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SOME FUTURE SCENARIOS OF NATURAL GAS IN EUROPE

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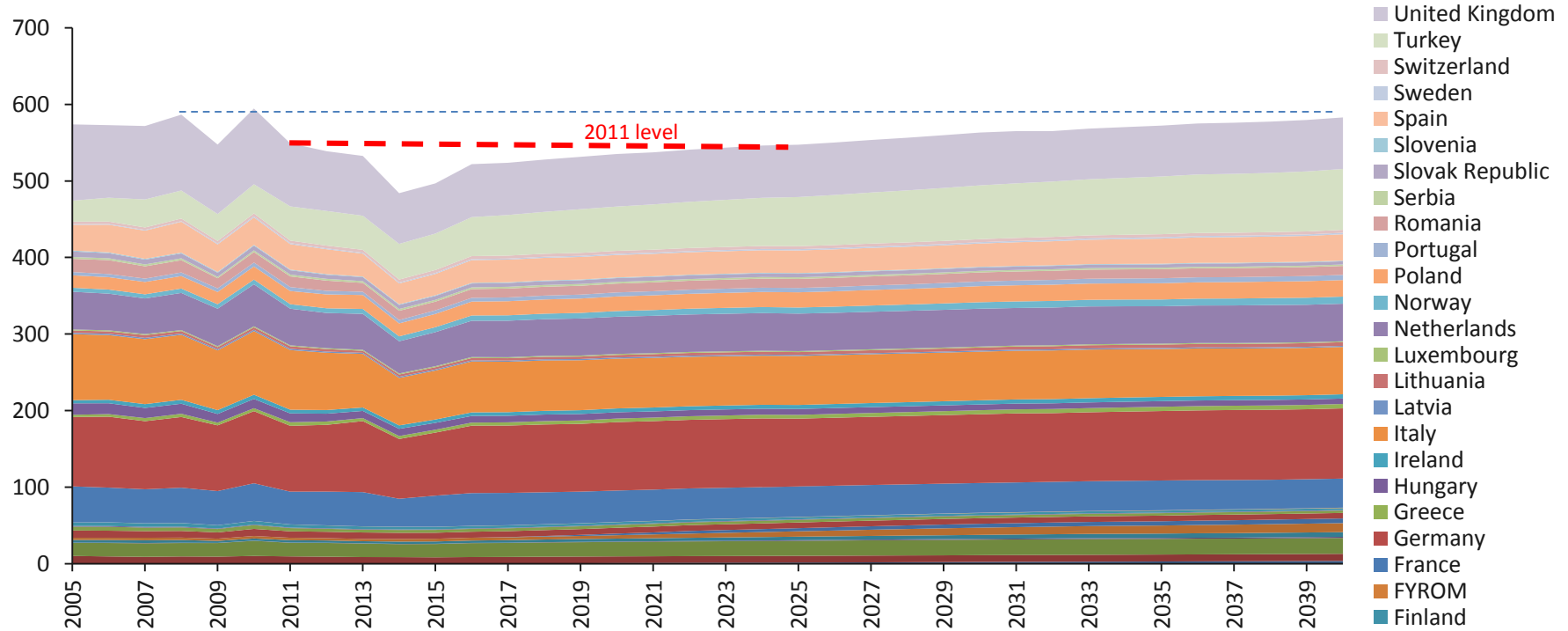


Aims and methods

- To give a realistic impression of the role of Russian natural gas in Europe in the period until 2040.
- To give a detailed account of the different sources of supply and to show how realistic recent outcries for diversification of supply are.
- To demonstrate that markets in CEE are currently not as well integrated as some scholars and policy makers have recently suggested and to show that increased market integration and de-escalation of the crisis in Ukraine are of utmost importance to safeguard EU energy security, in particular for countries in Central and Eastern Europe (CEE).
- To give a reasonable impression of the amount of US LNG that will be competitive in the European market space, a cause that has passionately been pleaded for by many in recent months.
- This study builds on calculations performed using the NEXANT world gas model (WGM) integrated in ERIRAS modeling information complex SCANNER.

European gas demand projection

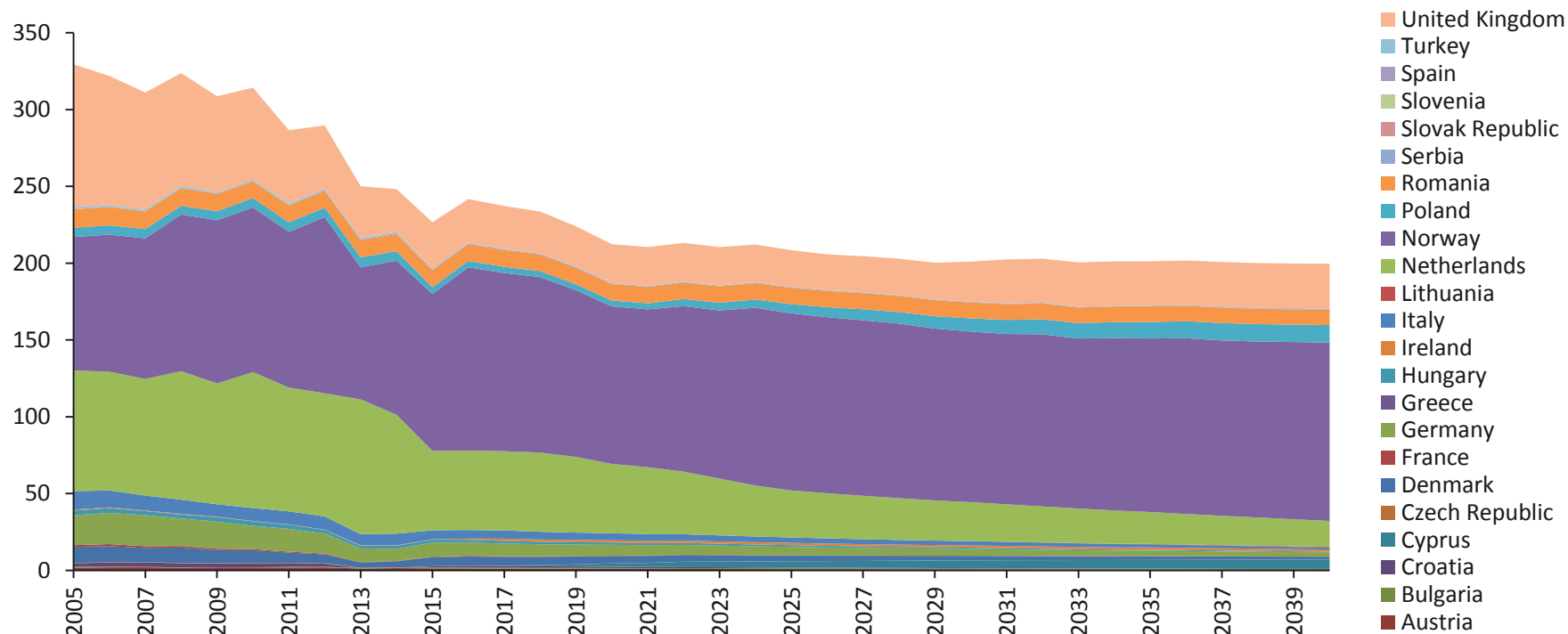
bcm



**European gas demand will not recover to the pre-crisis level of 2008 (and 2010) until 2040;
gas demand will reach the level of 2011 only by 2025**

Indigenous gas production in Europe

bcm



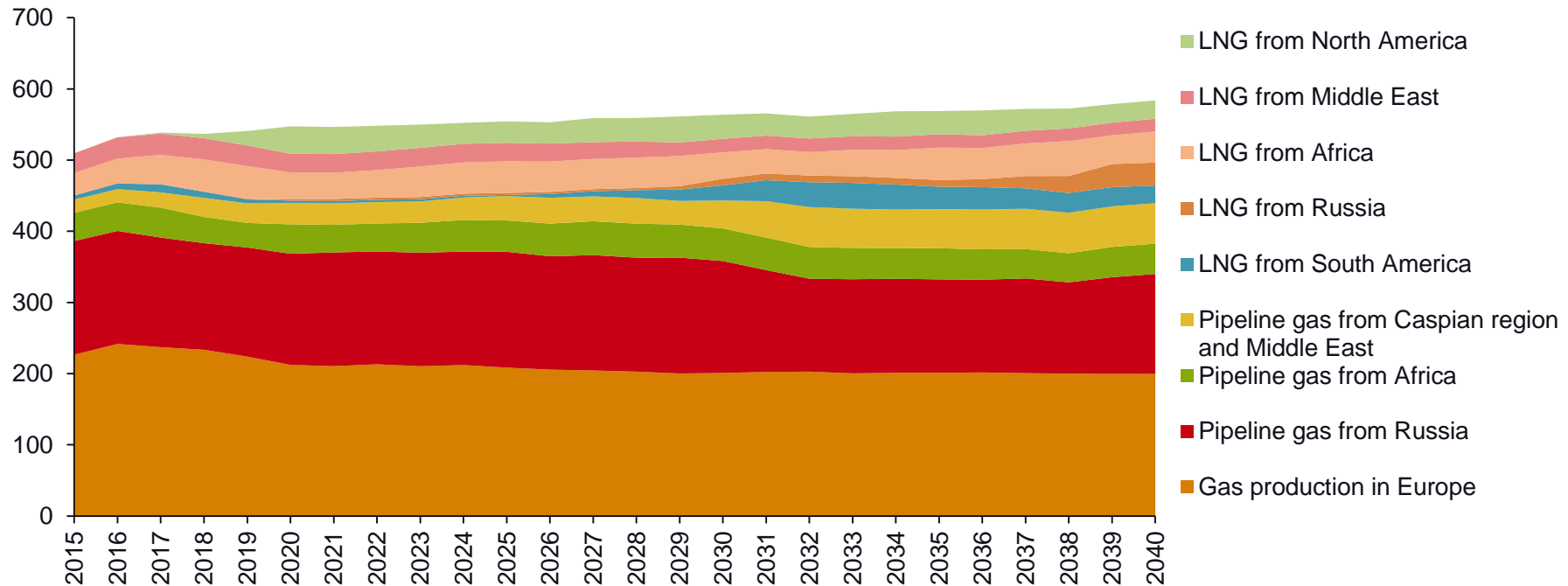
During this decade total gas production in Europe will drop by 1/3, but then the decline rates will slow down, Shale gas production in Europe is not expected to exceed 20 bcm by 2040

Scenario assumptions

	Baseline	No contract extension	High oil price	No Turkish Stream	No Ukrainian transit
Brent oil price	\$60/bbl in 2015, \$70/bbl in 2016, \$80/bbl in 2018 and reaching \$100/bbl by 2035	60/bbl in 2015, \$70/bbl in 2016, \$80/bbl in 2018 and reaching \$100/bbl by 2035	\$120/bbl	60/bbl in 2015, \$70/bbl in 2016, \$80/bbl in 2018 and reaching \$100/bbl by 2035	60/bbl in 2015, \$70/bbl in 2016, \$80/bbl in 2018 and reaching \$100/bbl by 2035
Russian contracts are extended by 10 years after their expiration, with a share of spot-pricing of 35%	+	-	+	+	+
Turkish Stream is constructed	+	+	+	-	+
Ukrainian transit is accessible	+	+	+	+	- (starting from 2015)

Baseline scenario: the European gas balance

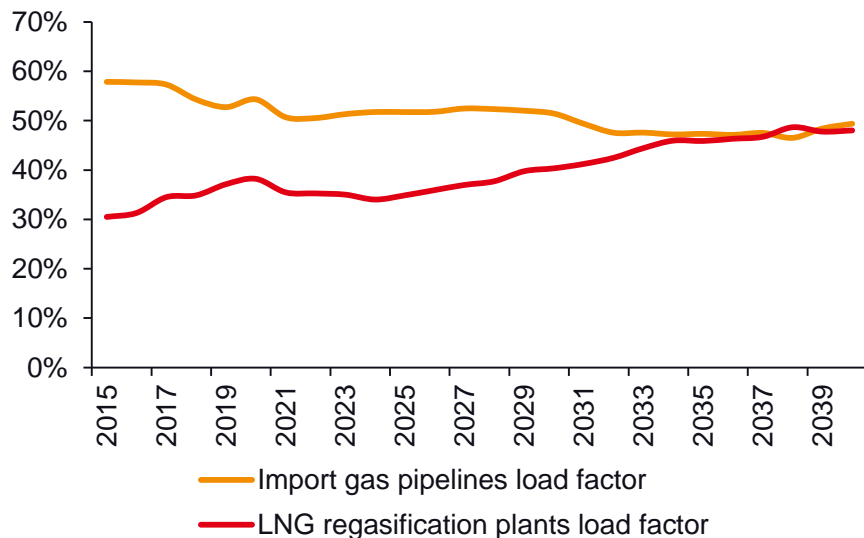
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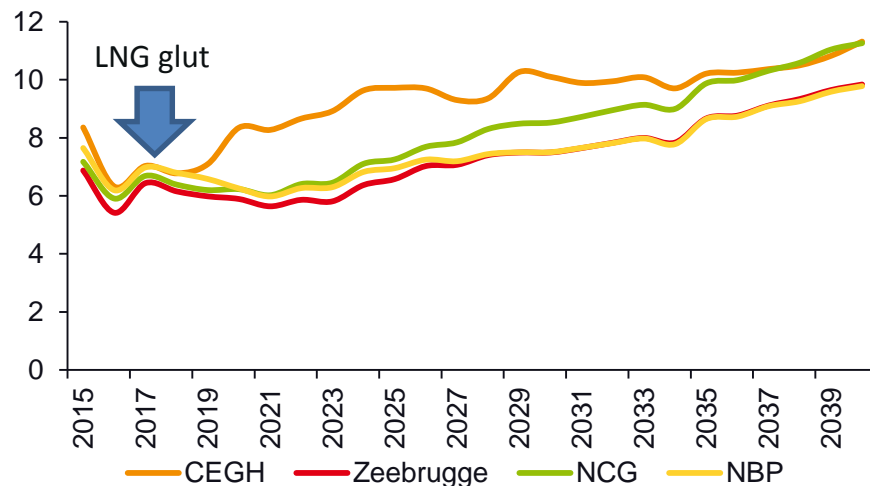
The structure of the European gas balance will not change dramatically in this scenario, pipeline supply share remains nearly flat, while growing LNG imports to Europe compensate for the declining indigenous gas production. Russian pipeline exports will drop from 150-160 bcm to 125-135 in 2035-2040.

Baseline scenario: LNG imports and prices

European import gas pipelines and LNG terminals load factors forecast, Baseline scenario, %



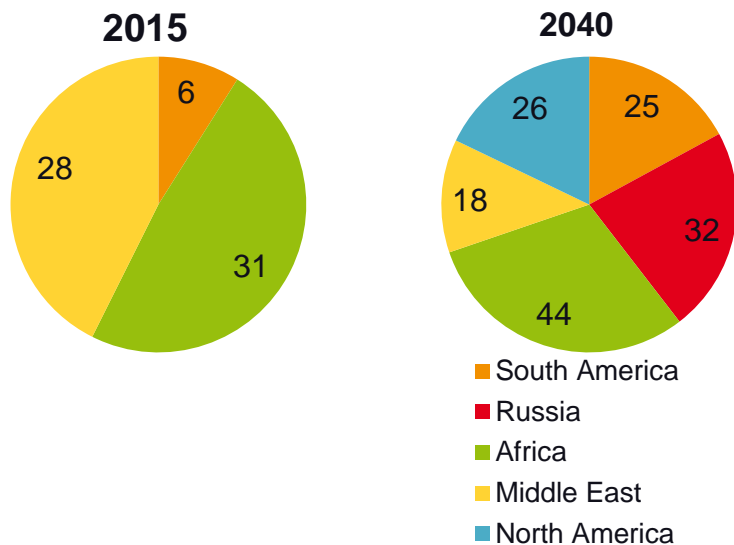
European gas hub prices forecast, Baseline scenario, \$/mmbtu (\$2012)



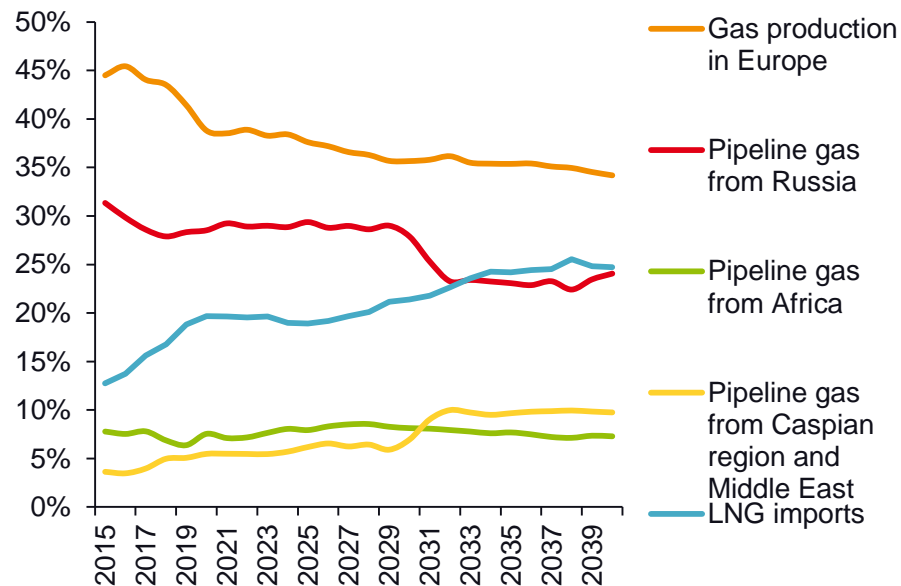
European LNG imports grow quite steadily until the end of forecast period, while pipeline imports level out after 2025. The dramatic increase in LNG import by 2020 will hold spot prices at 6–8 \$/mmBtu

Baseline scenario: sources of gas supply

LNG import structure by source in 2015 and 2040, Baseline scenario, bcm



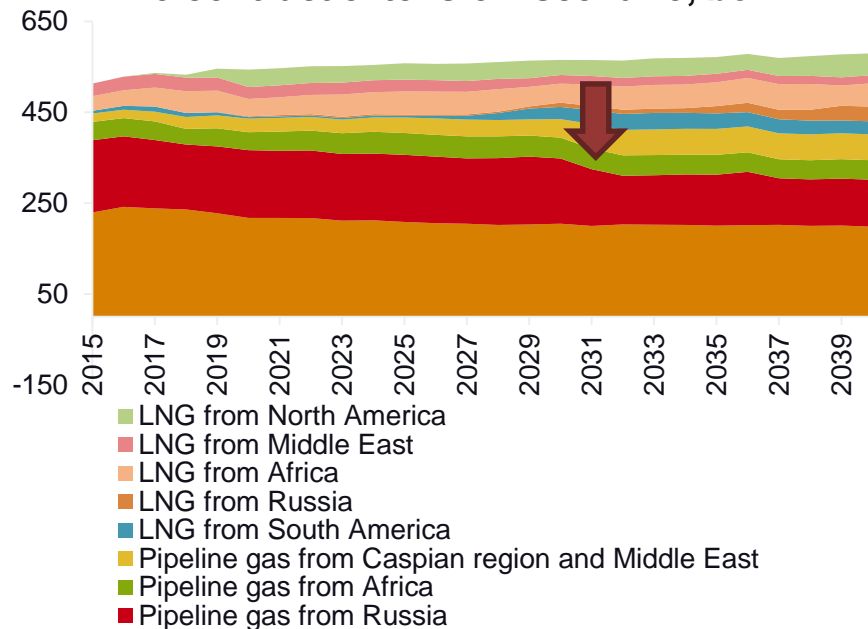
European gas market shares by major supply sources, Baseline scenario, per cent



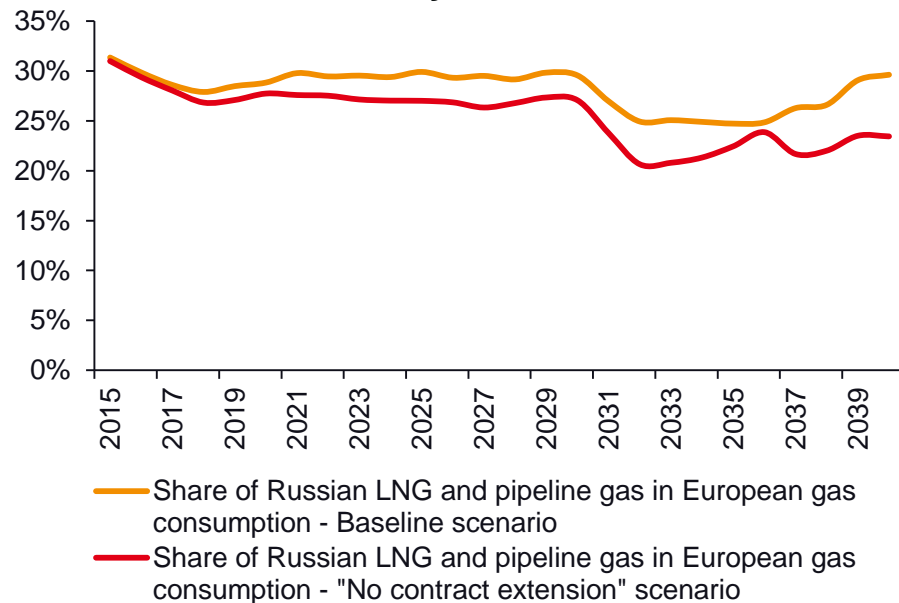
The share of Caspian and Middle Eastern pipeline gas will nearly triple upon the corresponding decline in the share of pipeline gas supplies from Russia. LNG imports from the US will rapidly grow up to 40 bcm by 2020 and then decline to less than 30 bcm by 2040. Pipeline gas imports

“No contract extension” scenario: the European gas balance

European gas balance forecast,
‘No contract extension’ scenario, bcm



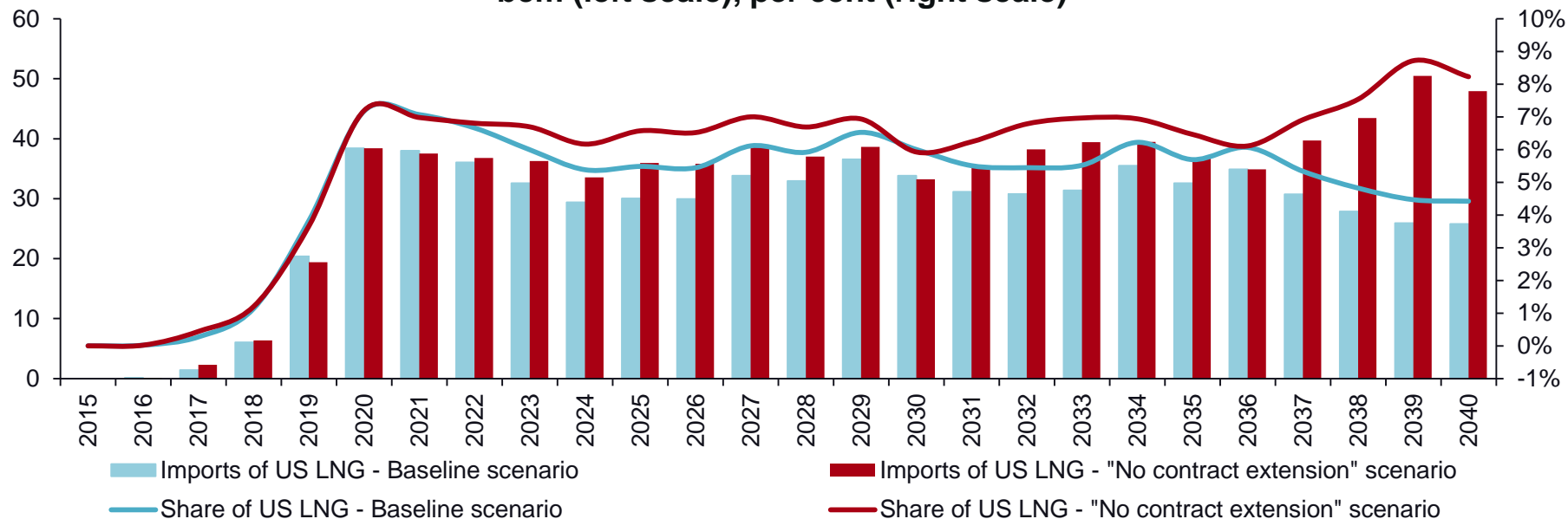
Share of Russian gas in the European gas
market by scenario, %



In this scenario LNG imports are increasing faster, while pipeline imports from Russian fall to 103 bcm in 2040, but no significant changes in spot prices are observed as compared to the baseline scenario

“No contract extension” scenario: US LNG

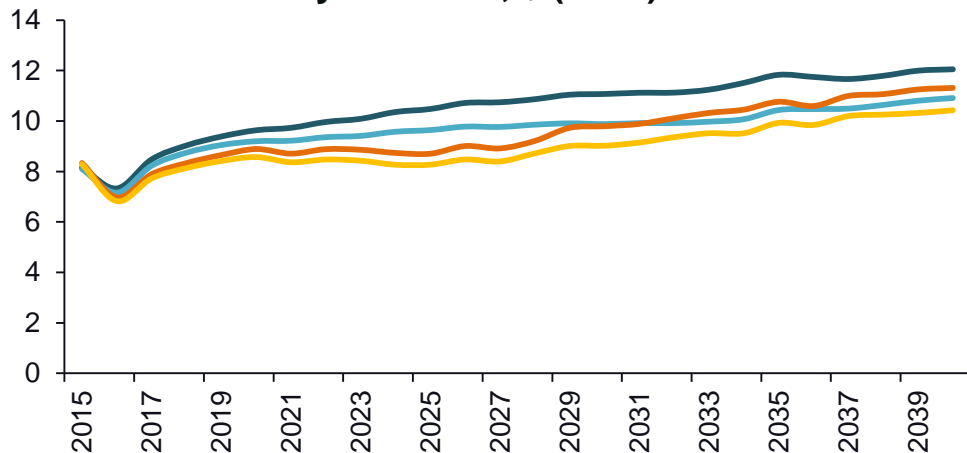
Volume and share of the US LNG in the European gas market by scenario, bcm (left scale), per cent (right scale)



LNG imports from the US will only partially substitute for Russian gas as contracts between the European companies and Gazprom expire. Share of the US LNG in the European gas market will reach about 8% by 2040

High oil price scenario: imports prices

Average weighted European gas contract prices forecast by scenario, \$ (2012)/mmbtu



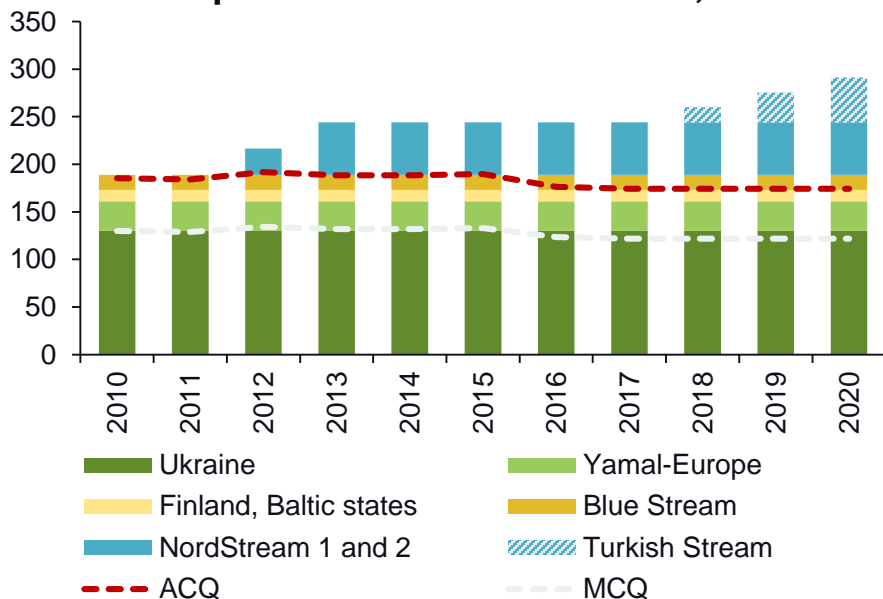
- Average weighted pipeline gas contract price - High oil price scenario
- Average weighted pipeline gas contract price - Baseline scenario
- Average weighted LNG contract price - High oil price scenario
- Average weighted LNG contract price - Baseline scenario

- Spot market prices at the major European hubs remain almost unchanged (higher by 3% on average for the period under study at eight European hubs).
- Prices of pipeline gas supply contracts in 2015–2040 are 9% higher than in the baseline scenario due to the higher oil prices, 10.5 \$/mmBtu on average.
- Prices of long-term LNG contracts in 2015–2040 are also 6% higher than in the baseline scenario, 9.5 \$/mmBtu on average.

The imports volume and structure are virtually unchanged as compared to the baseline scenario. Weighted average gas price is just 3% higher in this scenario than in the baseline scenario in the period 2015–2040.

“No Turkish Stream” scenario

Gas pipeline exports capacities from Russia to Europe and contracted volumes, bcm

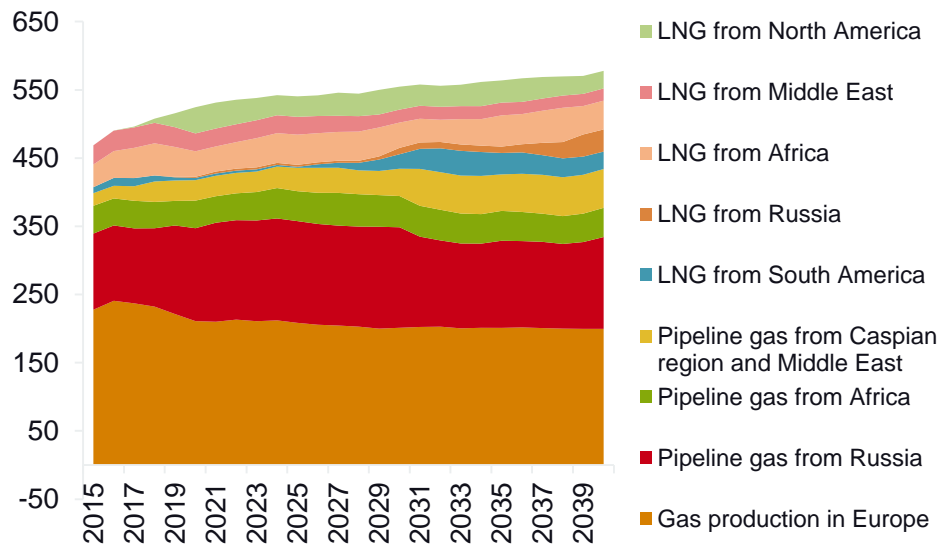


- There are no significant differences from the baseline scenario in terms of imports, including the imports from Russia (the difference in the volume of non-Russian gas imports to Europe from the baseline scenario does not exceed 3 bcm).
- Gas is delivered to Europe via Ukraine (up to 6 bcm), through Moldova (up to 10 bcm), and through the Blue Stream (up to 10 bcm) instead of the Turkish Stream.
- There are also no significant differences from the baseline scenario in terms of spot prices at 8 European hubs (difference is about 0.1%).

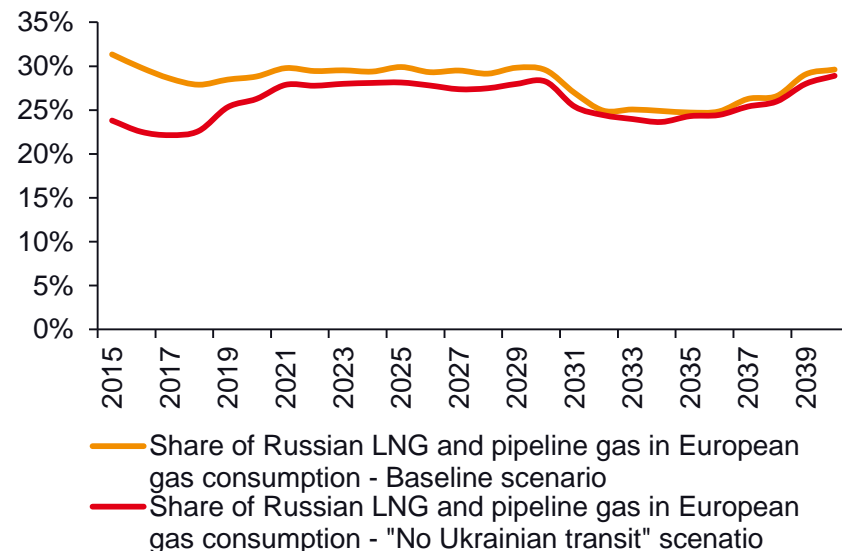
In the scenario “No Turkish Stream” there are no significant differences from the baseline scenario in terms of imports and prices – due to the fact that even in the baseline scenario utilization of this pipeline is rather low (less than 20 bcm)

“No Ukrainian transit” scenario: gas balance

European gas balance forecast, ‘No Ukrainian transit’ scenario, bcm



Share of Russian gas in the European gas market by scenario, %



In this scenario in 2015 pipeline gas imports from Russia is less by 47 bcm (30%) than in the baseline scenario, and it does not recover until 2040. Gas consumption in Europe in 2015 reduces by 6% and by 1% in 2040. Share of Russian gas will drop from 31% to 24% in 2015. Spot prices remain unchanged except for the Austrian hub CEGH, where they more than double in 2015, but after 2020 they will be 10% higher than in the baseline scenario

Conclusions

- Natural gas supply to Europe until 2040 changes remarkably little in the different scenarios. Even in fairly drastic contextual variations, such as the absence of gas transit through Ukraine, in the long term this would hardly have meaningful effect on the origins of natural gas in Europe.
- Despite the calls for diversification away from Russia, there are in fact very limited opportunities for EU to achieve this target even in the long term, not mentioning the short-term. Our analysis confirms that Russian pipeline natural gas will be very competitive until 2030, and after that Russian companies lose a part of their market share, which then stabilizes at around 130 bcm (which is still a significant share of the expected 240 bcm of pipeline imports).
- Most alternative supplies are only second best options (because their costs are significantly higher, or the quantities are not expected to be significant any time soon, or because supplies will not reach the market in the foreseeable future) and a substantial amount of natural gas supplies is tied up in long-term contracts. Therefore, building stable relations with Russia is critical for EU energy security, as well as focusing on much deeper integration of the internal market and infrastructure development inside EU.
- In the short to medium term, the exclusion of Ukraine as a transit country, which could happen if the conflict with Russia further escalates, would have significant upward consequences for spot market prices in CEE. In contrast, the effects in Northwestern Europe, where markets are better integrated, are virtually nonexistent. This confirms our hypothesis that CEE markets are currently not as well integrated as some analysts have claimed.
- Our analysis suggests that in the medium term fiercely debated LNG supplies from the United States will be competitive in the UK, Netherlands, and Belgium, but not in the larger part of Europe. Yet it is important to reiterate how uncertain it is, surely in the current price environment, that large volumes of LNG will find their way from the North American continent. But the bulk of LNG though will come from African countries such as Algeria, Angola, Nigeria, Equatorial Guinea, Qatar and Trinidad and Tobago.
- All new alternatives are important in their own right, but it is wise to keep them all in perspective, and not mistakenly assume that they can replace Russia.