OXFORD INSTITUTE FOR ENERGY STUDIES Natural Gas Research Programme

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Future Gas Market Dynamics in Europe: is it all about Russian pipeline gas versus US LNG?

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OIES Natural Gas Research Programme

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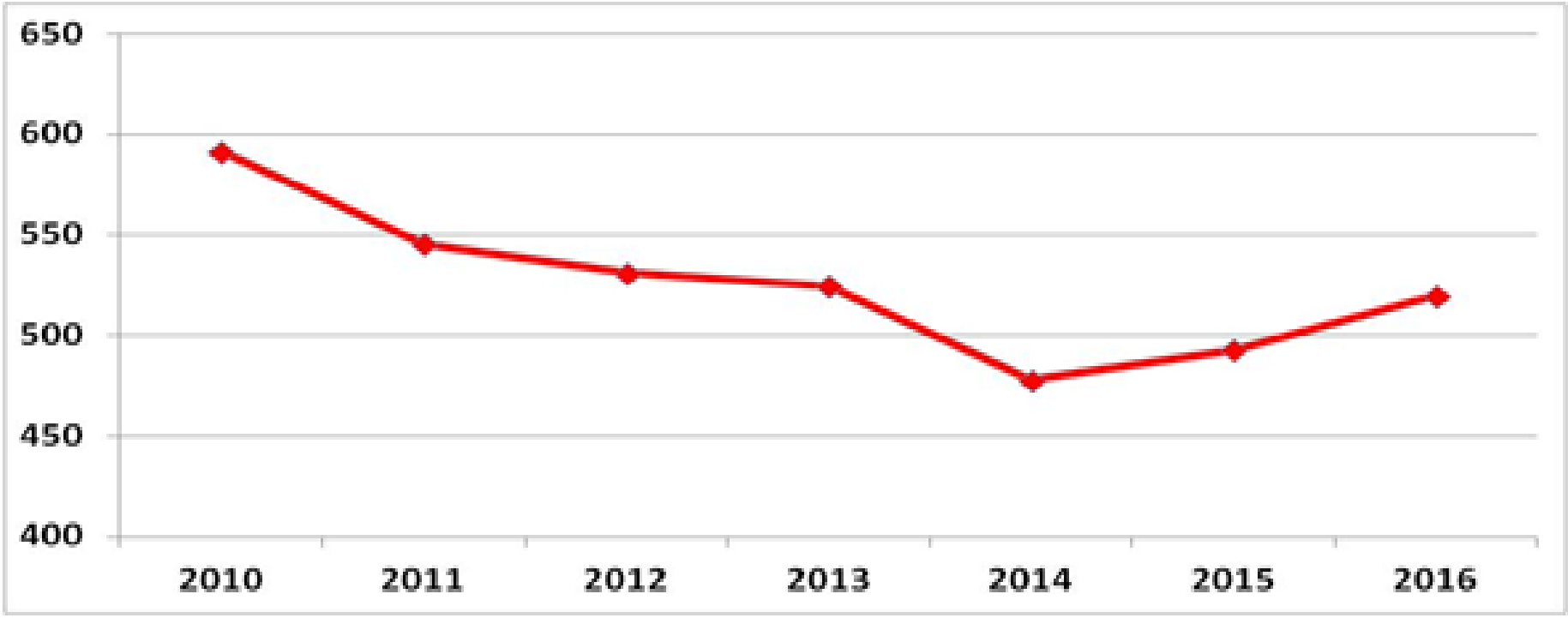
AGENDA

- Europe: can the gas demand recovery of 2015/16 be sustained?
- `Security': perceptions and reality
- Gazprom pipeline gas versus US LNG: competitive positions
- Different time frames

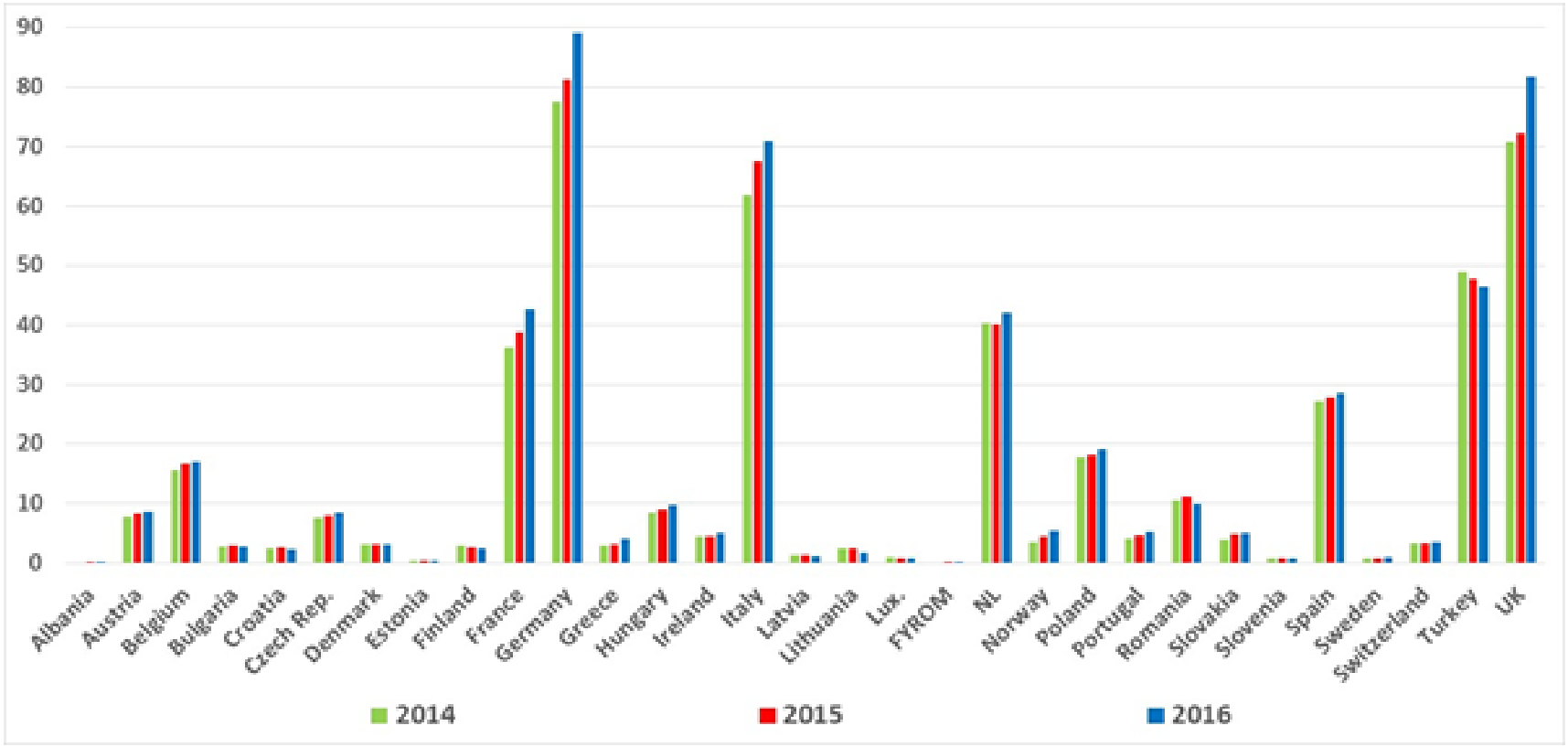
Gas Demand in 31 European Countries 2010-2016 (bcm)



Honoré: OIES (forthcoming)

2016 saw first non-temperature corrected increase in demand since 2008; demand in 2014 was back at early 1990s levels

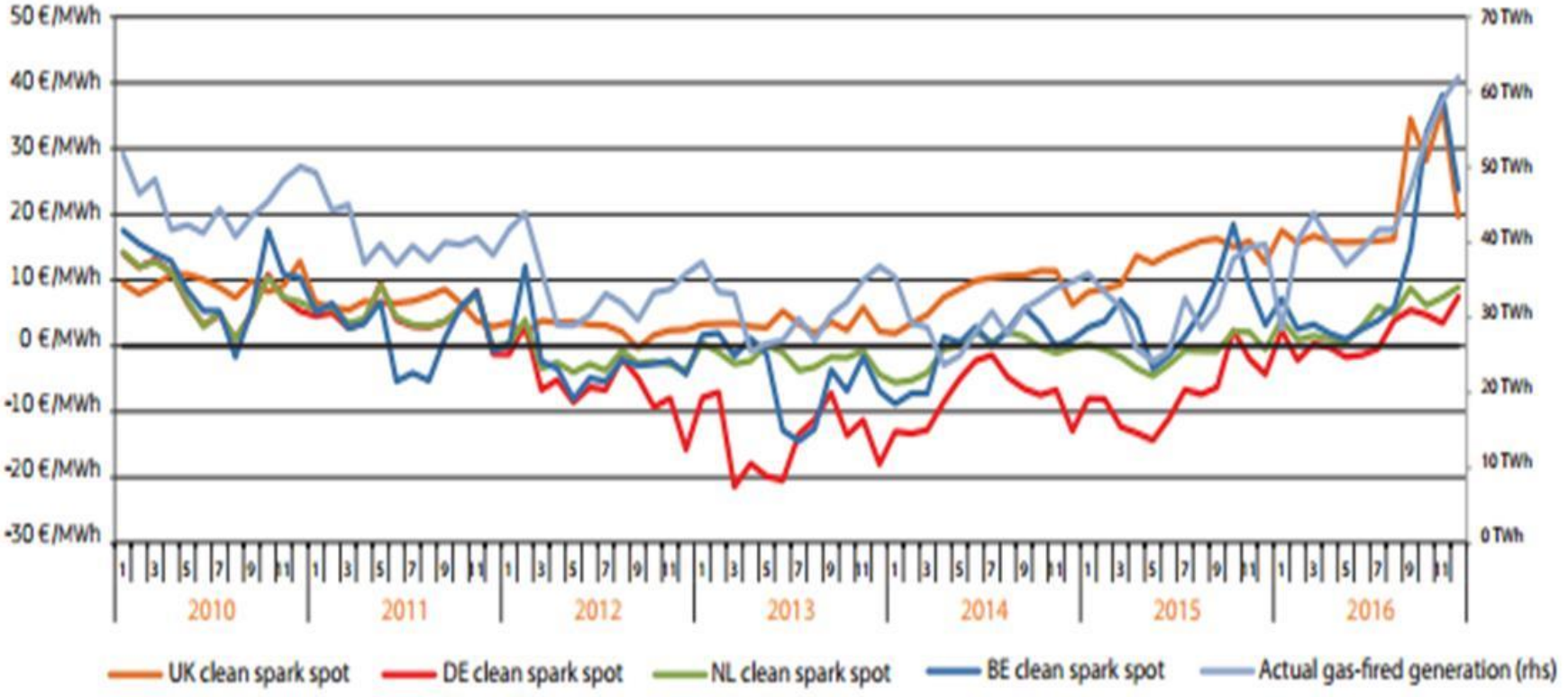
European Gas Demand by Country 2014-16 (Bcm)



Source: Honoré/OIES

Many countries increased their demand but some did not eg Turkey and some central/eastern countries

Clean spark spreads in four major EU markets and electricity generation from natural gas in the EU28 (Euro/MWh and TWh)

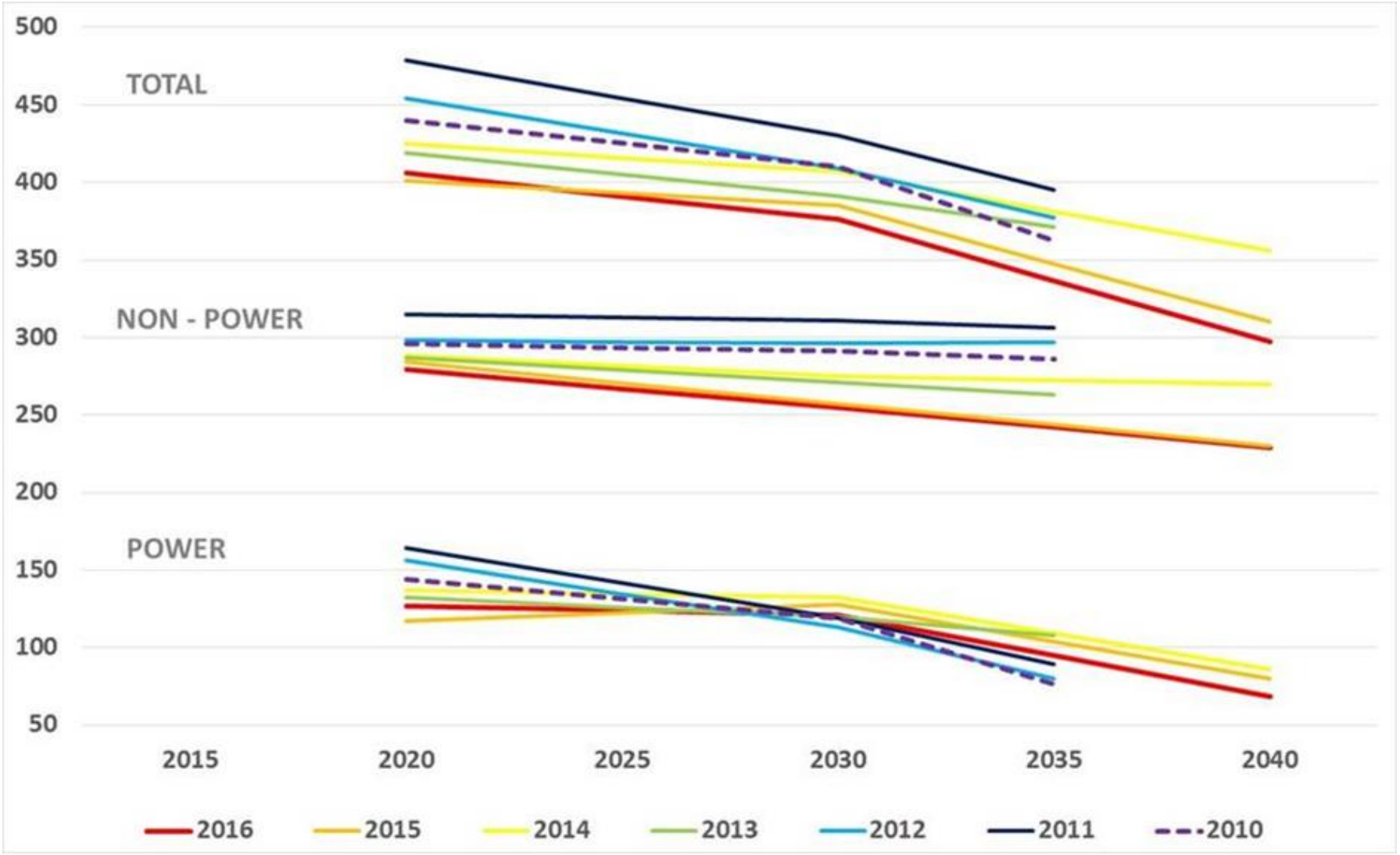


Source: Honoré/OIES

As coal prices increased and gas prices fell in 2016, so CCGTs came into the money, especially in UK which has a high carbon support price

IEA `450 Scenario': European Gas Demand 2020-40

Source: Honoré/OIES using data from IEA, World Energy Outlooks, 2010-16



If COP 21 targets are going to be achieved, demand decline is modest for the next decade but very significant post 2030

European Gas Security: perception versus reality

PERCEPTION: Russia is the major problem of European gas security:

For many Europeans: Gas = Gazprom/Putin = Bad: this is generally presented as an `energy/gas security problem' but in many cases is a metaphor for Russophobia/Putinphobia ie national/military security

REALITY:

- **European gas production is declining – by 2030 European gas production will be ~100 Bcm (43%) less than in 2014; low gas prices may mean this happens faster than anticipated; new production likely to be uncompetitive at low gas prices**
- **Diversification of pipeline gas has failed:**
  - **North Africa: export prospects are poor**
  - **Southern Corridor: 16 Bcm west of Turkey in the early 2020s is maximum (and could be less)**
  - **East Mediterranean: political gridlock**
  - **European shale gas: failed – politically toxic**
- **LNG can disappear in the 2020s if Asia needs it**

Projected conventional gas production decline 2016-2030 (Bcm)

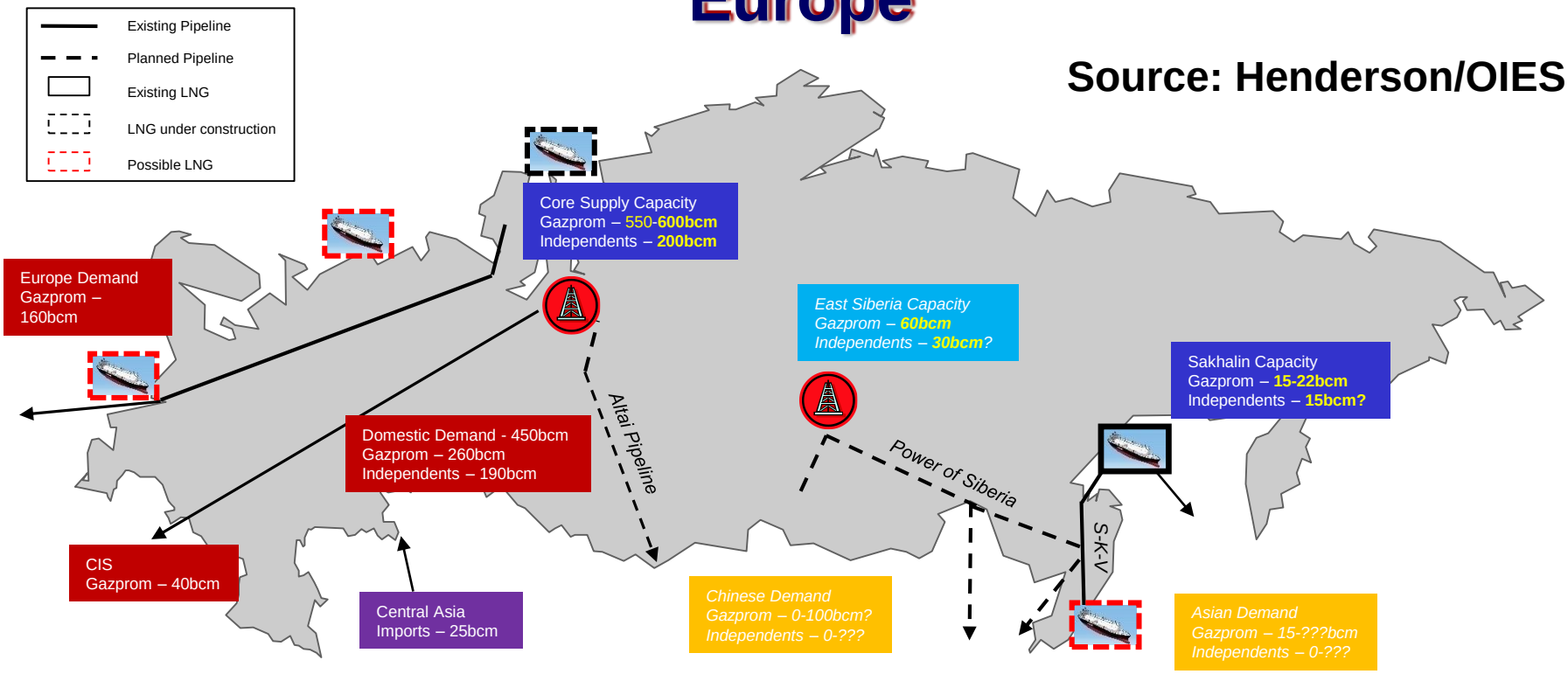
Sources: IEA, National statistics and Honoré/OIES

	2016	2020	2030
Norway	122	100 (87-111)	75 (57-90)
UK	41	34	20
Netherlands	53	38 (33-42)	26 (20-30)
Other	40	40	25
Total	256	212 (194-227)	146 (122-165)
Norway / UK / NL (share of total)	84%	81%	82%

Norwegian, Dutch and UK will continue to dominate European conventional gas production, which will decline 29-62 bcm (about 17% in the "mean" scenario) by 2020 compared to 2016 and by 91-134 bcm (about 43% in the "mean" scenario) by 2030

DUTCH DECLINE COULD BE FAR MORE RAPID THAN SHOWN HERE

Gazprom has a surplus of gas, mainly targeting Europe



- Russia's total supply capacity to western markets is c.750-800bcm
- Western demand for Russian gas = 620bcm (excluding sales from Sakhalin)
- Independent production is dedicated to domestic market or specific LNG projects
- Gazprom therefore has a shut-in gas production of around 100 Bcm which has been largely created by its decision to invest in the Yamal peninsula during the mid-2000s
- As the majority of the investment has already been made, the gas can be priced down to short run marginal cost if necessary

Gazprom Pipeline Gas Exports to Europe 2011-2016 (Bcm)

	2011	2012	2013	2014	2015	2016
Western Europe	115.9	111.4	133.6	126.8	130.0	146.3
Eastern* Europe	40.7	39.6	40.8	32.6	28.6	33.0
Baltic States	5.1	4.8	4.2	3.9	4.0	2.6
Total (Group)	161.7	155.8	178.5	163.3	188.4	228.3
Total LTC**	150.0	138.8	161.5	146.6	158.6	179.3

*Includes "other countries" which rose to 5-6 Bcm in 2014-15; **volumes exported under long term contracts by Gazprom Export excluding Baltic states. Sources: Regional totals are sum of individual countries exports from Gazprom in Figures2010-14, pp.82-3 and 2011-2015, pp.81-2. Gazprom Annual Report 2014, p.49 and 77. 2016 data from Gazprom Press Conference June 2017.

2016 was a record year for Russian gas exports

Nord Stream & Nord Stream 2 Pipelines

Source: OIES

Nord Stream: 55 bcm (in two strings): operational since 2011-12

Nord Stream 2: 55 bcm (in two strings): scheduled ~Q4 2019

Nord Stream 2 faces formidable political and regulatory obstacles making the 2020 start date unlikely (but not impossible)

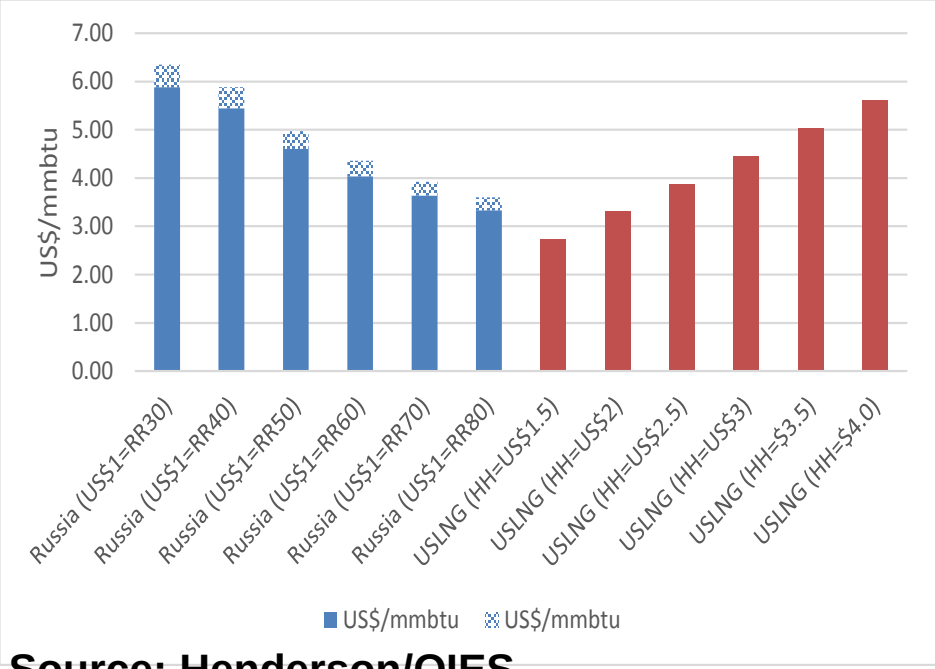
The Turkish Stream Pipelines

Source: OIES

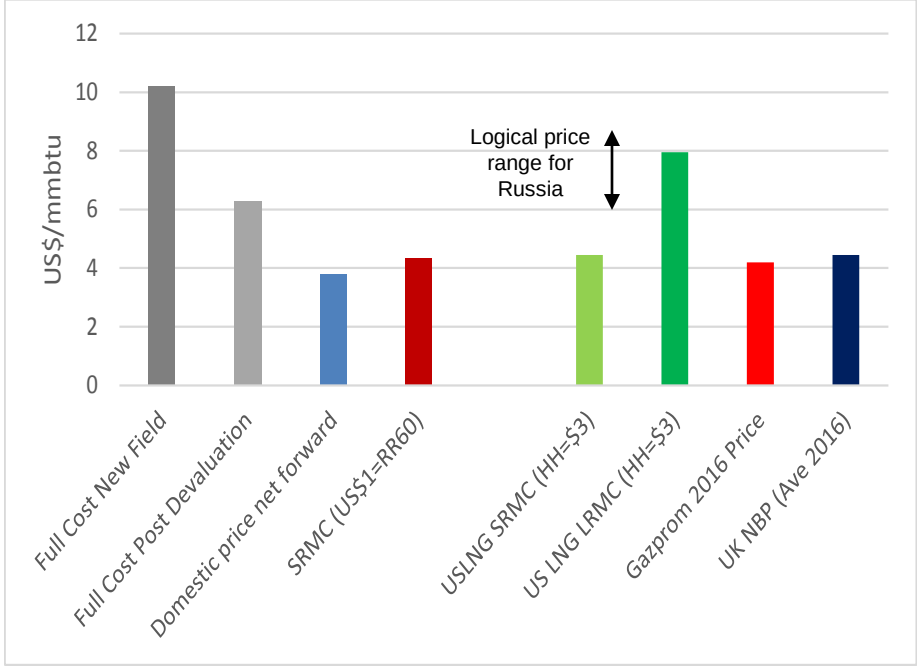
First pipeline will start laying imminently, completion by end-2019 likely; 2nd pipeline depends on EU regulation and pipeline capacity options

Russian Gas Can Be Very Competitive With US LNG in Europe

Russian pipeline gas versus US LNG at SRMC



Full comparison of Russian and US gas to Europe



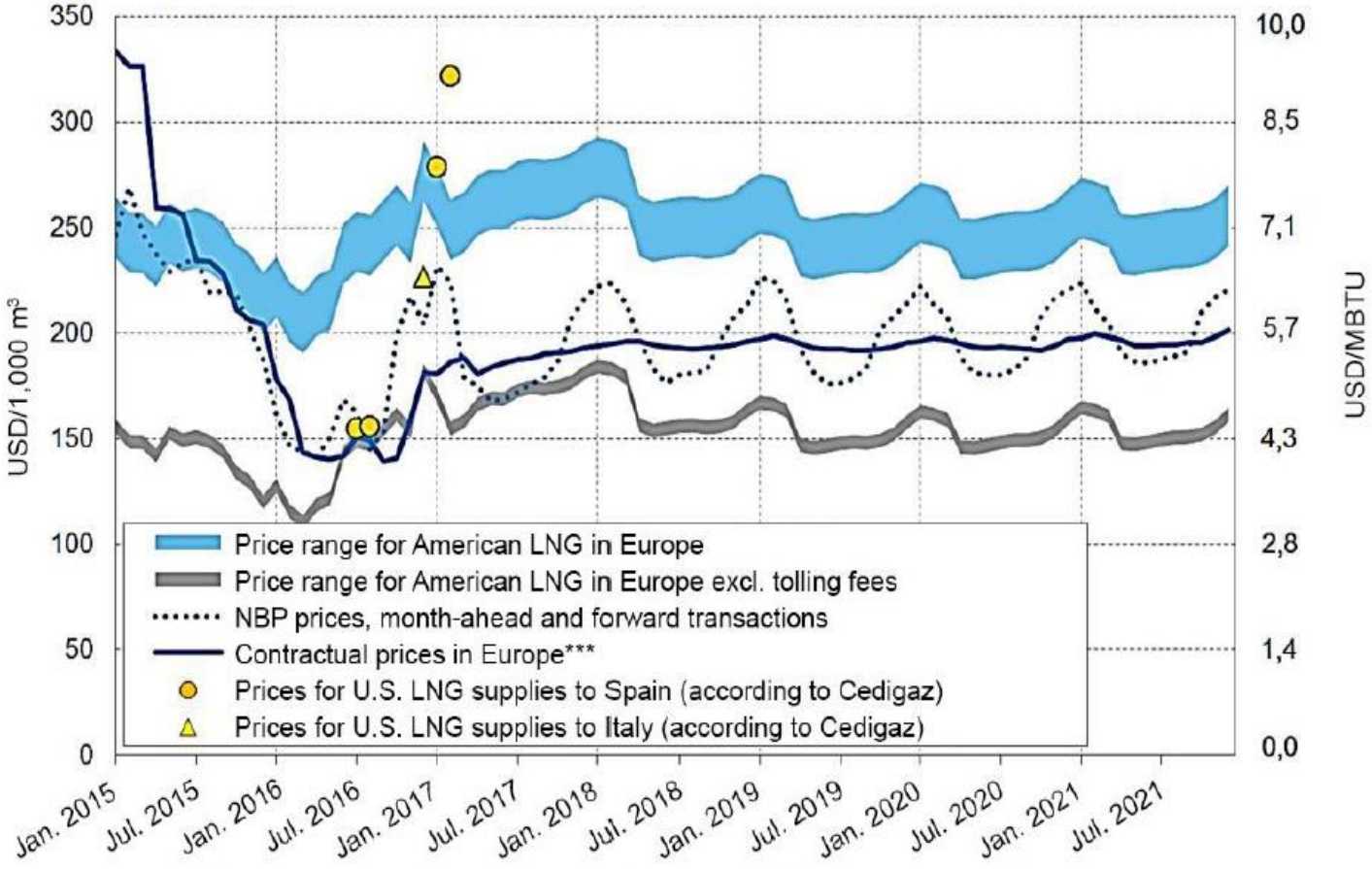
Source: Henderson/OIES

- **On a short-run marginal cost basis (SRMC) the key variables are the US$/Rouble exchange rate and the price of Henry Hub gas**
- **At current price levels Russian gas can compete with, and slightly undercut, US (and all except Qatari) LNG in Europe**
- **Longer term, Russia would logically adopt a strategy to keep the European gas price between the short and long-run cost of US LNG - $4-8/mmbtu**

LOW COMMERCIAL ATTRACTIVENESS OF U.S. LNG SUPPLIES TO EUROPE

In current environment, forward contract prices at European trading platforms do not cover full cost of future U.S. LNG supplies linked to Henry Hub prices

Estimated price range* for U.S. LNG supplies in Europe versus forward prices** in European gas market



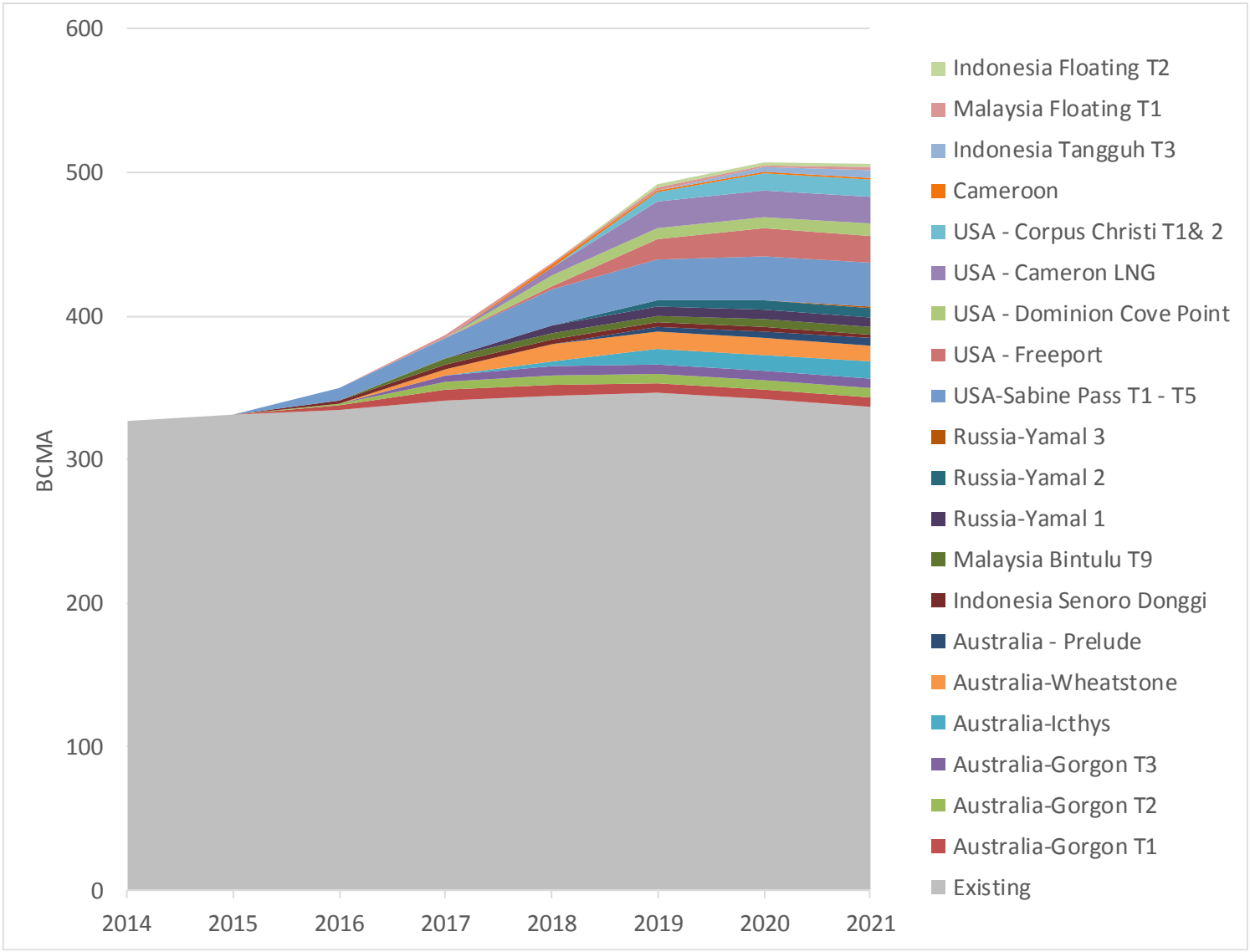
* *Based on Henry Hub forward prices, P = HH * 115% + X, where X – costs (liquefaction, shipments, regasification)*

** *NBP forward prices*

*** *Historical data: Russian gas prices, including delivery, at German border (according to World Bank), projected data: based on current forward prices of Brent and TTF*

Sources: Bloomberg, Cheniere Energy, WoodMackenzie, World Bank

But there will be a lot of new LNG on the water in the next few years



Source: Rogers/OIES

So not Russian Gas Versus US LNG but Russian Gas Versus LNG

KEY ISSUES FOR NEXT 5 YEARS ARE:

- **Demand (price) development – not just in power, but also industrial residential, transport(?) sectors**
- **Domestic supply decline – especially Netherlands**
- **Timing/reliability/competitiveness of LNG projects under construction which will impact…**
- **How long the perceived global LNG surplus will continue**

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