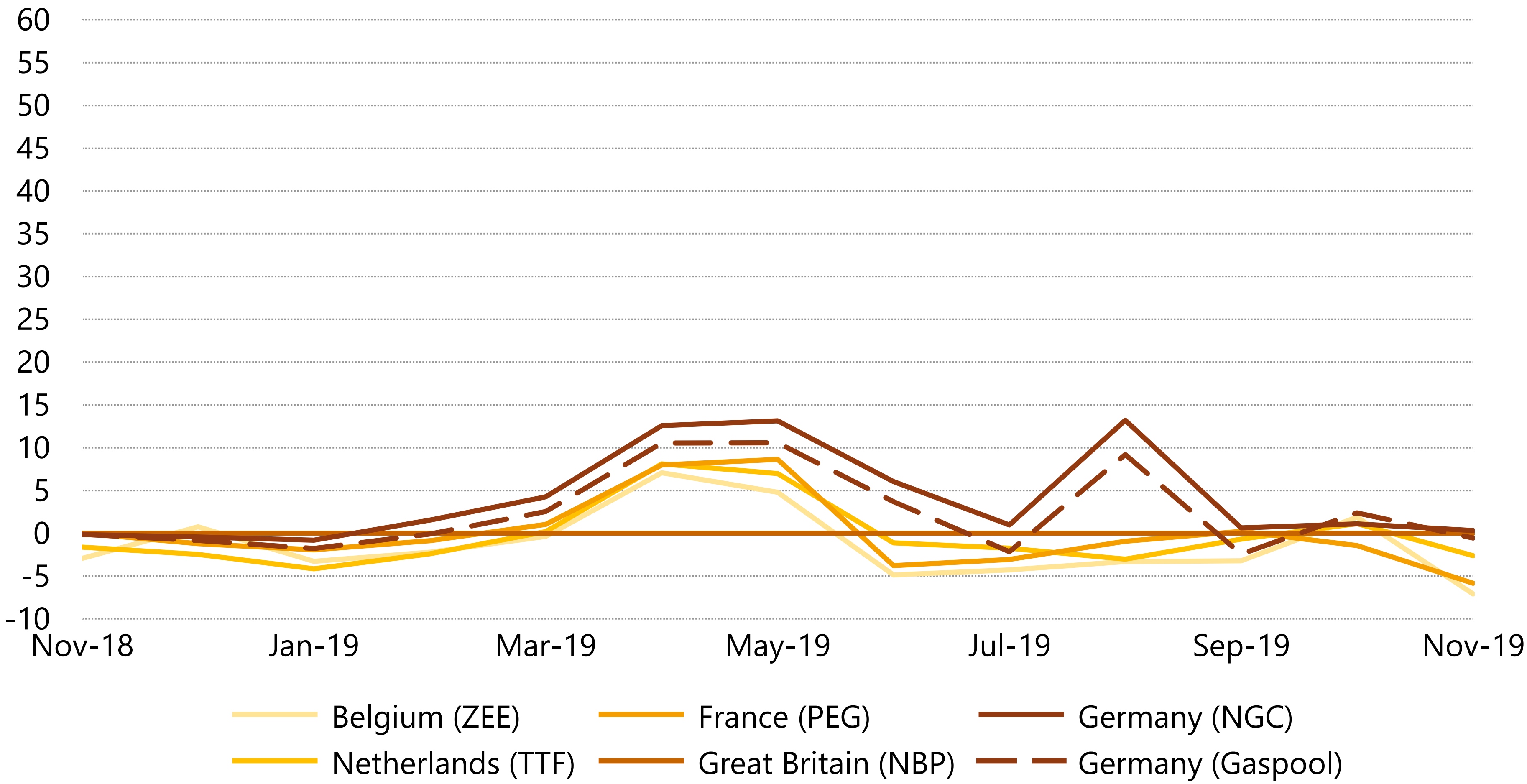


Notes: Monthly prices are the averages prices of each month's daily prices. Prices are converted in € using the monthly averages of the daily exchange rates.

Sources: Thomson Reuters, Aurora Energy Research EOS

% Price spreads against NBP

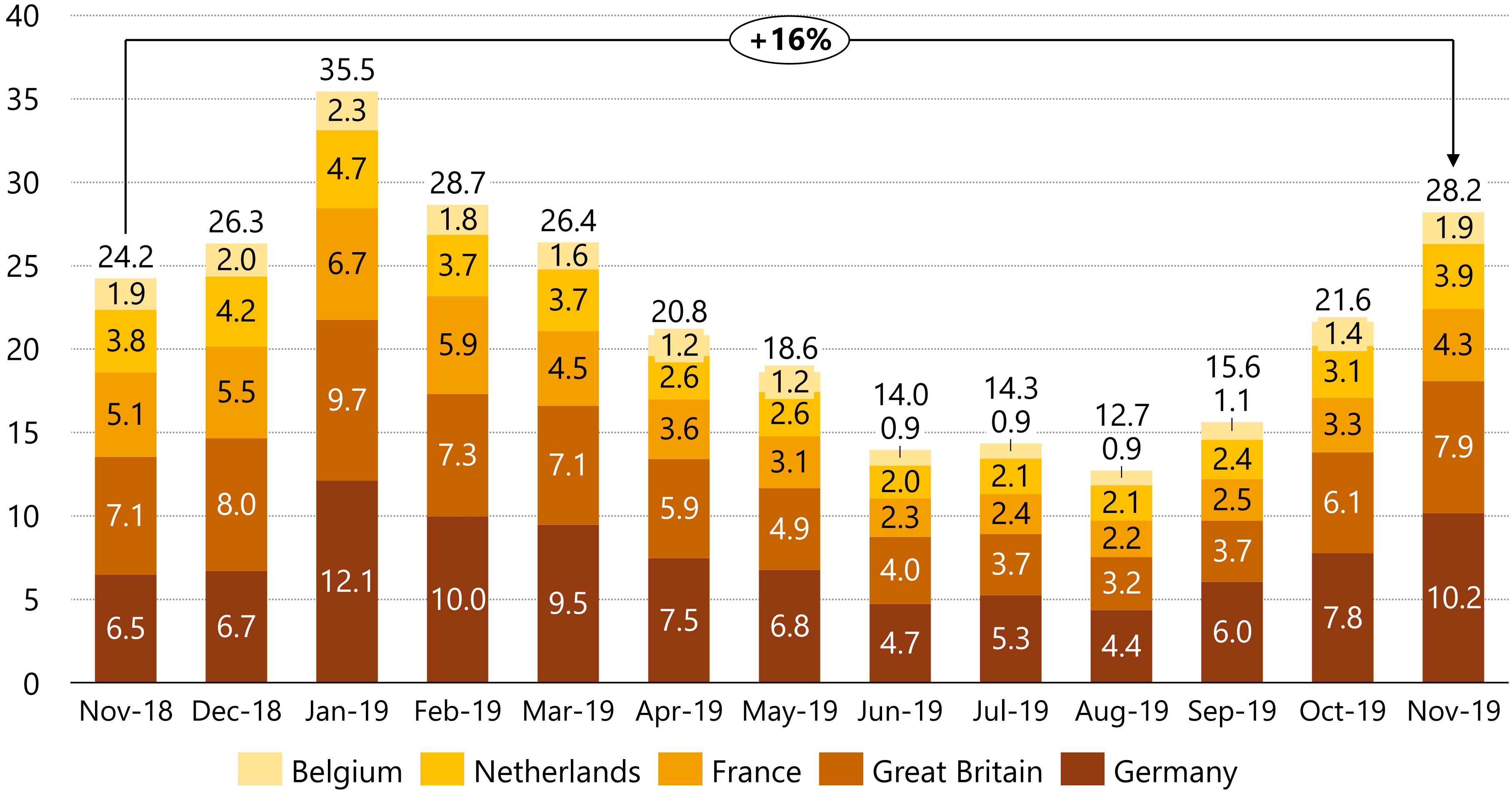
Price spread against NBP,
%



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]



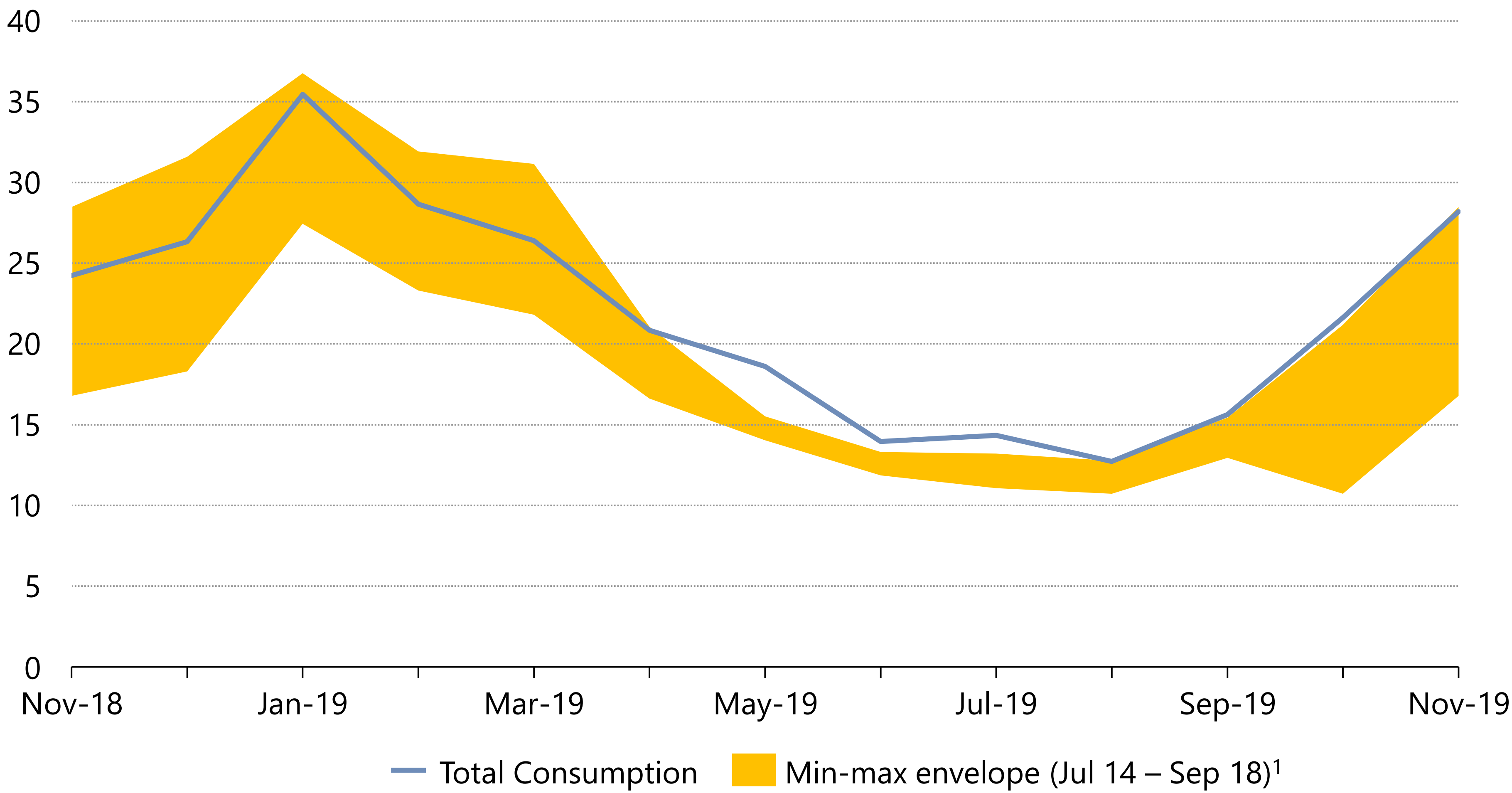
	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19
Belgium	1.9	2.0	2.3	1.8	1.6	1.2	1.2	0.9	0.9	0.9	1.1	1.4	1.9
Netherlands	3.8	4.2	4.7	3.7	3.7	2.6	2.6	2.0	2.1	2.1	2.4	3.1	3.9
France	5.1	5.5	6.7	5.9	4.5	3.6	3.1	2.3	2.4	2.2	2.5	3.3	4.3
Great Britain	7.1	8.0	9.7	7.3	7.1	5.9	4.9	4.0	3.7	3.2	3.7	6.1	7.9
Germany	6.5	6.7	12.1	10.0	9.5	7.5	6.8	4.7	5.3	4.4	6.0	7.8	10.2

Notes: 1. Consumption excludes demand from interconnectors.

Sources: Aurora Energy Research EOS

North West Europe consumption in min-max envelope

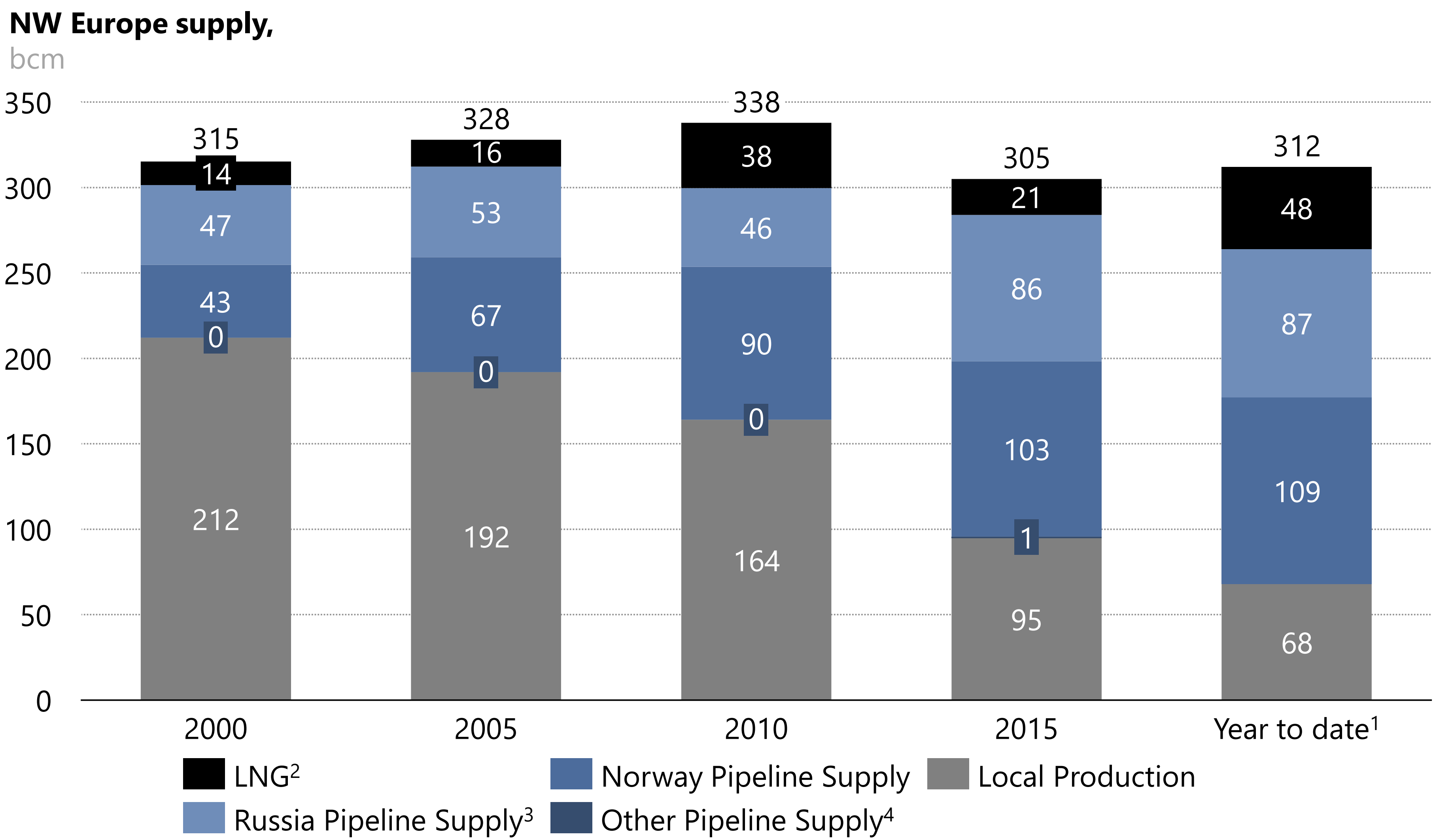
NW Europe consumption,
bcm



Notes: 1. Envelopes are calculated by taking the maximum and minimum monthly values since July 2014.

Sources: IEA, Aurora Energy Research EOS

North West Europe annual gas supply

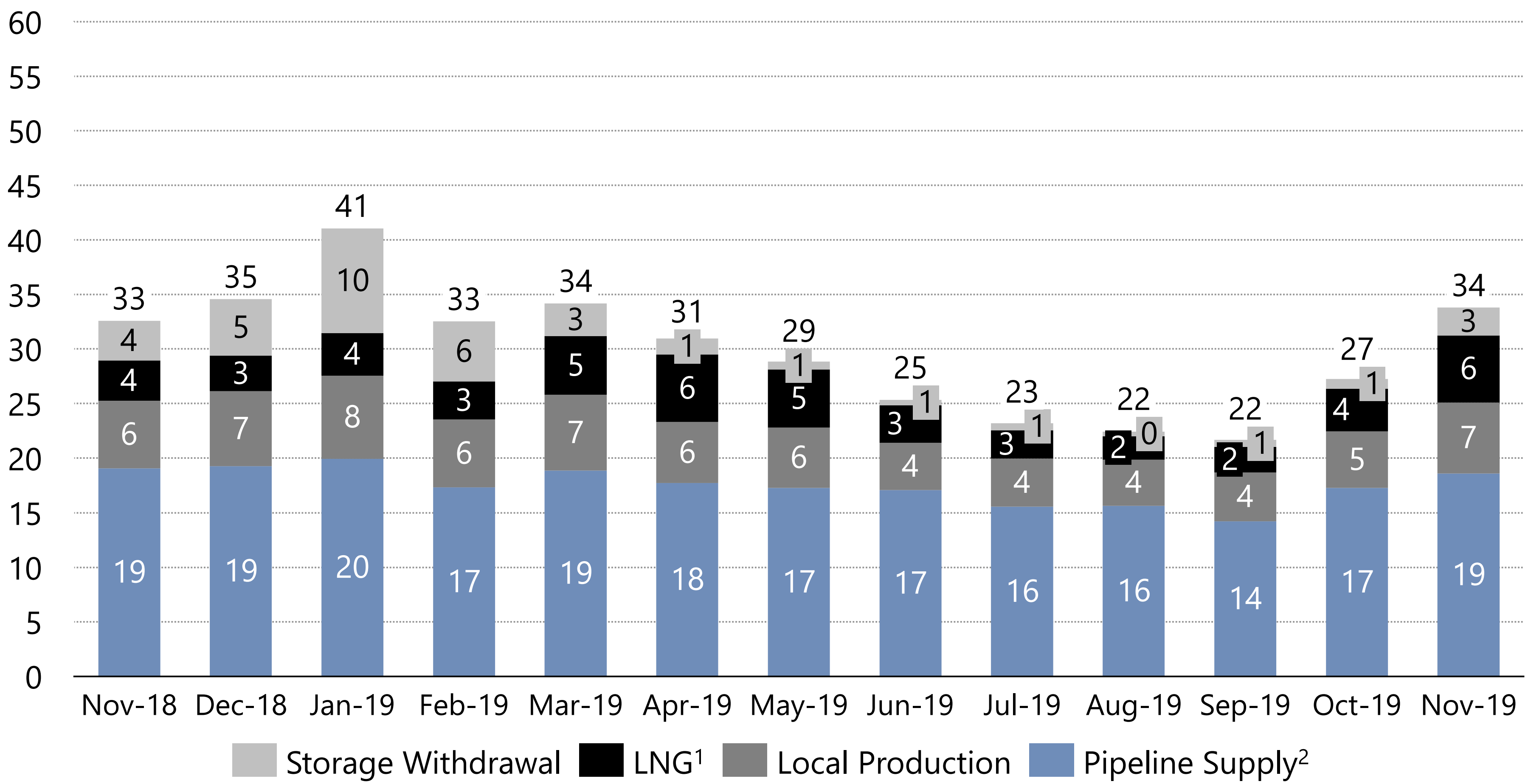


Notes: 1. Year-to-date corresponds to the last 12 months. Previous years are calendar years. 2. LNG reflects regasification send-out to the high pressure network. 3. Russia pipeline supply includes pipe imports via Poland, Czech Republic, and Austria. 4. Other pipeline supply includes Denmark, Spain and Switzerland.

Sources: Aurora Energy Research EOS, IEA

North West Europe monthly gross gas supply

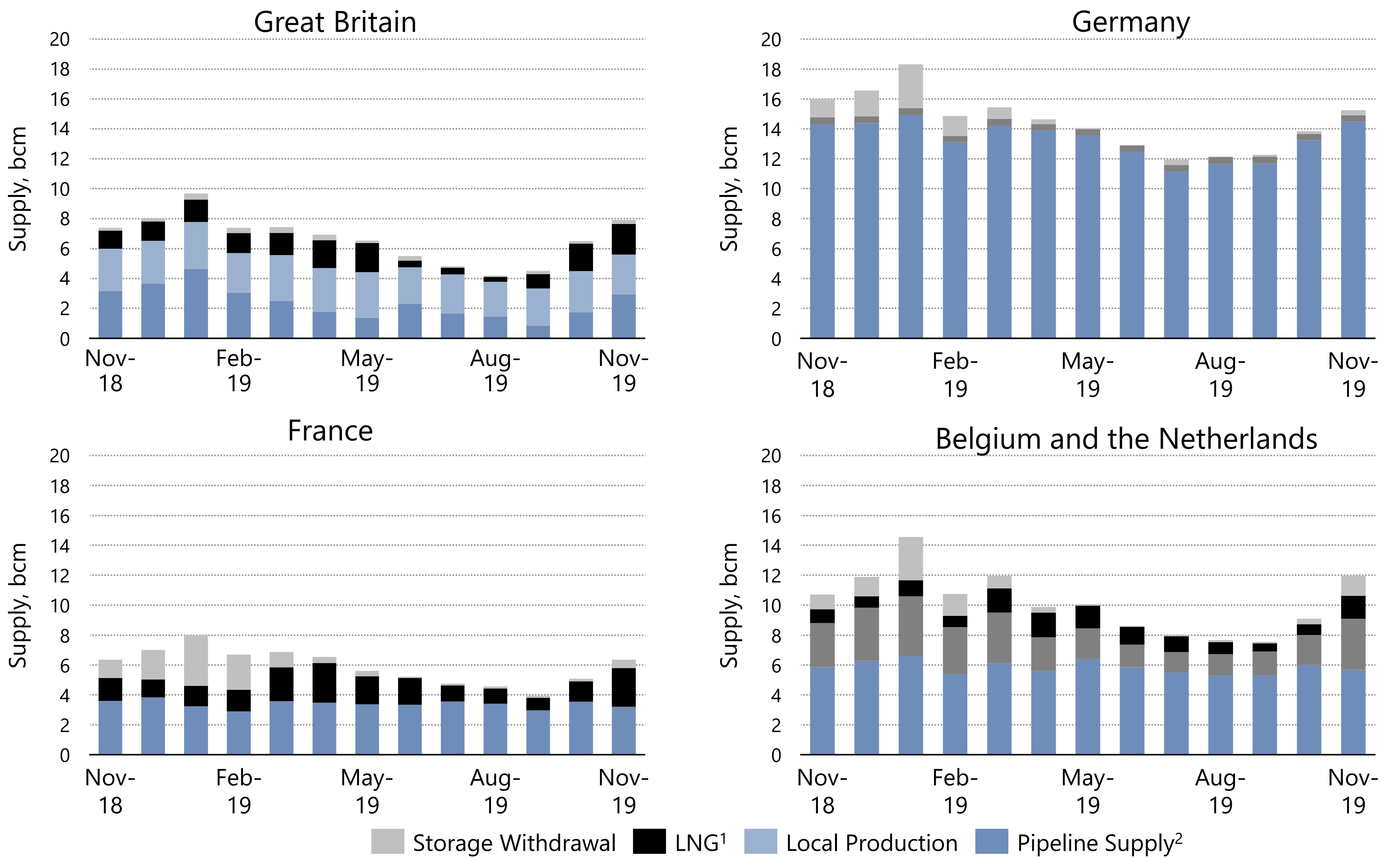
NW Europe supply,
bcm



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

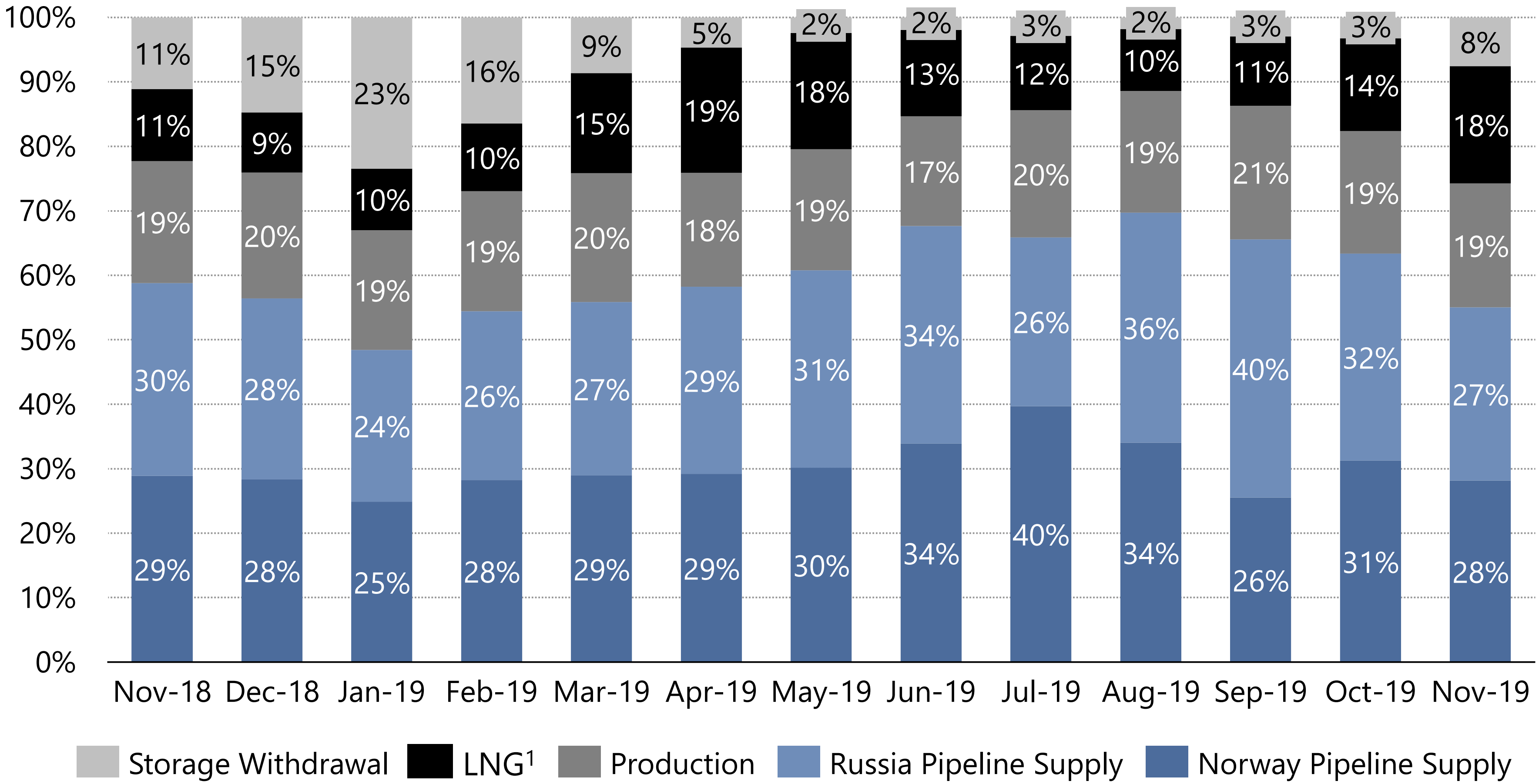


Notes: 1. LNG reflects regasification send-out to the high pressure network. 2. Pipeline supply is from Russia (including via Poland, Czech Republic, and Austria), Norway, Denmark, Spain and Switzerland

Sources: Aurora Energy Research EOS

North West Europe share of monthly gas supply

Share of gas supply,
%

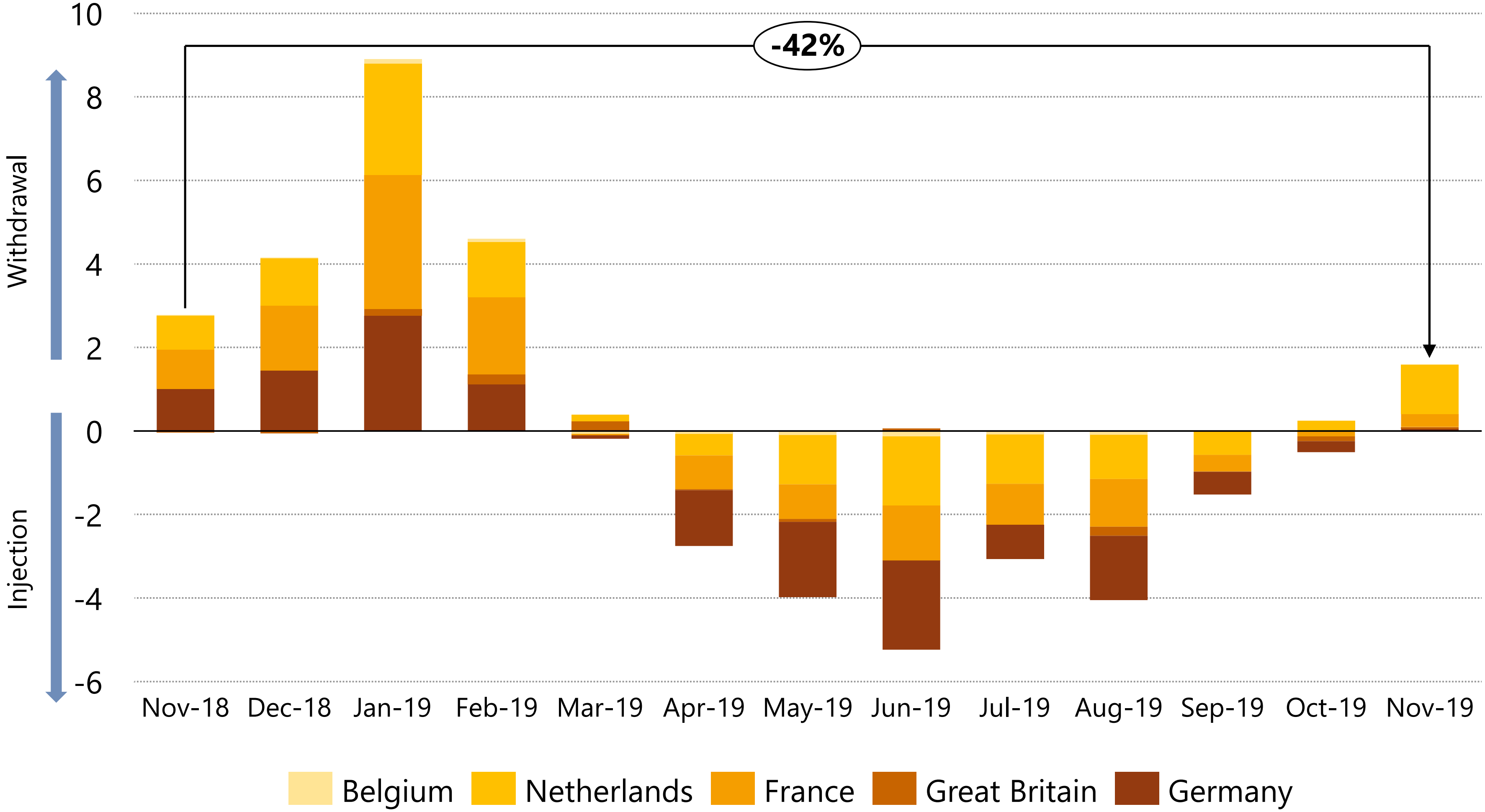


Notes: 1. LNG reflects regasification send-out to the high pressure network. 2. Russia pipeline supply includes pipe imports via Poland, Czech Republic, and Austria.

Sources: Aurora Energy Research EOS

North West Europe net gas supply from storage

Net supply from storage,
bcm



Notes: Storage data is based on net daily flows.

Sources: Aurora Energy Research EOS

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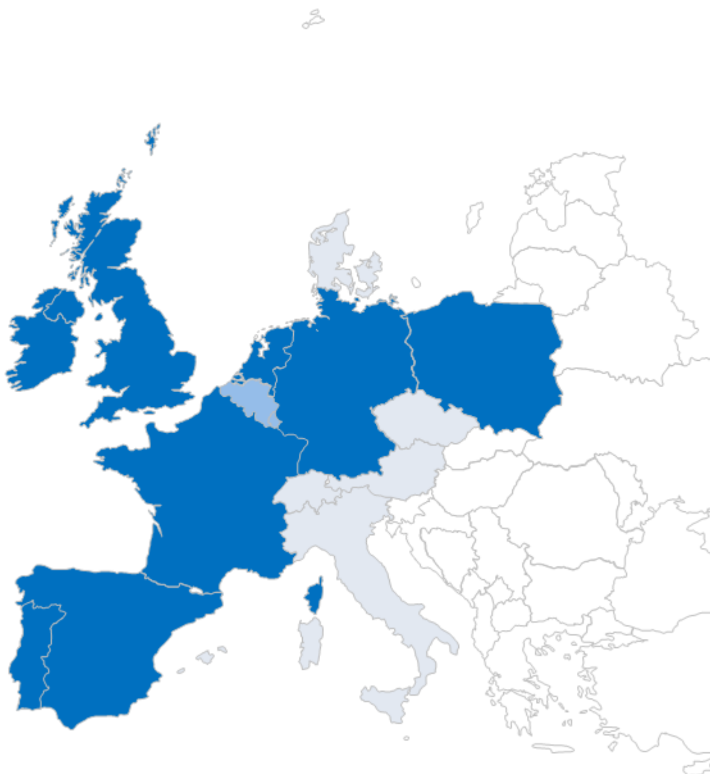

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Source: Aurora Energy Research

European Gas Market Service

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

AURORA ENERGY RESEARCH

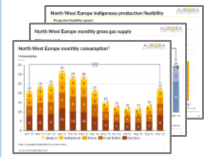
1 European Gas Market Forecasts

- 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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