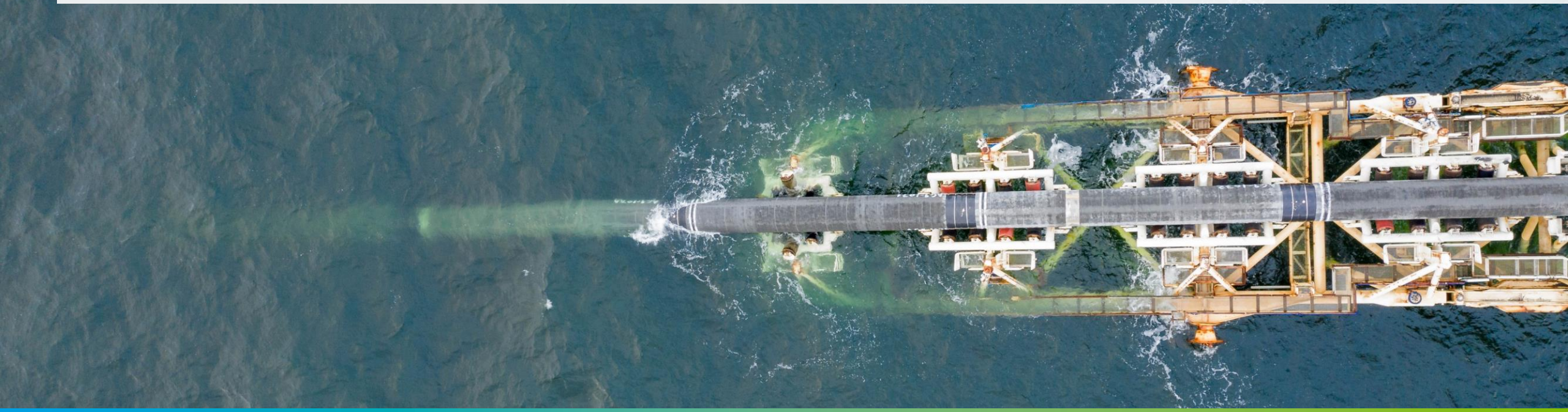
Nord Stream 2
Committed. Reliable. Safe.

Nord Stream 2

Enhancing European Energy Security

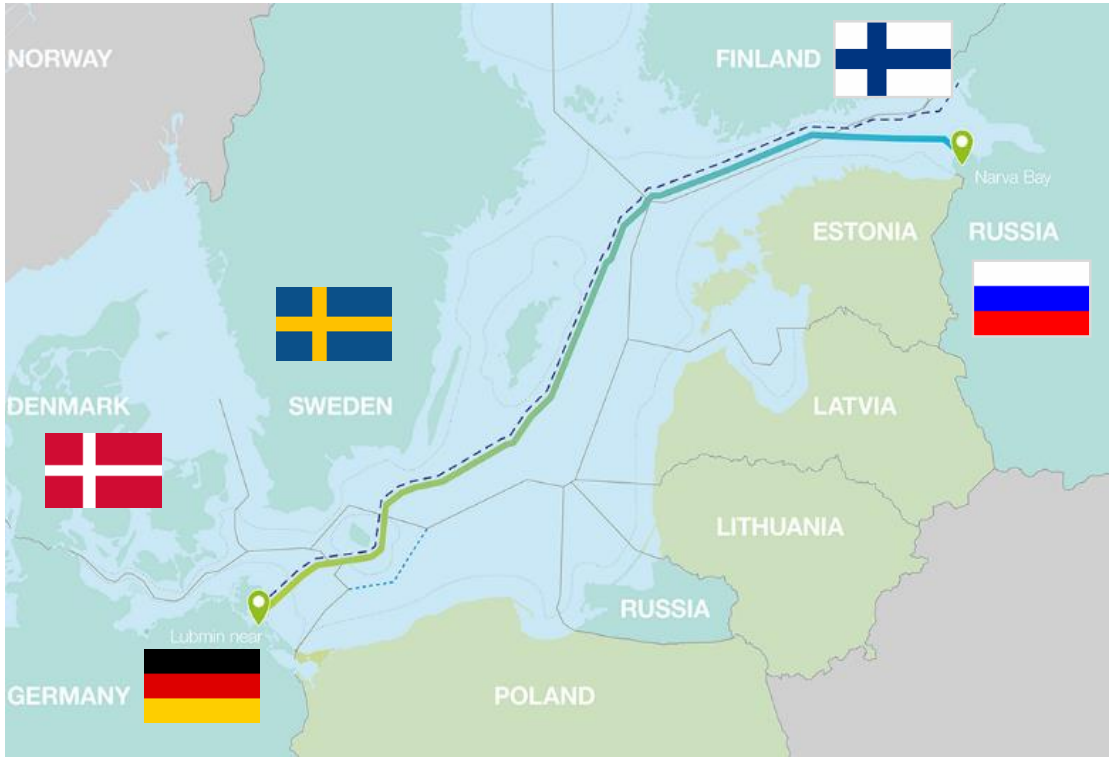
Reinhard Ontyd, Chief Commercial Officer, Nord Stream 2 AG | FLAME - Amsterdam, 14 May 2019



Project Status

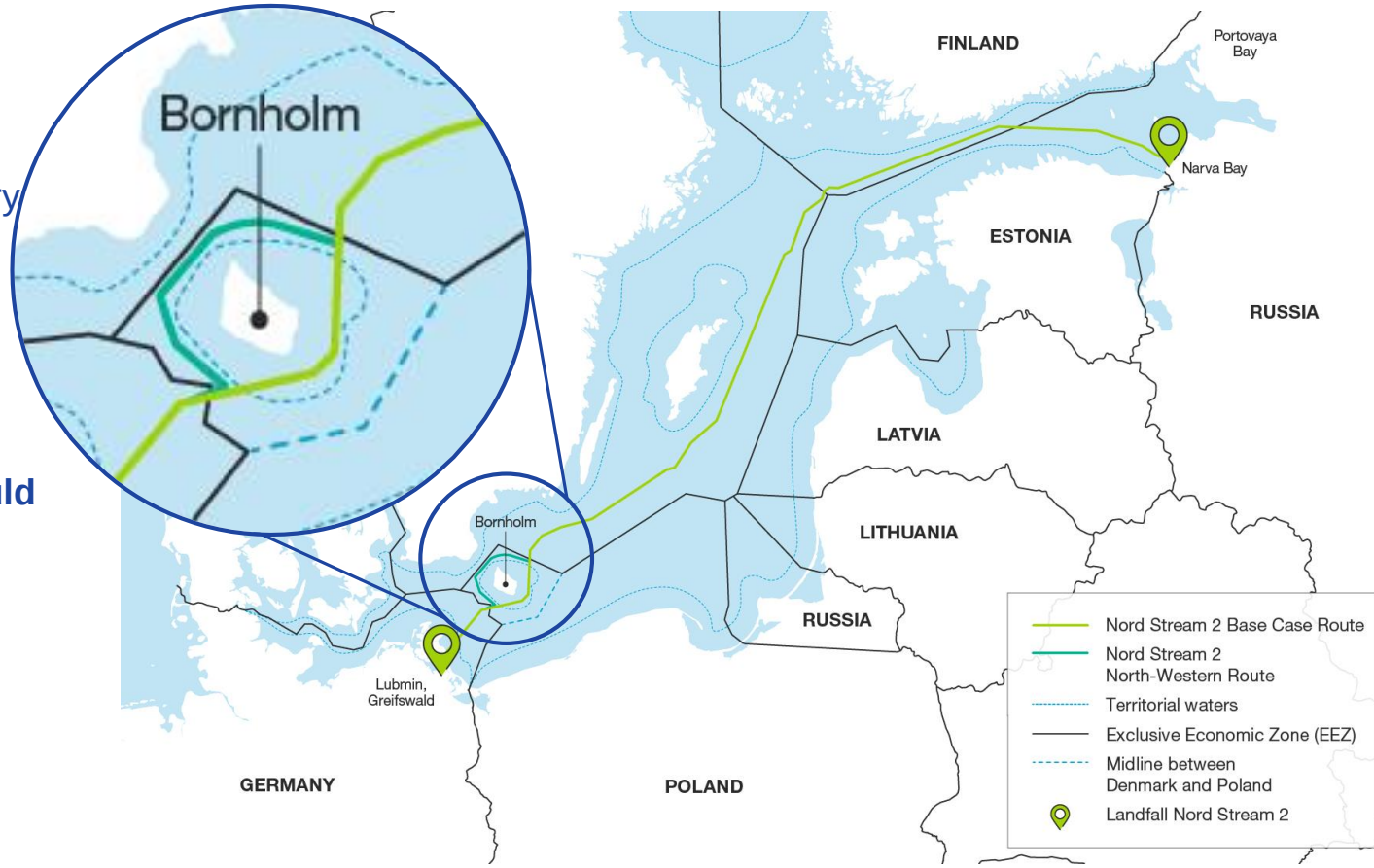
Permits Received in 4 of 5 Countries – 90% of the Route Is Permitted

Country	Length [km]	Regulation	Permitting Status
Russia	114	– Federal laws about Internal Sea Water, Territorial Sea, Continental Shelf – Decree of the government	✓ 14 August 2018 ✓ 7 June 2018
Finland	374	– Water Act – Finnish Act on the EEZ	✓ 12 April 2018 ✓ 5 April 2018
Sweden	511	– Act on the Continental Shelf	✓ 7 June 2018
Denmark	~140	– Act on the Continental Shelf	Two routes ready to permit
Germany	85	– Energy Industry Act – Federal Mining Act	✓ 31 January 2018 ✓ 27 March 2018
Total		**8 permits**	**7 out of 8**



Denmark: Two Routes Ready for Permit plus a new application

- Base Case route application April 2017
  - Optimal route in Danish territorial waters, based on Danish Government advice
  - Danish Foreign Ministry decision pending since January 2018
- North-West route application 10 August 2018
  - In Danish Exclusive Economic Zone (EEZ) only
  - Not subject to Foreign Ministry approval
- Both permitting processes have shown that **a permit could be granted for either route**
- South-East route application 15 April 2019
  - Submitted after request by Danish Energy Agency, following EEZ border agreement between Poland and Denmark
- Appeal lodged against request for third application



Project Update

- Work ongoing in Germany, Sweden, Finland and Russia
- All 2,473 km of pipes delivered and 94% concrete coated
- More than 50% of pipeline completed so far:
  - Offshore pipe laying complete in Germany
  - Allseas Pioneering Spirit laying pipe in Swedish waters
  - Solitaire laying pipe in Russian waters
- German landfall: infrastructure and micro-tunnel built, valves installed
- Russian landfall: ongoing infrastructure construction and trench box installation

Nord Stream 2 – CAPEX Committed

Already, **almost all of the project CAPEX, amounting to 8 billion euros, have been contractually committed in investments** in European industry and services involving over 670 companies from 25 countries. A selection:

Logistics
1. Port of Mukran
2. Port of HaminaKotka
3. Port of Karlshamn
4. Port of Hanko Koverhar
5. Company Headquarter in Zug

Pipes & Materials
1. EUROPIPE
2. OMK
3. Chelpipe
4. PetrolValves
5. Voestalpine
6. MMK
7. Dillinger Hütte
8. Impalloy
9. Wasco Coatings

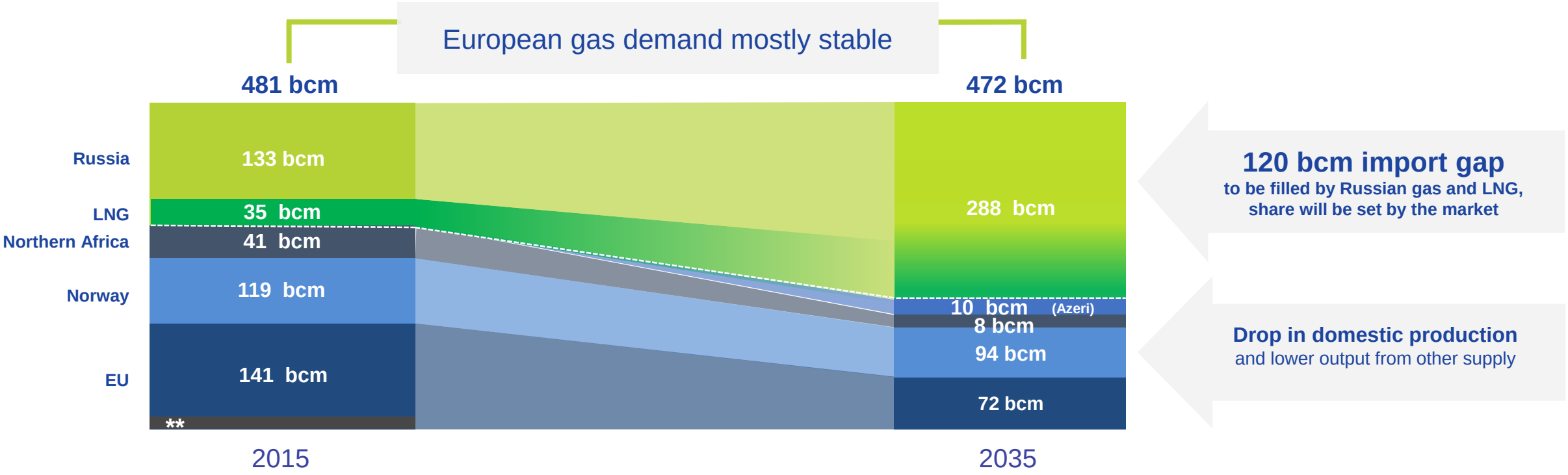
Engineering & Surveys
1. Saipem Fano
2. Fugro Survey
3. Geo
4. Next
5. MMT
6. N-Sea

Offshore Pipelay
1. Allseas
2. Saipem
3. Boskalis / van Oord

Environmental Studies, Quality Management, Safety & inspection
1. Rambøll
2. IfaÖ
3. DNV GL
4. Svarog
5. Business Trend
6. Delta Energy Services
7. Intertek

Nord Stream 2 is more necessary than ever

The case for Nord Stream 2 was already clear . . .



120 bcm import gap
to be filled by Russian gas and LNG, share will be set by the market

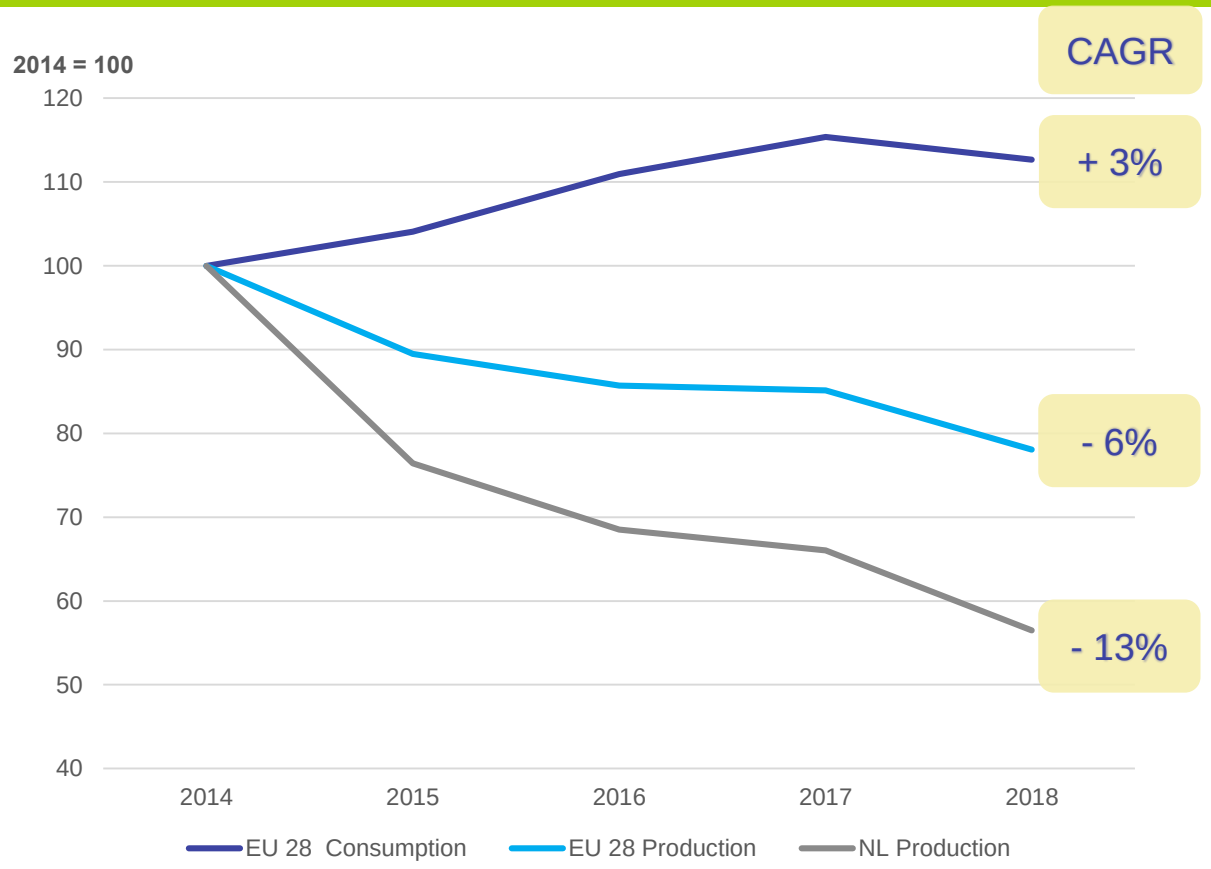
Drop in domestic production
and lower output from other supply

** Statistical difference of ~12 bcm in 2015

Sources: adapted from Prognos 2017, based on EU Reference Scenario 2016, adapted with NOP 2015, OGA (Oil and Gas Authority) production projections, February 2016, NEP Gas 2016, Norwegian Petroleum Directorate; The Oxford Institute for Energy Studies, Algerian Gas: Troubling Trends, Troubled Policies, May 2016; The Oxford Institute for Energy Studies, Azerbaijan's gas supply squeeze and the consequences for the Southern Corridor, July 2016, BP Statistical Review of World Energy, June 2016; demand includes EU-28 and Switzerland, excludes western imports to Ukraine

The case for Nord Stream 2 is now even stronger

- EU demand is growing again
  - up by 13% in total since 2014
  - 3% annual growth
- Continued fall in EU gas production
  - Down by 34 bcm/y (22%) since 2014
  - Dutch gas production down by 30 bcm/y since 2014 (44%)
- Imports have increased to fill the gap
  - Up by 90 bcm/ y (33%) since 2014
- LNG and pipeline gas competing for market share e.g.
  - Q4 2018 LNG imports up by 59% yoy
  - Q4 2018 Russian imports down by 6% yoy
  - Q4 2018 Norwegian imports down by 7% yoy



Source: Eurostat Gas Statistics, extracted 03.05.2019; European Commission Quarterly Report on European Gas Markets Volume 11

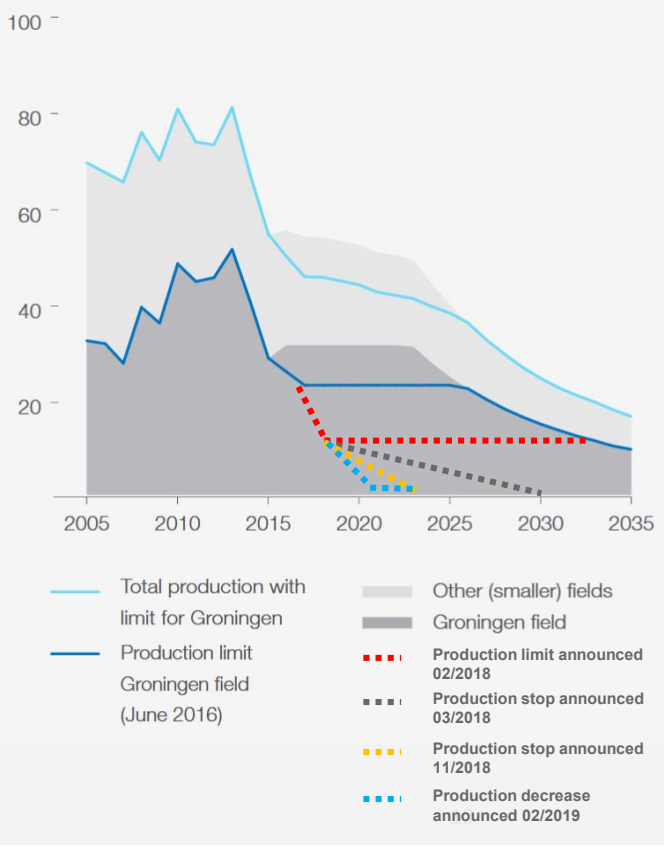
Europe’s Biggest Gas Field in Groningen Accelerates Decline in EU Gas Production

- Dutch government policy is **“complete cessation of gas production from Groningen”** to guarantee safety after seismic problems
  - Production caps have been successively lowered e.g. from 22 bcm to 12 bcm for 2022
- Groningen production is declining faster than previously expected as demand reduces
  - **54 bcm in 2013 to forecast 16 bcm in gas year 2019/20**
  - Accelerated **phase out of exports to Germany**
  - Increased use of nitrogen blending and **gas imports** to replace Groningen gas
- Gasunie expects future production of Groningen to be much lower than caps:
  - **Less than 2 bcm production in 2022/3 vs. cap of 12 bcm**
  - Groningen output could cease to be necessary as early as 2023-2024

Faster decline of Groningen accelerates EU demand for imports

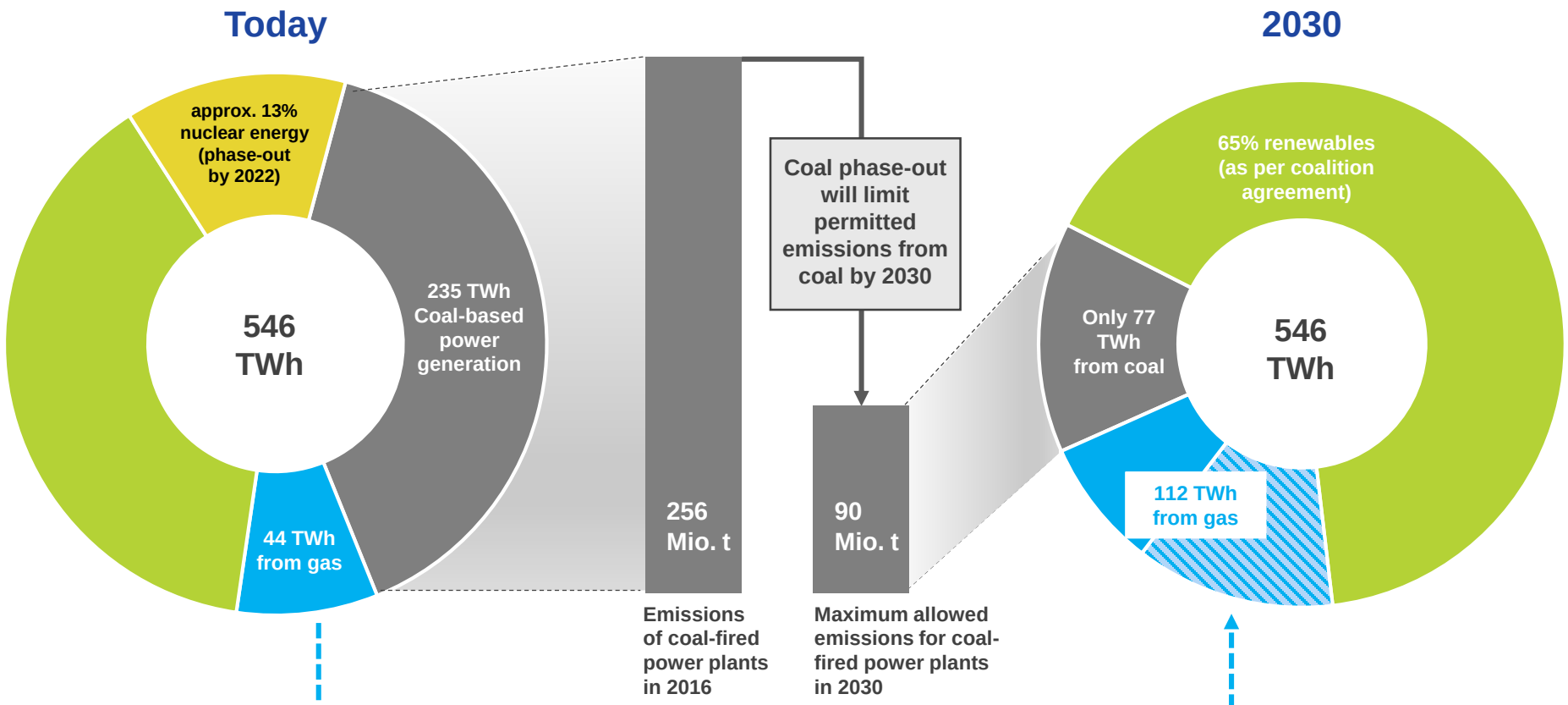
Gas production in the Netherlands [bcm]

Source: Prognos (2017), based on GTS (2015), Rijksoverheid (2016)



Sources: GTS letter to Parliament December 2018, Dutch Economic Ministry letter to Parliament January 2019, GTS letter to Dutch Economic Ministry January 2019

German Coal Phase out will increase gas demand by 13 bcm



Based on Ashutosh Shastri "Implications of German coal-fired power generation phase-out" Enerstrat May 2019

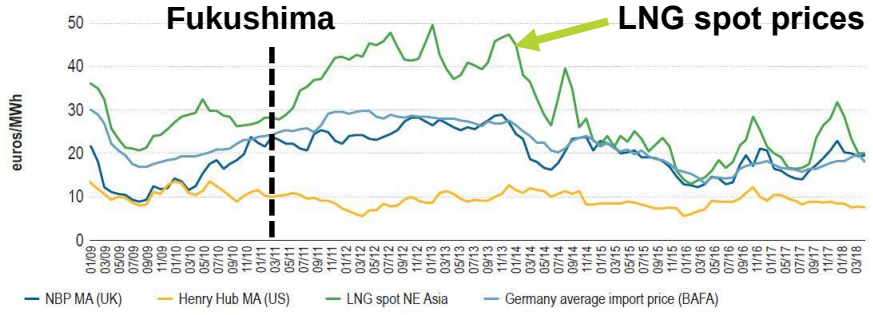
Global Gas Demand Is Set to Grow by About 45% by 2040, Increasing Competition Over Gas

FT FINANCIAL TIMES

Japan's nuclear reactors face new near-total shutdown

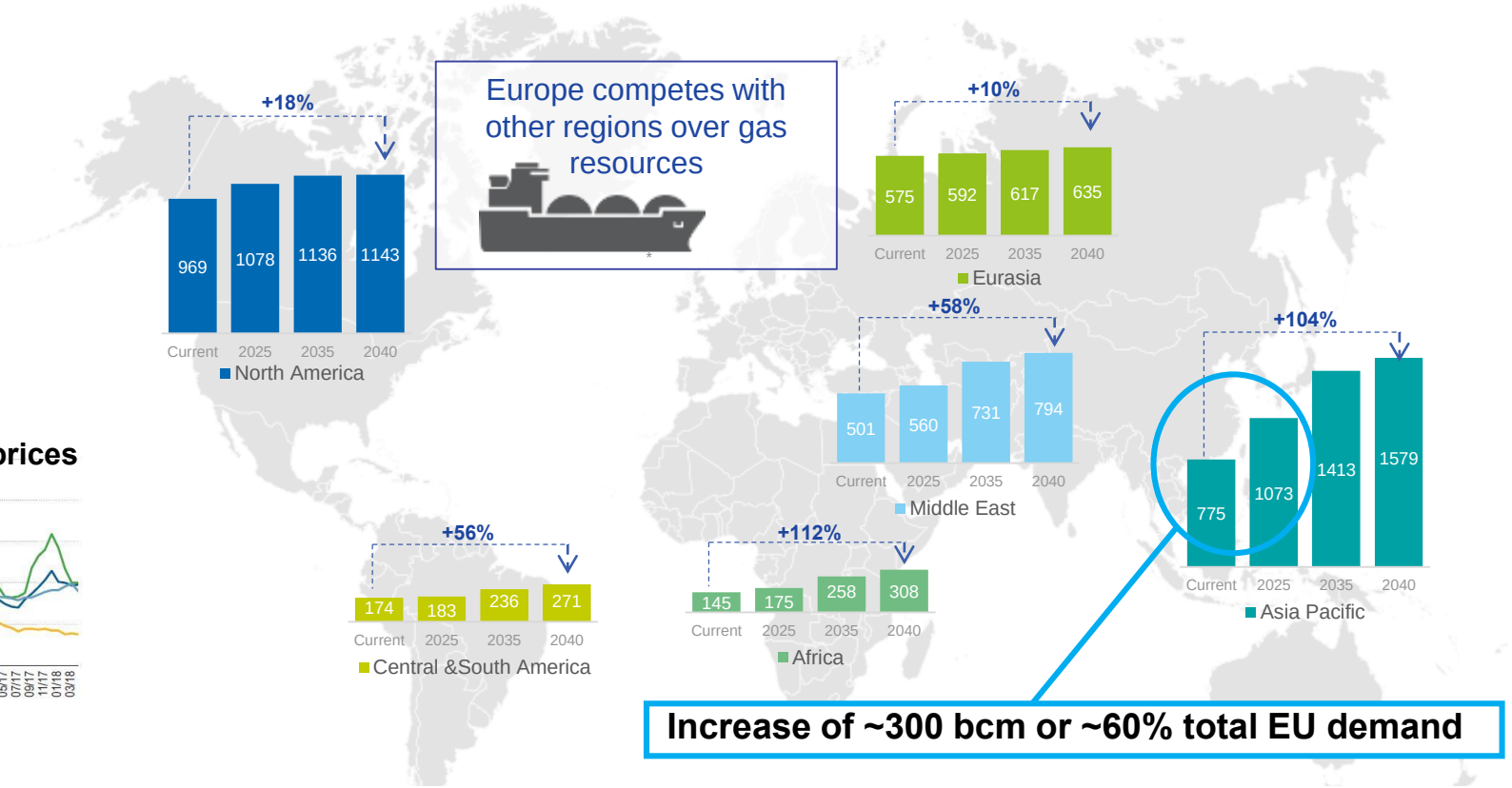
April 25, 2019

Figure 7: Evolution of international wholesale gas prices, 2009 – April 2018 – euros/MWh



Source: ACER based on ICIS Heren and BAFA[25].

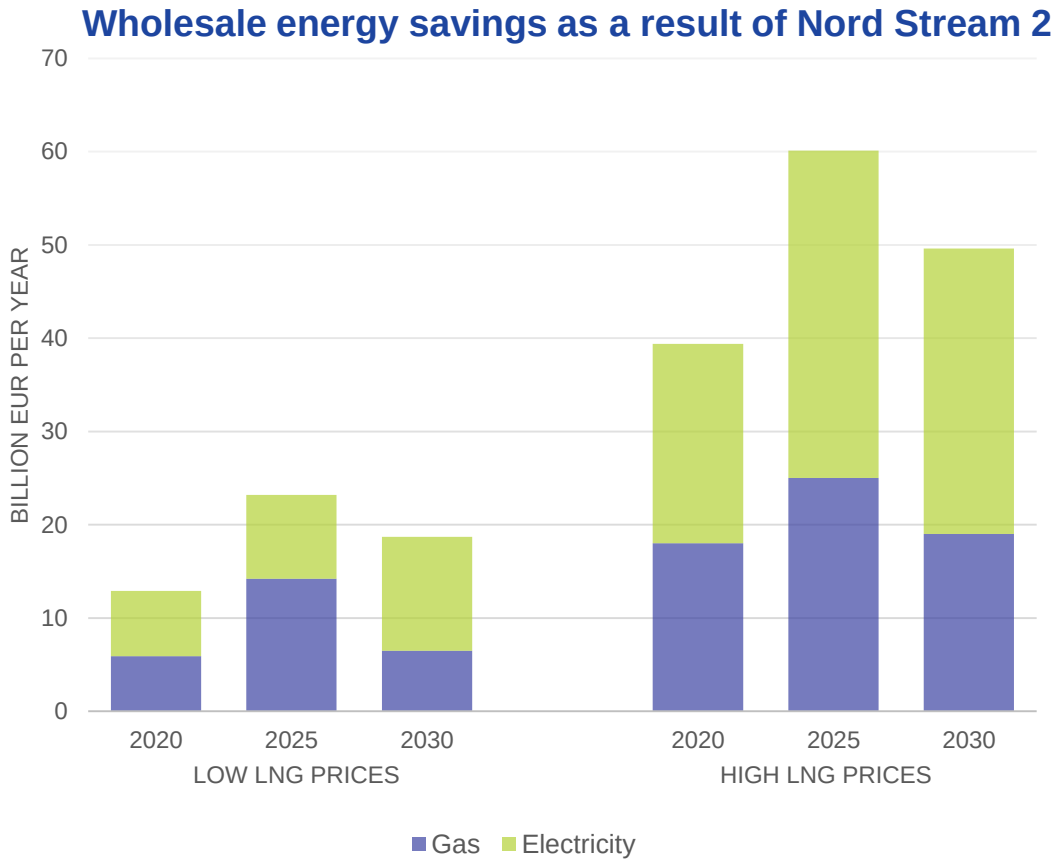
World Energy Outlook 2018: Natural gas demand in New Policies Scenario [bcm]



1) Demand growth leads to increased need for LNG because production and consumption locations further diverge from each other, i.e. Asian region is among the largest consumers globally, but has close to no natural gas resources itself or in proximity of a pipeline
2) Current = 2017
Source: IEA WEO (2018)
* Eurasia: Caspian regional group (Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyszstan, Tajikistan, Turkmenistan and Uzbekistan) and the Russian Federation

Lower Gas Prices Mean Lower Power Prices for EU Consumers

- Modelling shows Nord Stream 2 enables EU consumers to benefit from lower gas prices as a result of competition between LNG and pipeline gas
- Gas fired power plants often set the electricity market price as the marginal plant
- Lower gas prices feed through to lower power prices, creating significant savings:
  - Between €13 bn and €23 bn a year if LNG prices are low
  - Between €39 bn and €60 bn a year if LNG prices are high
- Significant savings for key industries:
  - Chemicals between €1.0 bn and €4.4 bn a year
  - Iron & Steel between €0.4 bn and €1.9 bn a year
- Note: benefits of lower gas prices for gas fired power plants only included in electricity savings



Source: EWI, Nord Stream 2 and its effects on European wholesale power prices, October 2018

Low-emission, High-efficiency Gas Transport

55 bcm of gas shipped via Nord Stream 2 compared to…

Central Russian corridor onshore pipeline:

Nord Stream 2 saves
8.2 mn tonnes
of CO_2 per year.

This roughly equals the total annual CO_2 emissions of **Cyprus**

Source: based on Gazprom Investors Day Presentation 2017

Up to 600-700 LNG tanker loads from the global market:

Nord Stream 2 saves
17.1-44.6 mn tonnes
of CO_2 eq. per year, depending on distance travelled.

This roughly equals the total annual CO_2-emissions of **Lithuania** (lower end) or **Slovakia** (higher end)

Source: based on ThinkStep GHG Intensity of Natural Gas Transport Report 2017

Coal burned in an average power plant to generate the same electricity:

Nord Stream 2 saves
~160 mn tonnes
of CO_2 per year.

This roughly equals the total annual CO_2 emissions of **Sweden, Finland, Estonia and Lithuania combined**!

Source: own calculation, based on IEA 2015, 10.34 kWh/m3, 49% efficiency for gas

Country comparisons based on Eurostat, Total greenhouse gas emissions by countries (including international aviation and indirect CO2, excluding LULUCF) for 2014

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