Quality Check for Prices on European Gas Hubs

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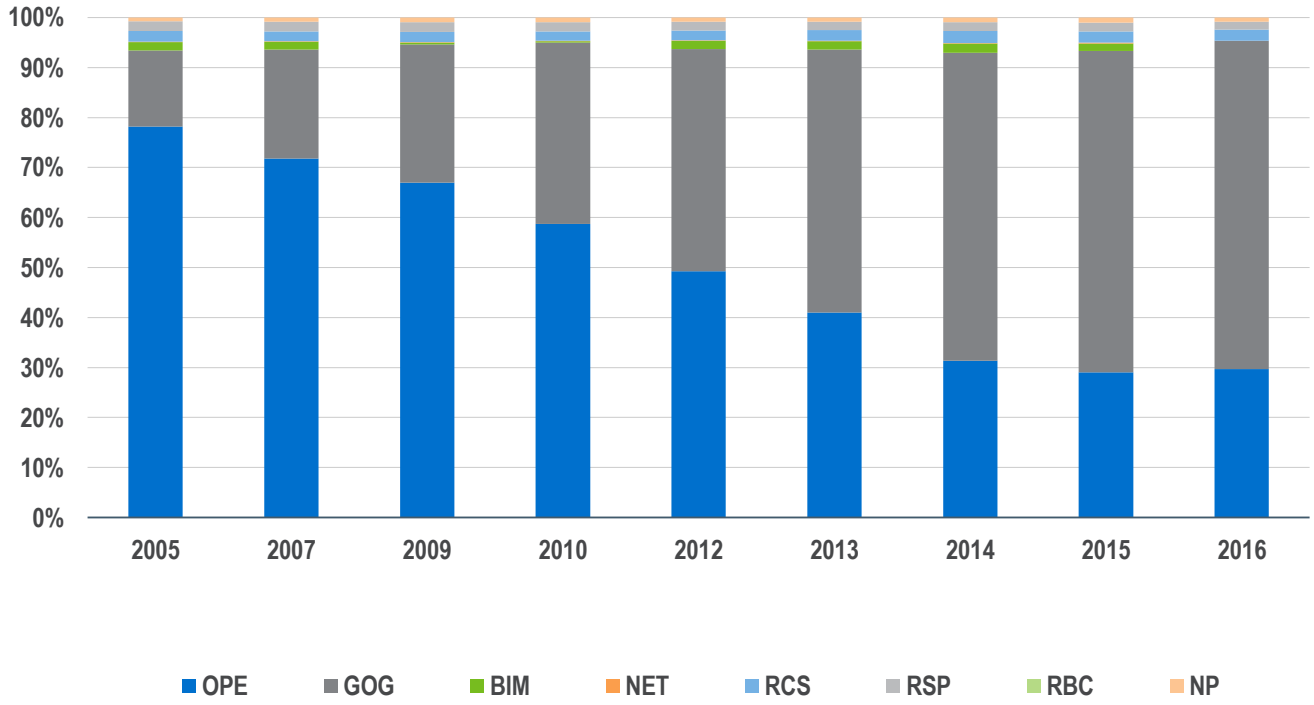
*Views expressed in this presentation are the author’s sole responsibility and do not necessarily represent that of Gazprom Export

Agenda: What Story European Hubs Prices Tell?

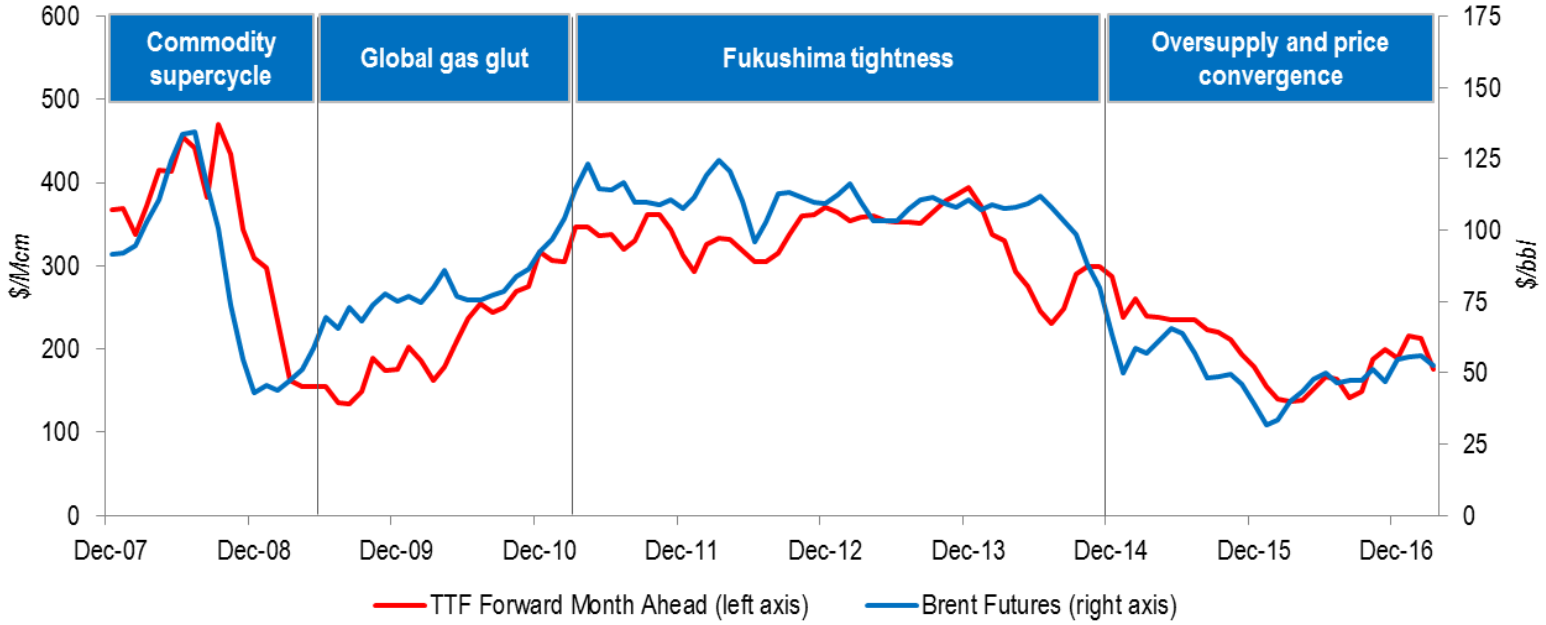
- Summary of developments in reforming pricing mechanisms in Europe
- Has European natural gas became a truly independent commodity whose prices are driven exclusively by supply and demand?
- Permanent oversupply of ‘paper’ gas and the grave consequences of price degradation on European hubs
- How to fix European gas pricing mechanisms to enable the market to function efficiently in the interests of producers and consumers?

IGU 2017 Price Survey: Europe Price Formation – 2005 to 2016



- **IGU: Share of "gas-on-gas completion" pricing mechanism in Europe has grown dramatically from 15% in 2005 to 66% in in 2016; in Northwest Europe its share hit 91%**
- **Mainstream view: hub pricing is now almost universal; hub prices are well aligned and are driven by and large by supply and demand balances; they are a true indication for market equilibrium**
- **Alternative view: prices on the hubs do not meet quality check for market purity as the are still mainly driven by the oil indexes; prices send a wrong signal of a nearly permanent market oversupply, which is not a case in reality**

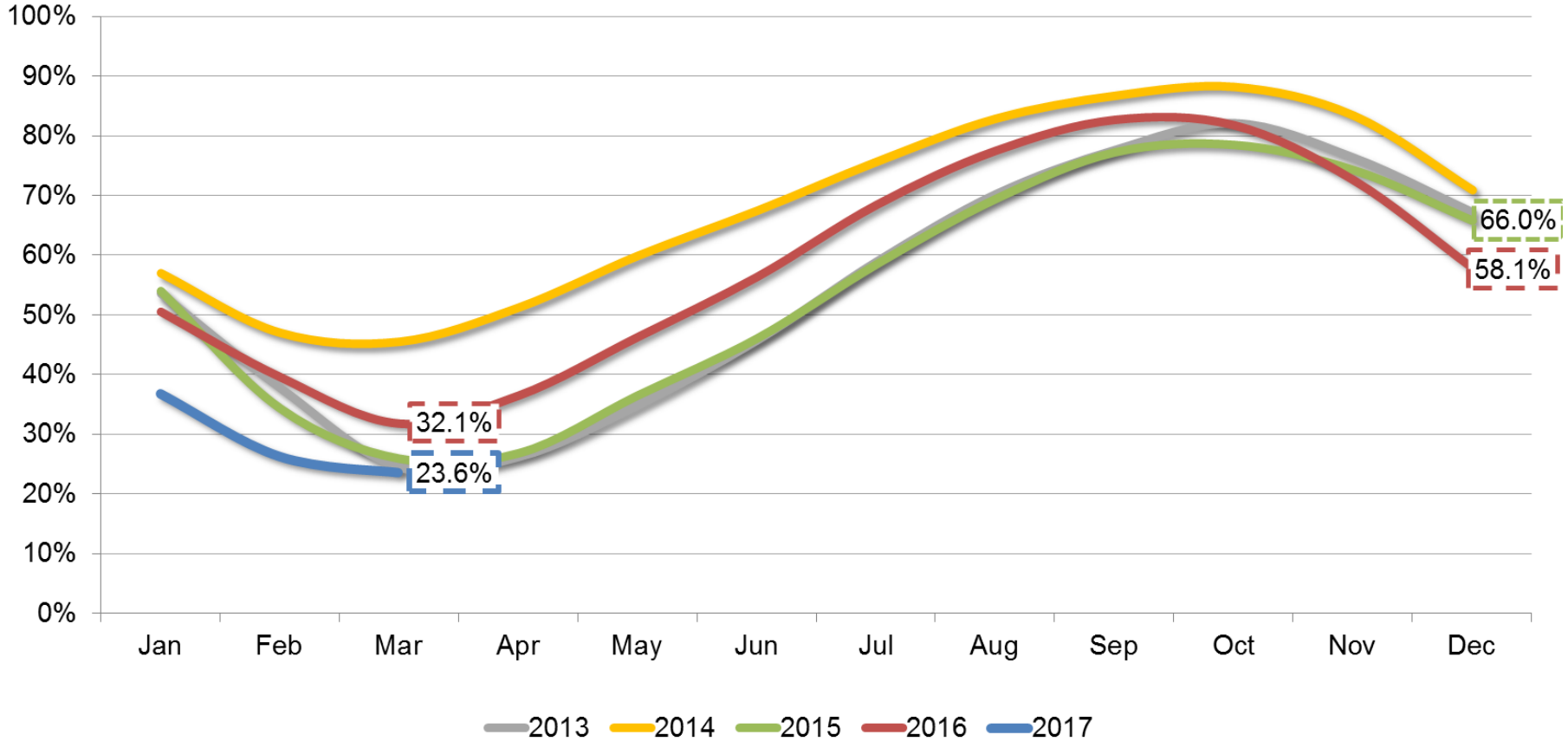
Market Tightness is Inadequate Criteria for Division of European Gas History into Periods



Source: Adapted from Timera Energy

- **"Global gas glut" (Jun '08 – Dec '10) only strengthened European gas prices despite the LNG flood; European gas prices just followed oil price recovery prior to Fukushima**
- **"Fukushima tightness" (Mar '11 – Dec '14) gave no special momentum to gas price developments: erratic fluctuations of gas prices completely ignored outflow of large LNG volumes from Europe**
- **"Oversupply and price convergence" (Dec '14 – current): collapse of gas prices coincided with oil price drop; LNG not coming to Europe**
- **European gas history periodization based on market tightness creates parallel reality. It supports an absurd conclusion that oversupply leads to higher prices and vice versa**

Deficit in European Gas Stock Does Not Point to Situation Nearly Permanent Oversupply



By the end of Q1 2017 the UGSs of European countries were filled by 23.6%, a new minimum over the last five years.

Source: Based on IHS and IEA data

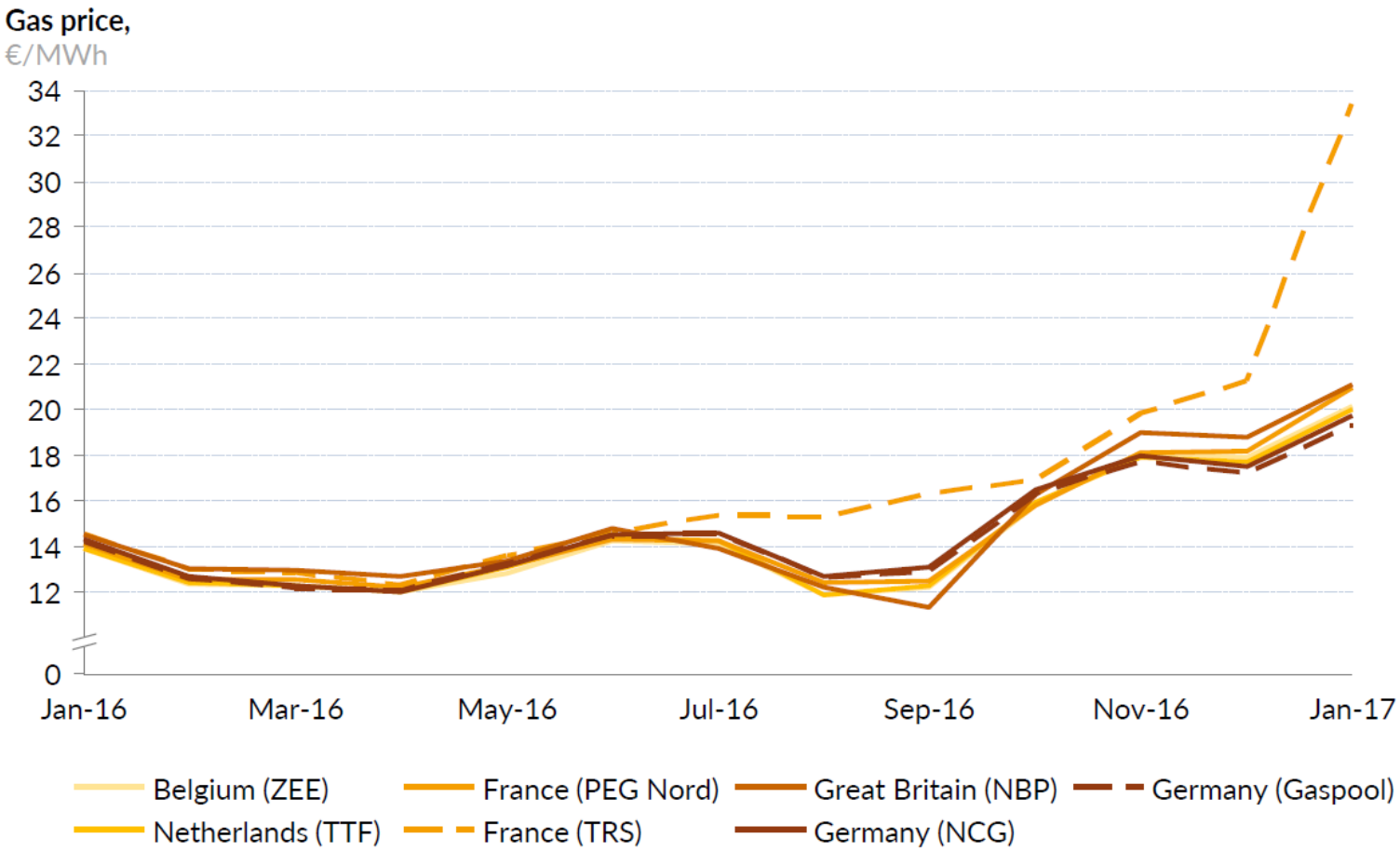
Europe is not Oversupplied by LNG

	2015	2016	Δ, bcm	Δ, %
Qatar	29.1	24.0	-5.1	-17.4%
Algeria	13.7	15.0	1.3	9.6%
Nigeria	8.0	9.8	1.8	22.5%
Norway	2.8	2.6	-0.2	-5.9%
Peru	1.3	2.1	0.8	61.4%
Trinidad and Tobago	1.7	1.3	-0.4	-21.0%
USA	0.0	0.5	0.5	-
Angola	0.0	0.1	0.1	-
Egypt	0.0	0.1	0.1	-
Oman	0.1	0.0	-0.1	-100.0%
Total	**56.6**	**55.5**	**-1.1**	**-1.9%**

Source: Bloomberg, IHS

Supply and Demand Could Matter as Demonstrated by Isolated Regional Markets on Special Occasions

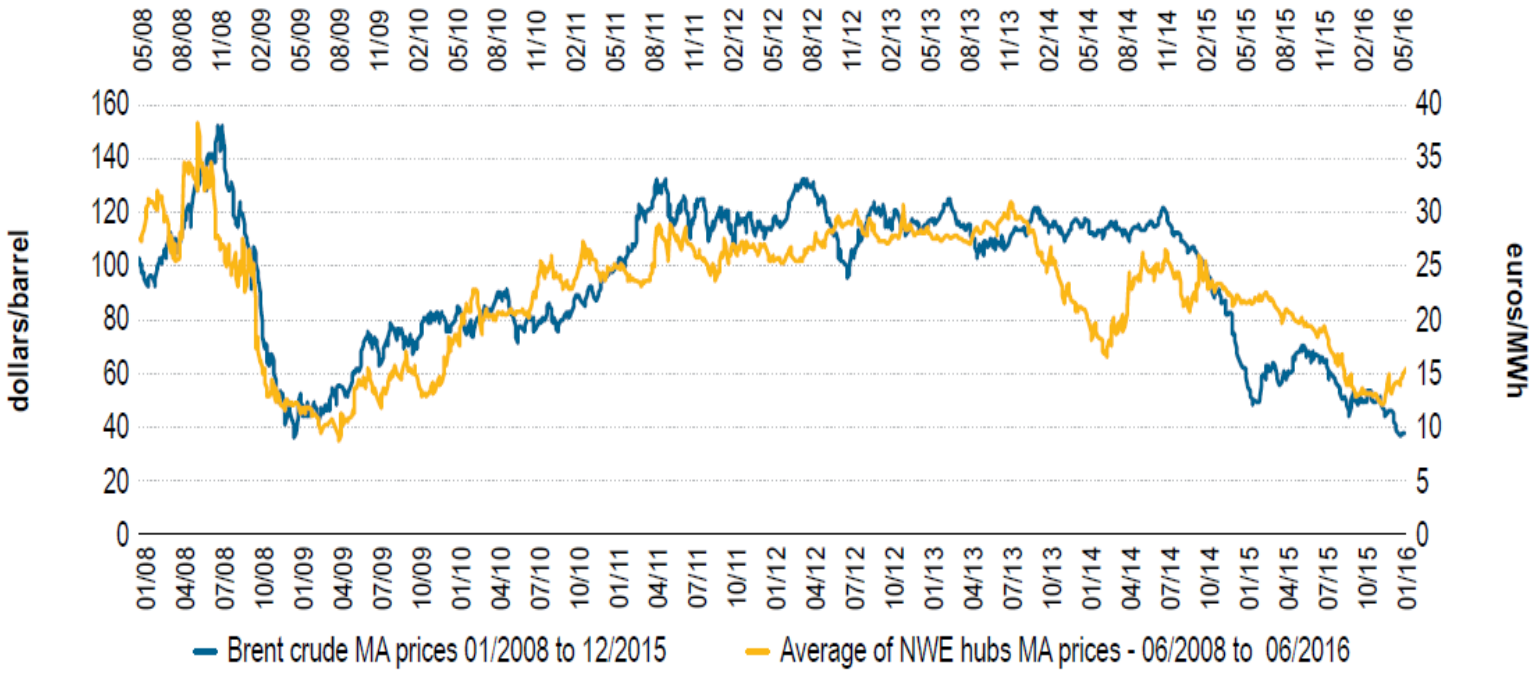
North West European gas price development



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.

ACER 2016 Report: Correlation between Oil and Gas Prices is High

Figure 20: Oil and gas hubs price evolution in Europe – 2008–2015



Source: Platts (2015) and ACER calculations.

Note: A six-month forward-lag is used for gas in the comparison with oil prices, which is the usual practice in the indexation formulas of gas long-term contracts.

ACER in fact admits that hub gas "liberated" from oil still seeks direction on the oil forward curve

Correlation and Regression Analysis Indicates that TTF Price Dependence on Oil Prices is Increasing

	Time period	Brent, USD/barrel	Oil Price: Six month moving average	Oil Price: Nine month moving average
Correlation (TTF MA, USD/mcm)	2008-2016	76.6%	85.5%	83.3%
	2008-2013	69.9%	84.7%	81.9%
	2014-2016	79.5%	87.3%	88.7%
R Squared (TTF MA, USD/mcm)	2008-2016	58.6%	73.1%	69.4%
	2008-2013	48.9%	71.8%	67.1%
	2014-2016	63.2%	76.3%	78.6%

Nearly functional dependence of gas prices on oil means that NA shale breakeven costs which have emerged as the major determinant for global oil prices are setting price rage for European hub prices

Source: Gazprom Export

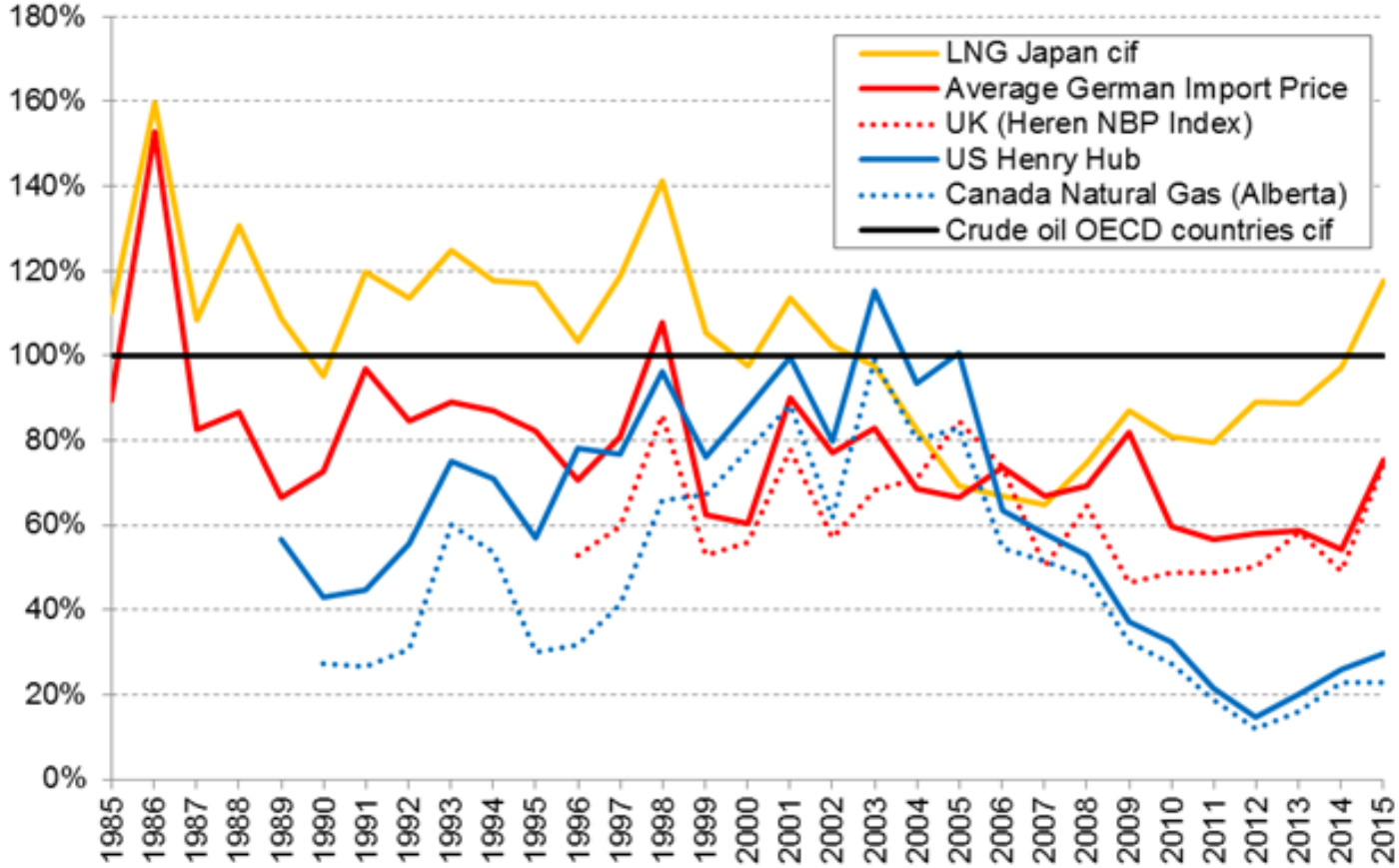
Explanation #1. All Exchange Traded Goods Have Strong Correlation with Oil due to Commodity Super Cycle

	Beef	Meat, sheep	Meat, chicken	Swine (pork)	Banana, Europe	Orange Juice	Natural gas, Europe
1990-2016	75%	88%	72%	38%	76%	76%	92%
1995-2016	77%	86%	66%	53%	75%	71%	90%
2000-2016	67%	81%	51%	68%	67%	58%	86%
2005-2016	38%	68%	3%	62%	28%	30%	70%
2010-2016	7%	78%	-54%	67%	-6%	19%	91%

Source: based on IMF and WB data (monthly)

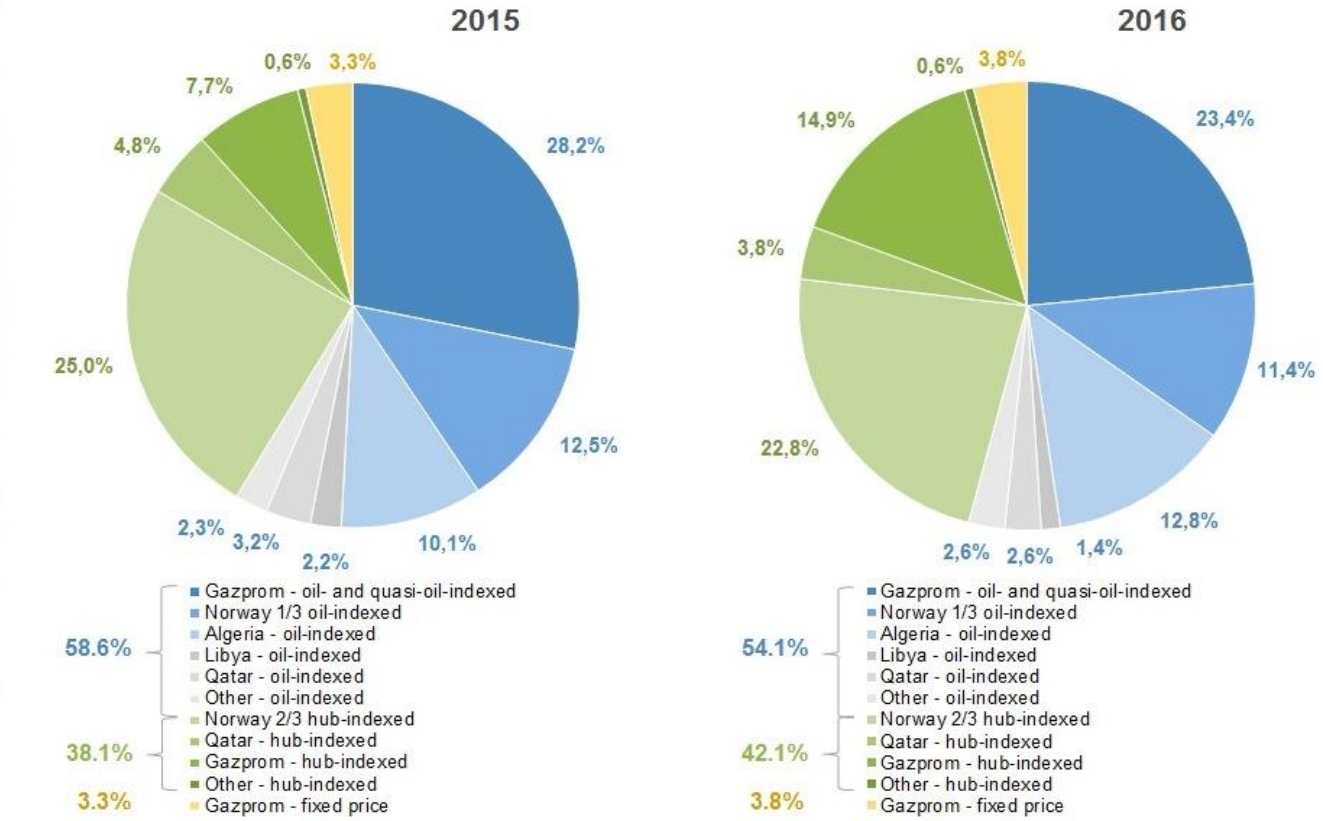
Explanation is not sound. Despite commonalities in price behavior over the last 25 years, commodities by few exceptions had a strong momentum of their own after the 2008 crisis

Explanation#2: Forces of Inter-Fuel Competition Make Gas/Oil Bond Unbreakable; Oil Price Sets a Resistance Level for Natural Gas Prices



Source: BP, Gazprom Export

Explanation #3: IGU Report Does not Count Quasi-Oil Indexed Contracts which Together with Oil-indexed Contracts are Still Prevailing in Gas Imports



Source: Gazprom Export

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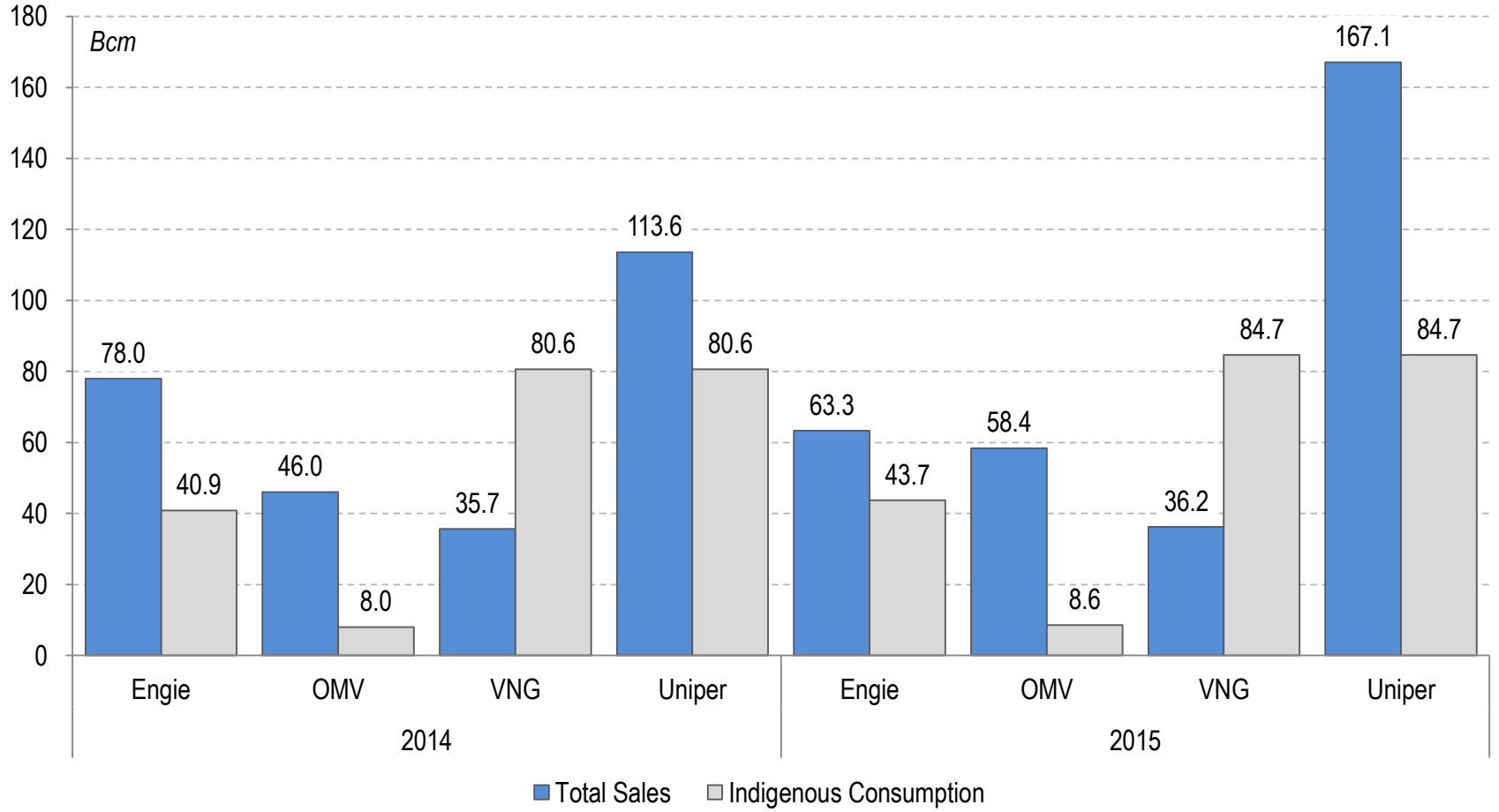
If IGU Survey is correct, one should admit then that oil-indexation mechanism is so powerful that its 9% market share in North-West Europe guarantees its dominance in price setting. Direct influence of oil prices on hub prices could hardly be justified by trader's psychology, their "nostalgia for the past years". This interpretation of gas on oil dependence does not look convincing too.

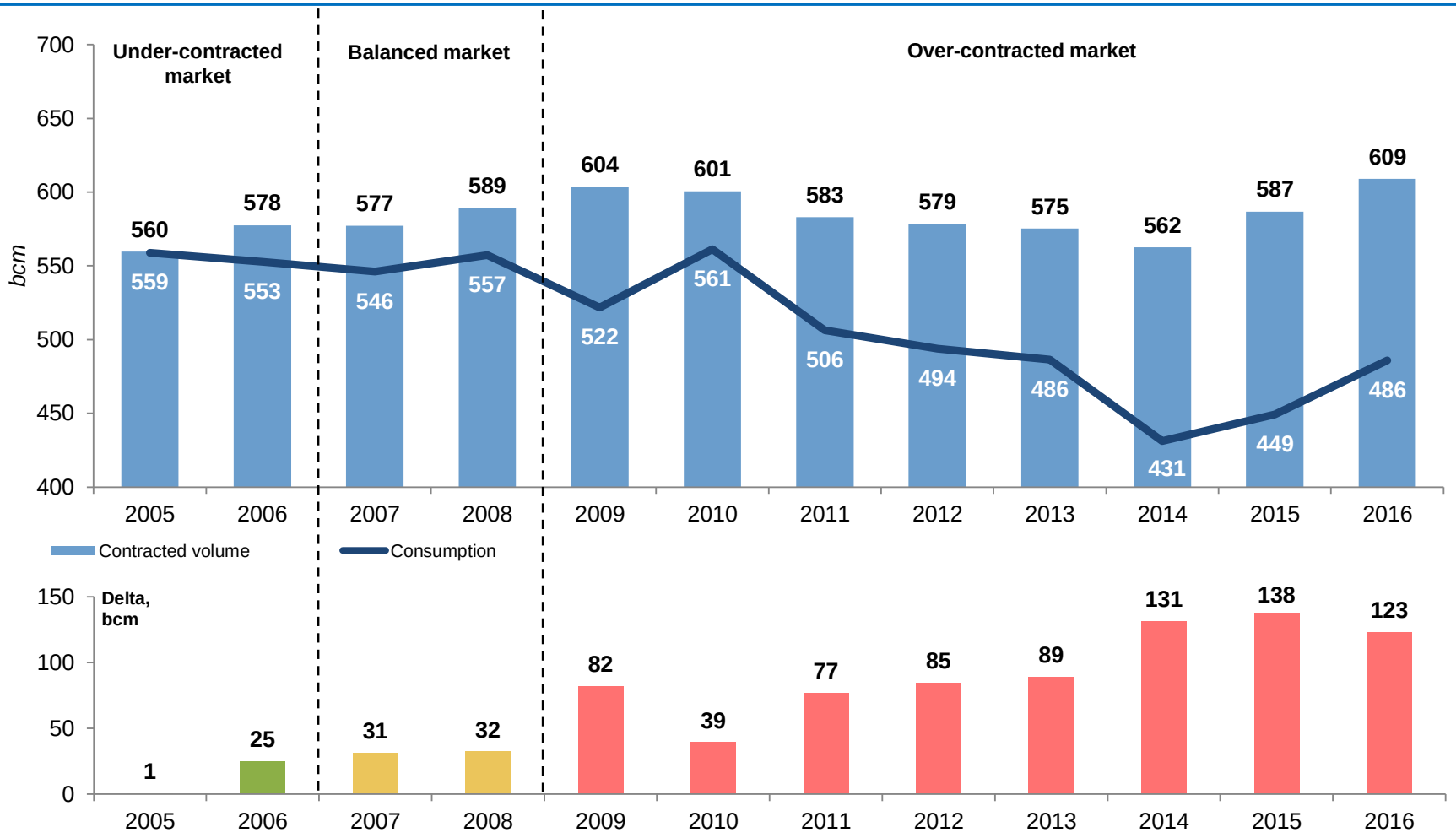
Growing Importance of Forward Market Compared to Prompt Market: Trading Volumes by Utilities/Midstreamers are Higher than Gas Consumption



Source: IEA, Companies' Annual Reports

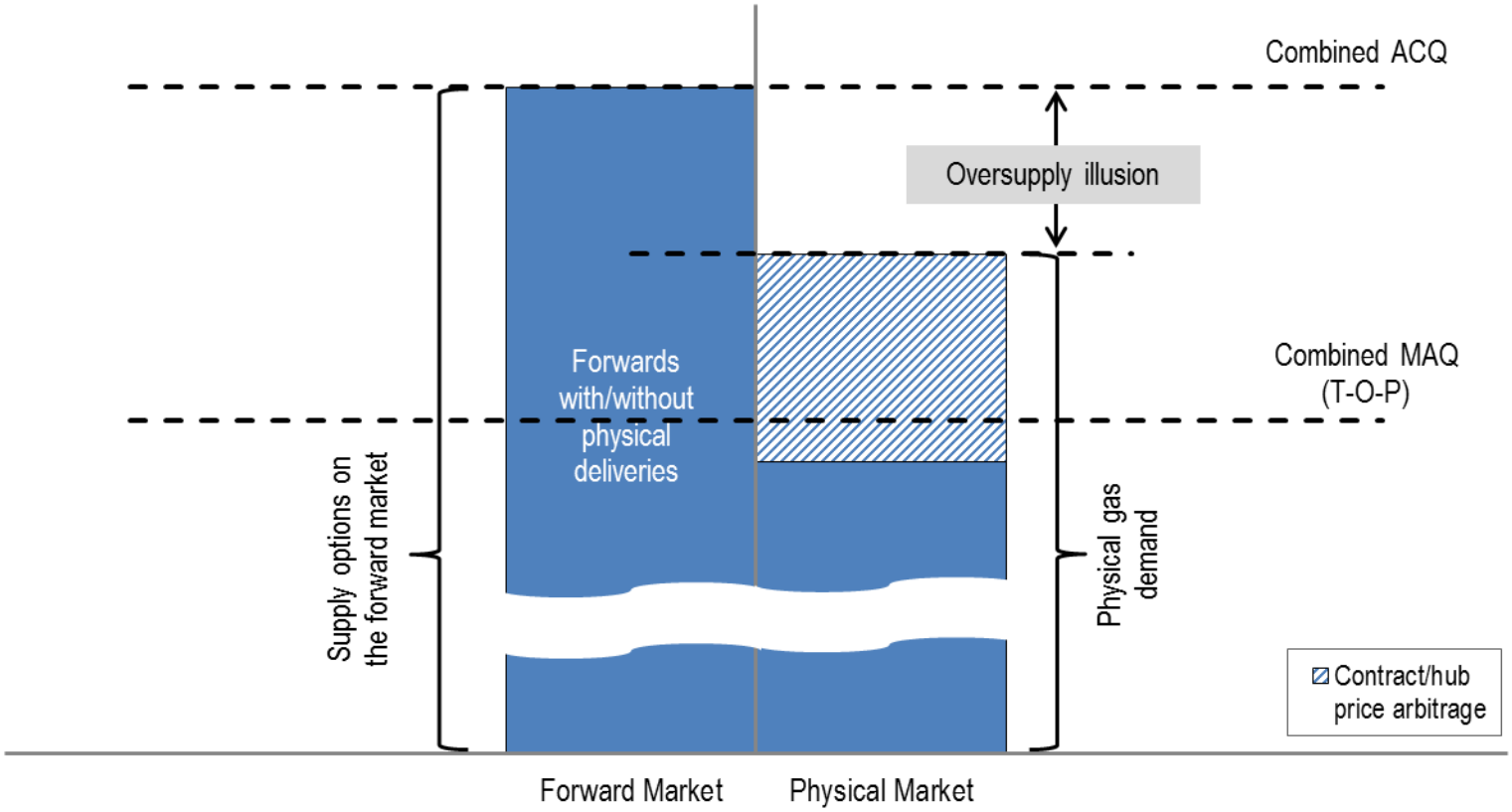
Monetization of firm delivery obligations under import LTCs and selling them on a forward market by holders of these contracts leads to a systemic disconnect between supply and demand.

Overcontraction as Factor of Hub Price Degradation



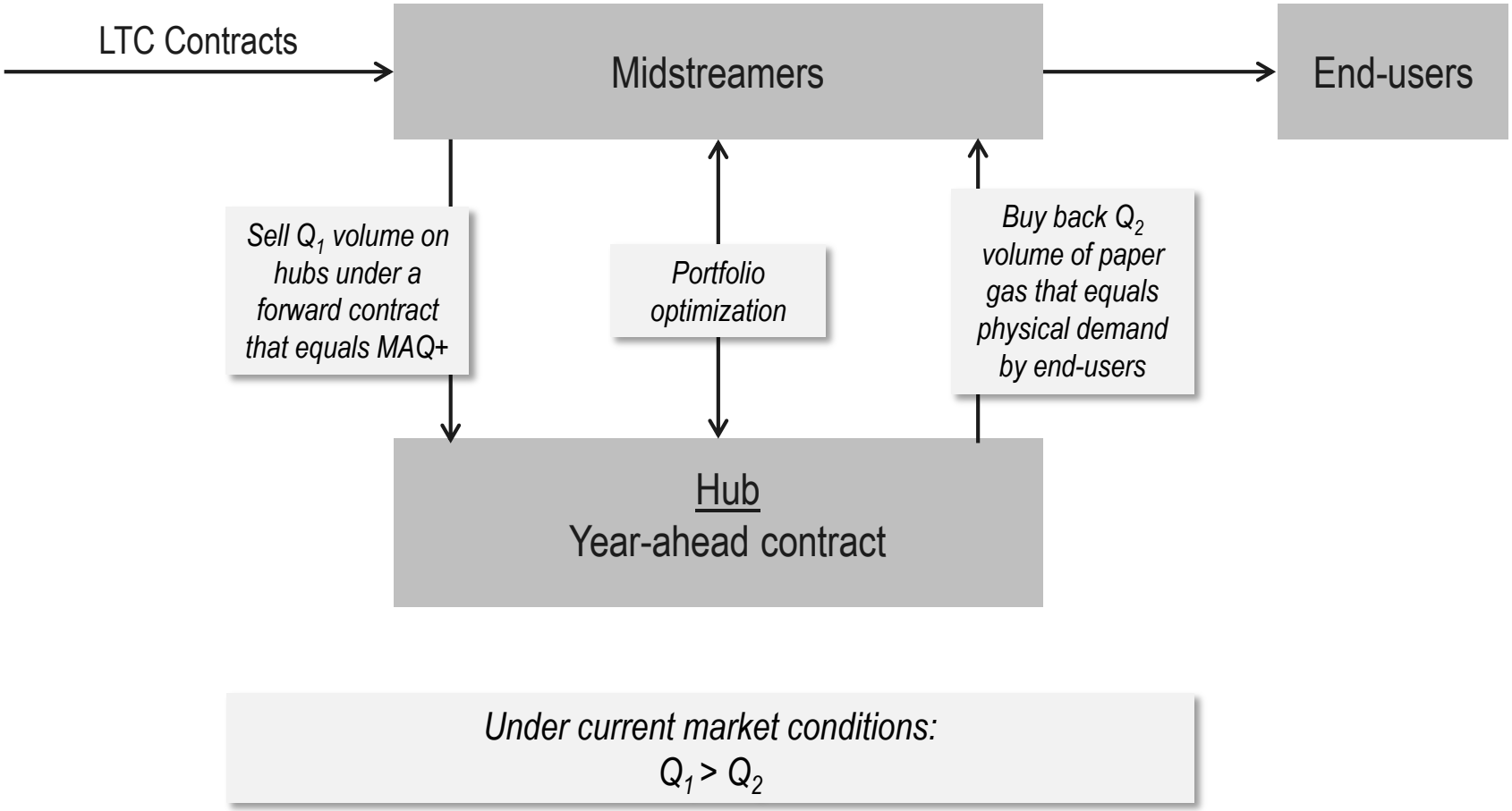
*Demand Includes import contracts and indigenous production
Source: Cedigaz, Eurostat, IEA, Gazprom Export LLC Database

Illusion of Oversupply Created by Monetization of Contract Commitments on the European Forward Market



Source: Gazprom Export

There is Need to Rebalance Market by Eliminating Paper and Physical Gas Disconnect



Source: Gazprom Export

Conclusions

- Whatever the reasons for strengthening of gas on oil price dependence, target market model goal of making gas prices an indication of the scarcity of gas rather than of the oil, as in the old days, has not been reached.
- There is another important conclusion from strengthening gas/oil link. Prices of oil could hardly break down the corridor of USD40-60 per barrel in the foreseeable future, which corresponds to breakeven costs of NA shale oil. That range translates into USD4-5.5 per MMBTU for European gas prices.
- Full costs of liquefaction which stand from USD3.3 to 5 per MMBTU makes LNG deliveries to Europe loss–making and putting at risk a project of gas market globalization based on flexible LNG flows.
- On that background, artificial oversupply put further downward pressure on hub prices undermining investments and creating a risk of missing a new investment cycle by gas industry.
- This market failure could be fixed by taking nomination rights away from buyers. It could be achieved by eliminating volumetric flexibility in the LTCs and adjusting contract volumes to baseload.

THANK YOU FOR YOUR ATTENTION!