



Shale Gas in USA, Europe and Russia: without illusions

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Global shale gas resources

242 ROGNER **411 Gtoe = 456 tcm = 16,111 tcf**

Table 6 Estimates of unconventional natural gas in place by type, in Gtoe

Region	Coalbed methane (31, 32, 34) ^b	Gas from fractured shales (35, 36, 22, 19) ^b	Tight formation (33, 32, 19, 34) ^b	Methane hydrates (12, 37, 38, 39) ^b	Remaining in-situ ^a	Total non-conventional occurrences
NAM	77	98	35	6,089	20	6,319
LAM	1	54	33	4,567	8	4,662
WEU	4	13	9	761	7	794
EEU	3	1	2	0	1	7
FSU	101	16	23	4,186	42	4,367
MEA	0	65	21	190	25	302
AFR	1	7	20	381	4	413
CPA	31	90	9	381	3	514
PAO	12	59	18	1,522	1	1,612
PAS	0	8	14	190	4	217
SAS	1	0	5	381	2	389
World	232	411	189	18,647	117	19,595

^aGas remaining in-situ after commercial production of conventional natural gas has ceased (own estimates).

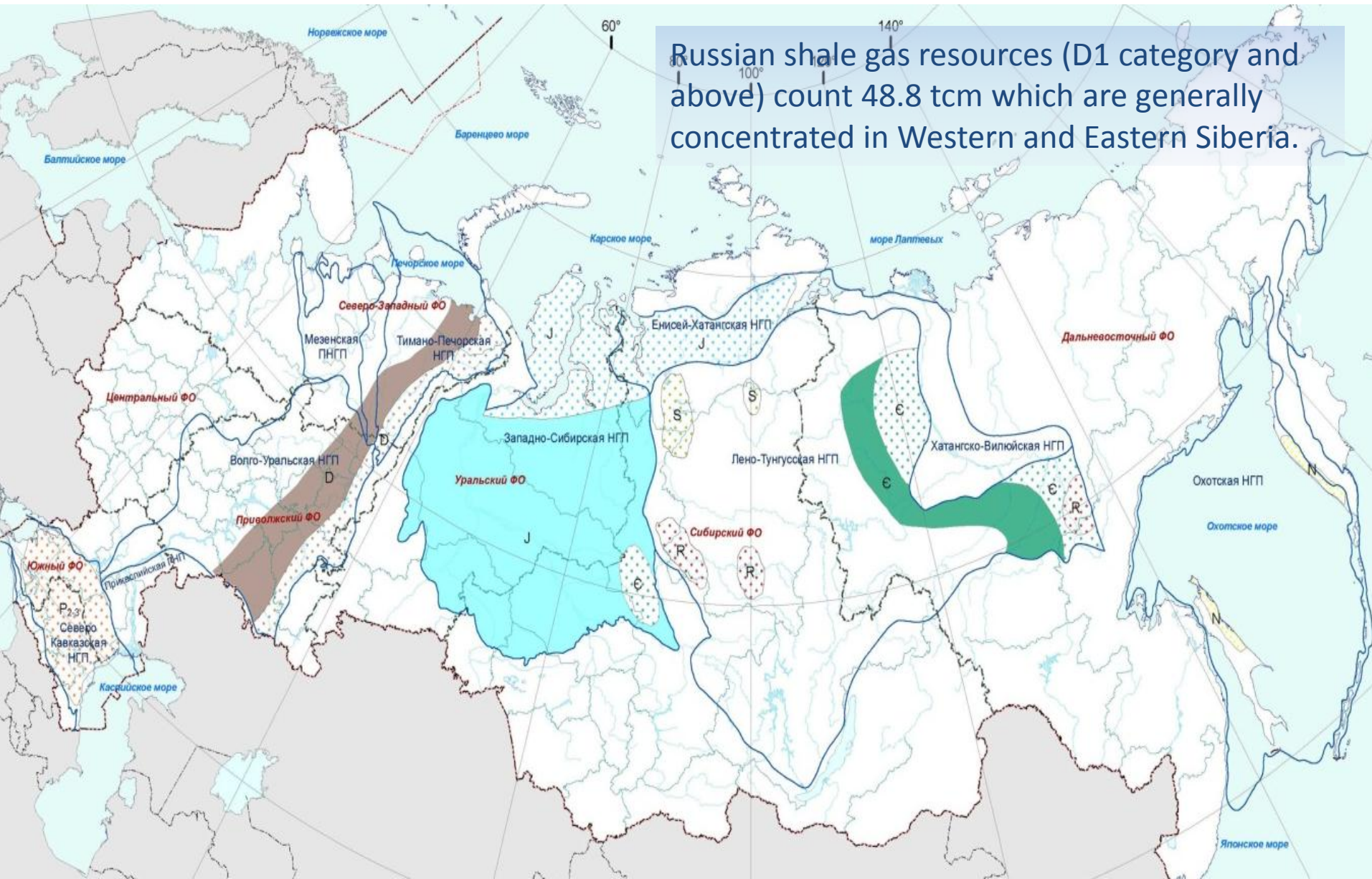
^bData adapted or modified from these references.

H-H. Rogner:
«The data in the following tables are speculative and should be read as such, particularly the regional distribution estimates, which in many cases are highly speculative.»

H-H. Rogner, "An Assessment of World Hydrocarbon Resources", *Annu. Rev. Energy Environ.* 1997. 22:217–62, p. 242:

Shale gas resources distribution in Russia

Russian shale gas resources (D1 category and above) count 48.8 tcm which are generally concentrated in Western and Eastern Siberia.

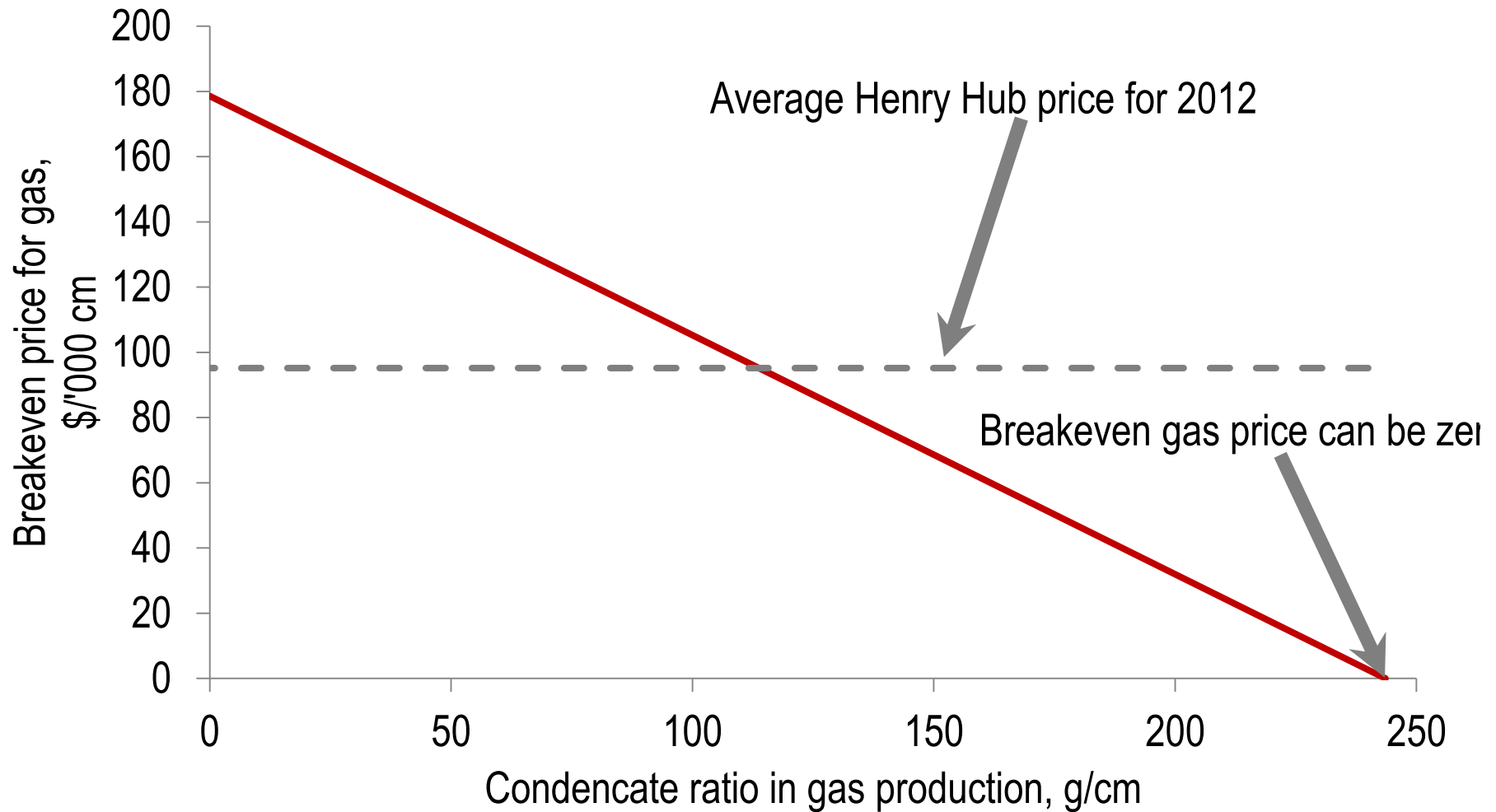


Proved gas reserves and TRR for shale gas in USA, Europe and Russia

	Proved reserves	TRR shale gas	Times
USA	8,79	13,56	1,54
Europe	1,7	17	10
Russia	44,6	48,8	1,1

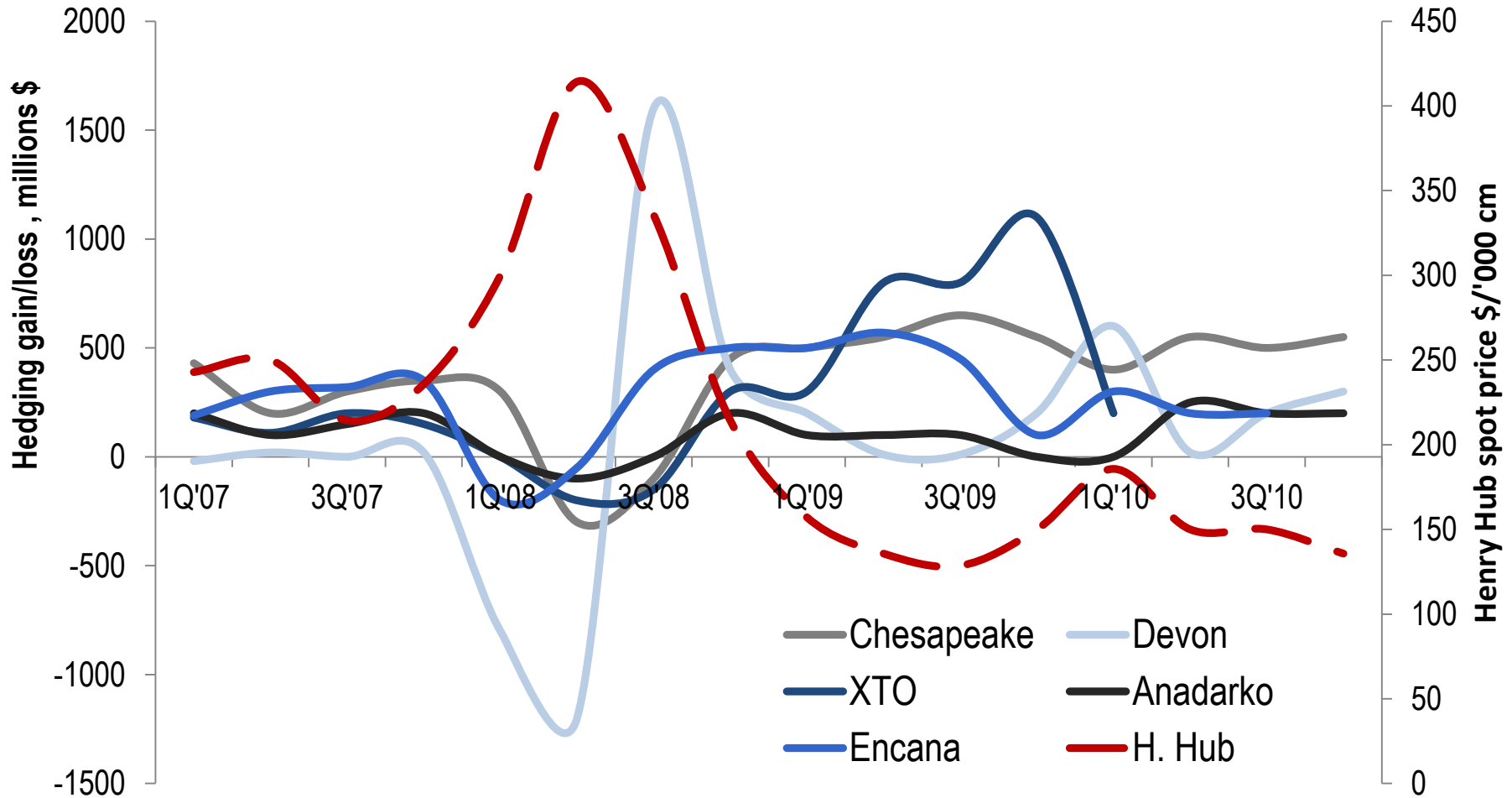
The difference between proved reserves and TRR shale gas in US is 1.5 times and 10 times for Europe. Evaluation for shale gas in Europe is very generous but far less responsible, without taking into consideration specific geologic conditions of shale gas layers.

Breakeven price for natural gas in US



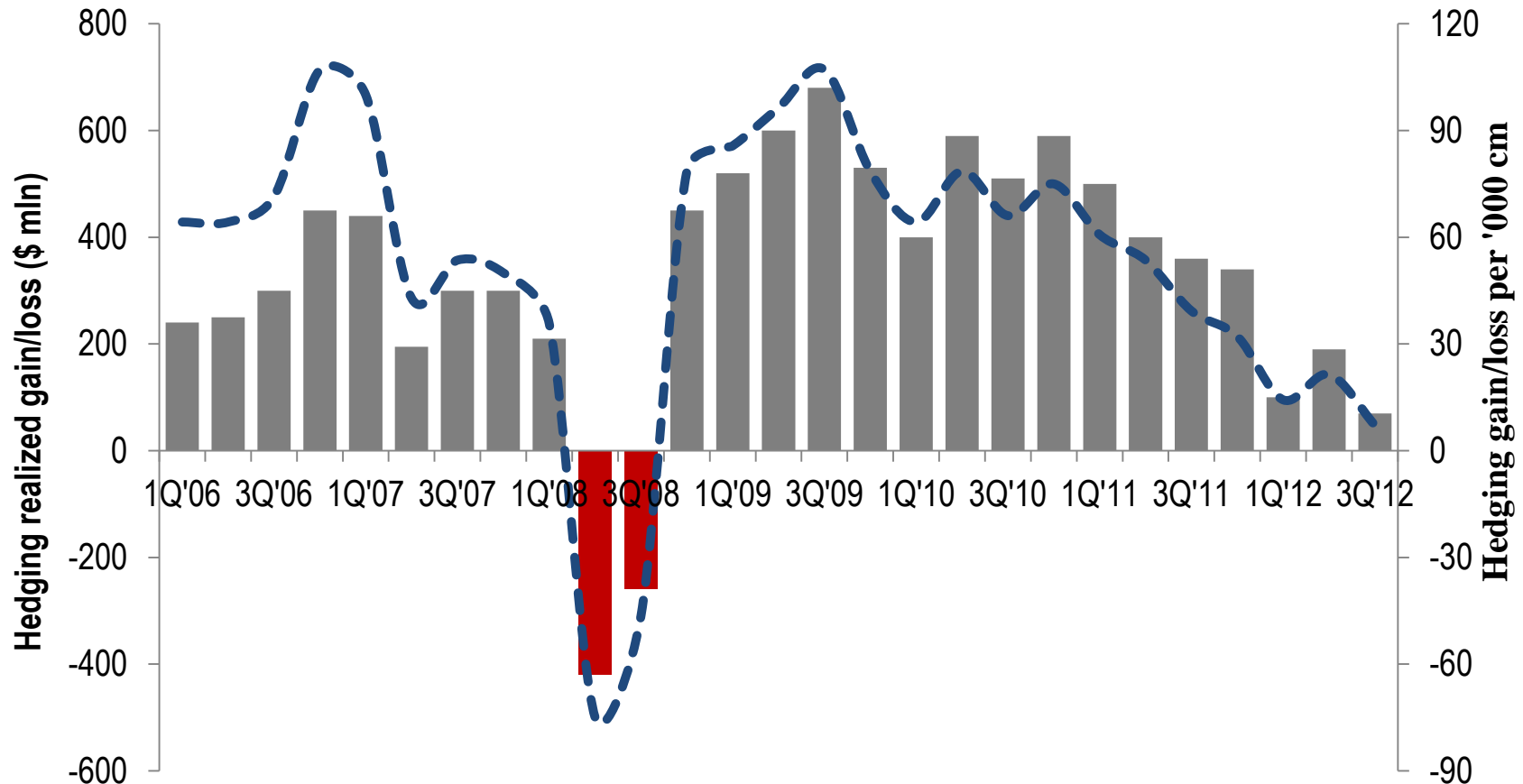


Realized price hedging gain/loss for main shale gas producers compared to Henry Hub spot price



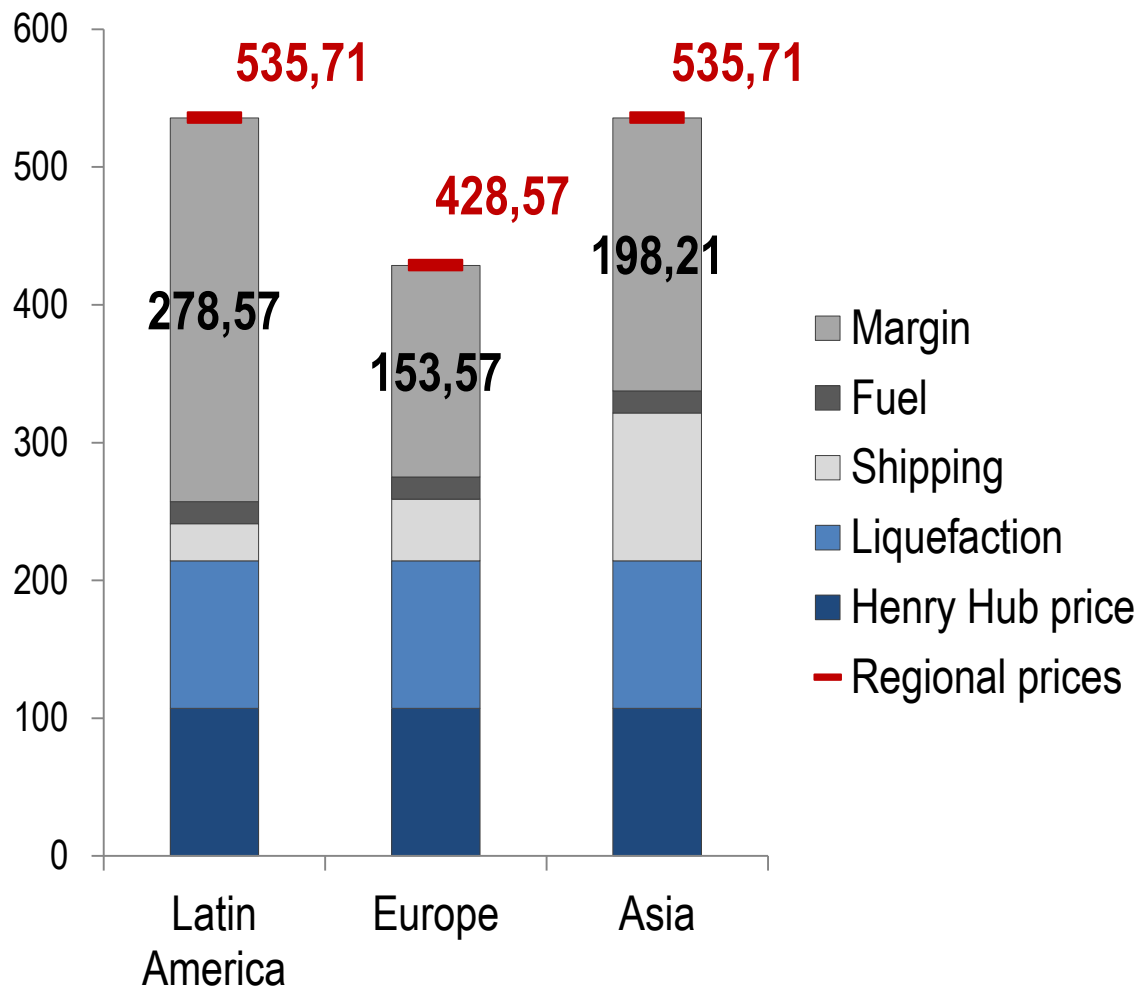
Nearly 70% of the shale gas sector production is hedged by US companies.

Chesapeake quarterly realized hedging gain/loss 2006-2012



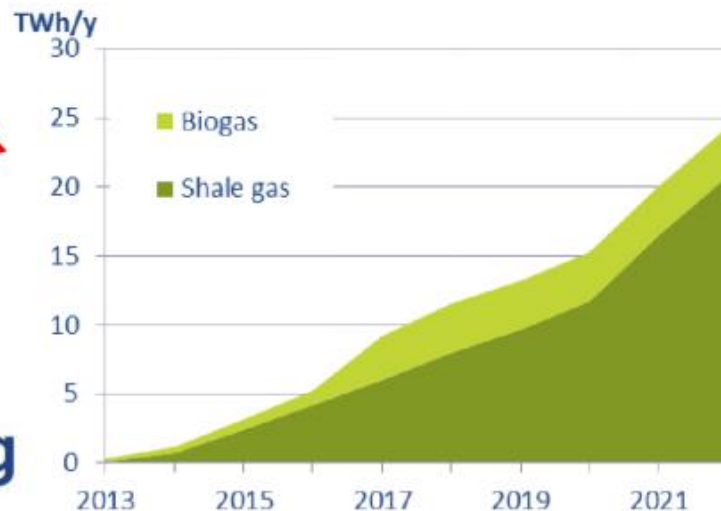
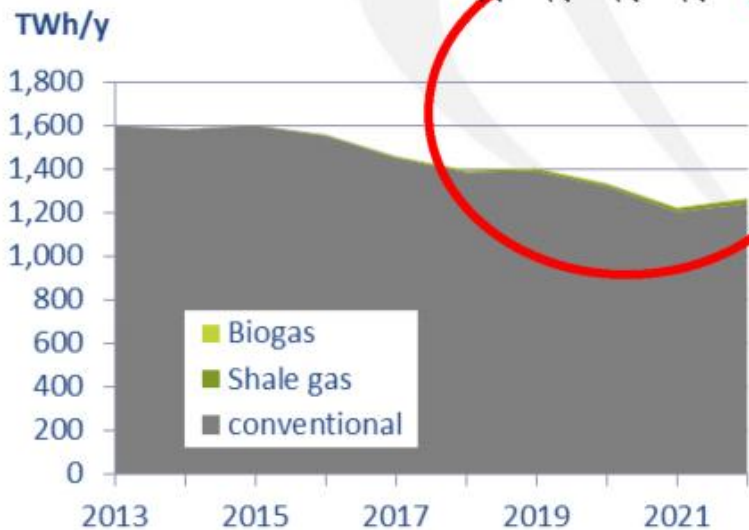
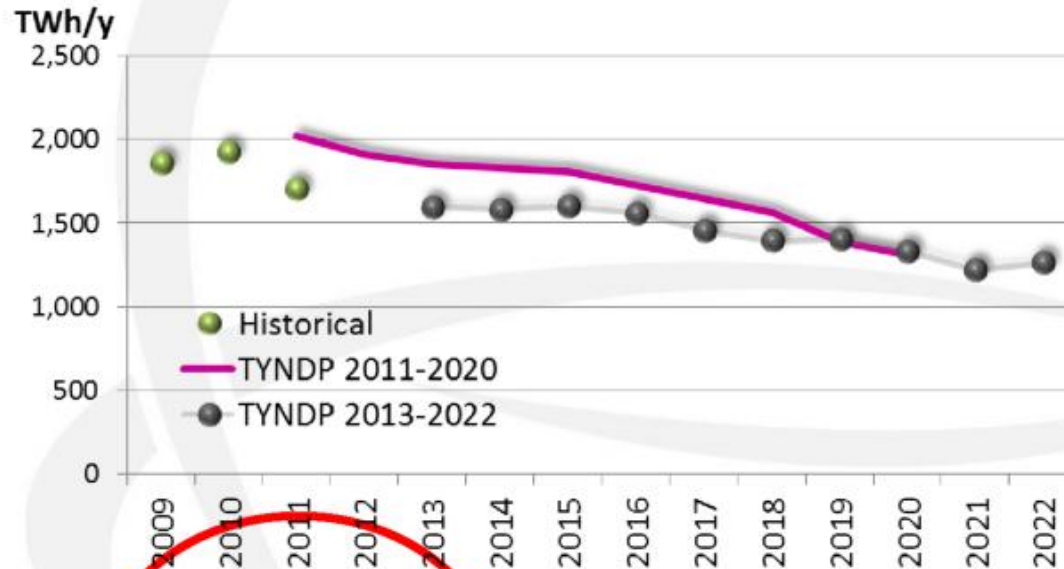
From 2006 Chesapeake earned 8.7 billion dollars on such operations, nearly 50 USD per 1000 cm. Another financial instrument is Volumetric Production Payment (VPP) in the last 5 years it has given Chesapeake 6.4 billion dollars of extra income.

Future LNG delivery prices from Sabine Pass terminal to different regions, US\$ per 1000 cm



Potential and not very significant export of LNG from North America is likely to be directed to Latin America and Asia. We do not expect a lot of supplies to Europe till 2020.

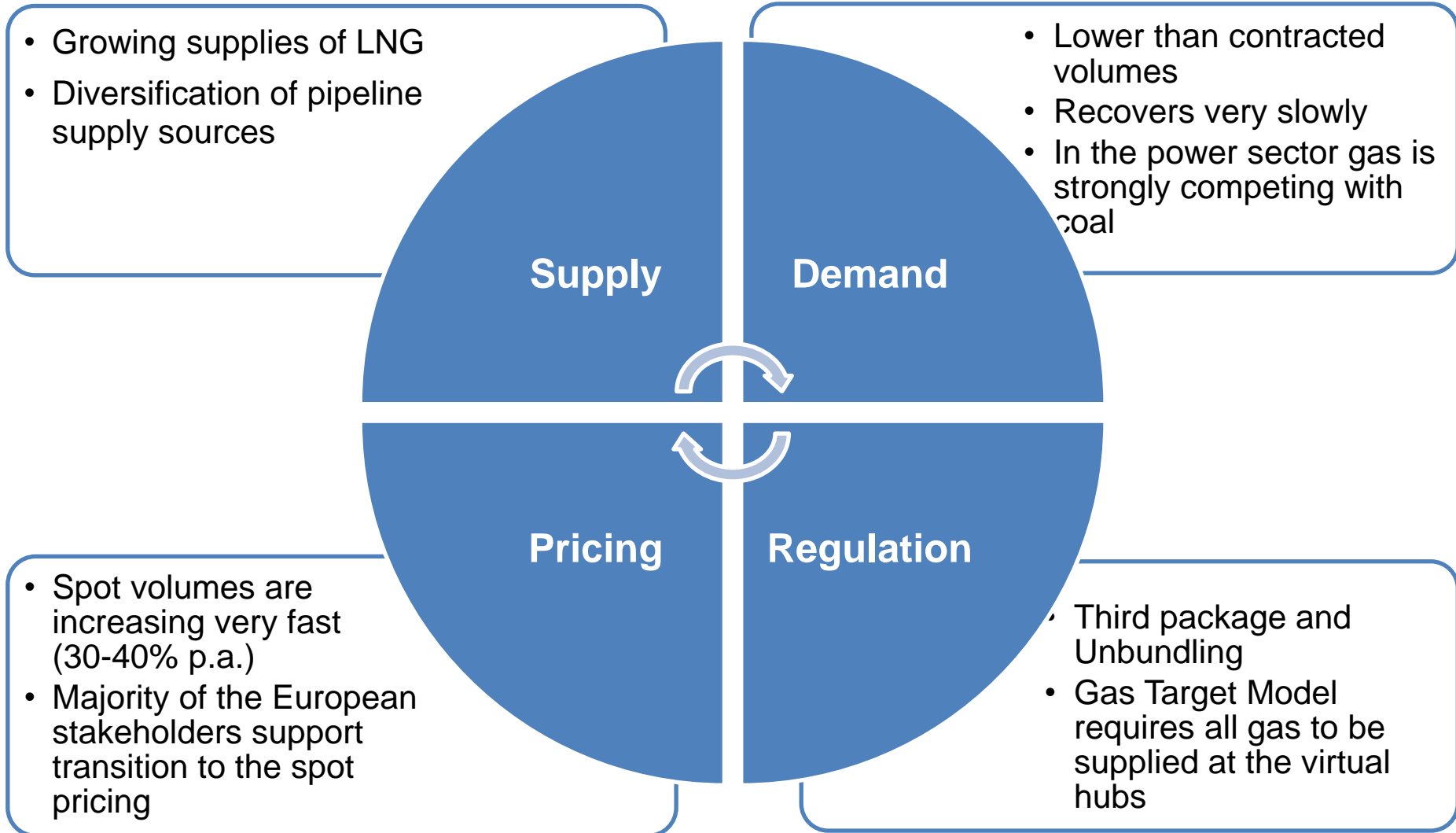
Indigenous production in Europe



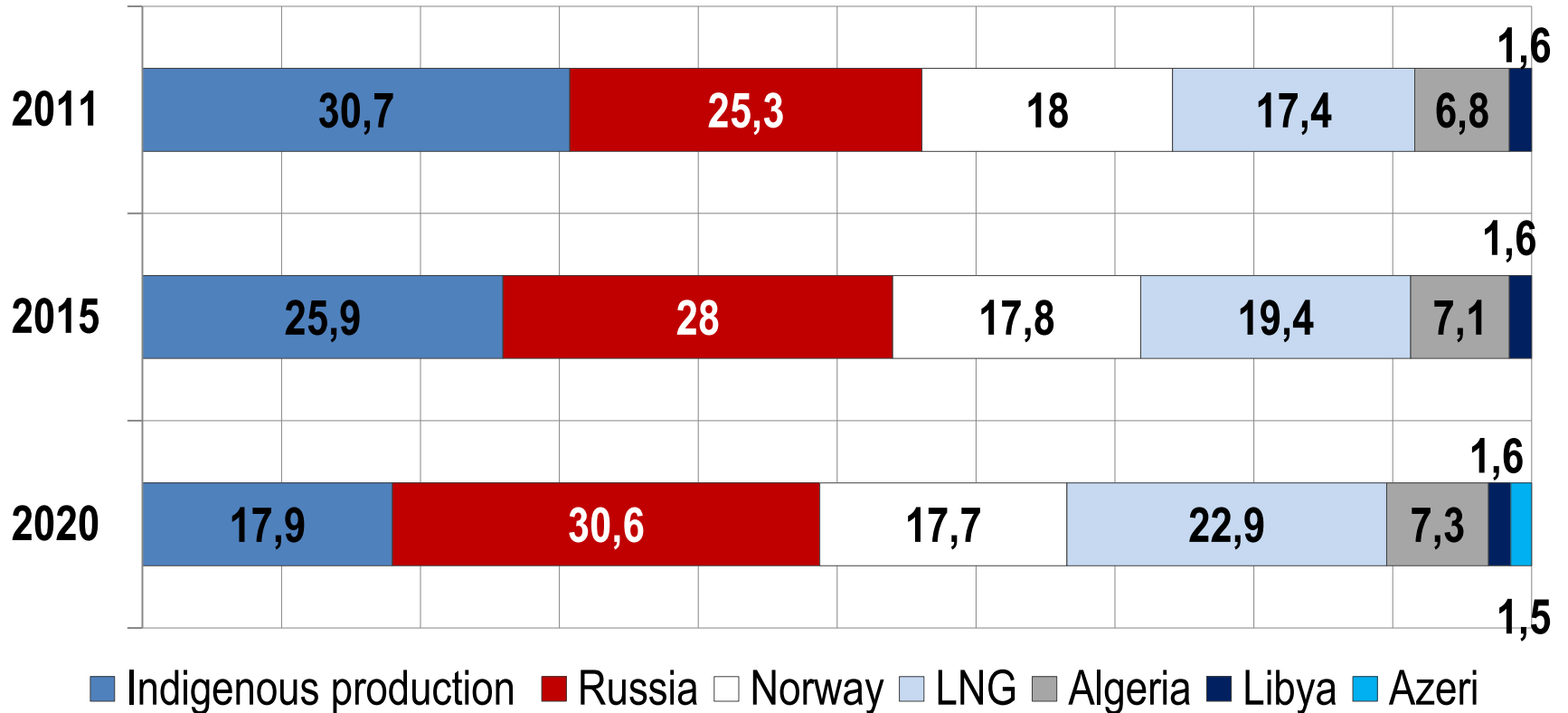
Conclusions for shale gas part in terms of European-Russian gas relationships

- Evaluation for shale gas in Europe is very generous but far less responsible, without taking into consideration specific geologic conditions of shale gas layers.
- The economic of shale gas production in US is very specific. Wellhead prices for shale gas are quite expensive, and a positive side is cheap logistics and the production of gas, Liquids and oil simultaneously. European shale gas production conditions are much differ than in the USA and its production economy will also be different.
- Potential and not very significant export of LNG from North America is likely to be directed to Latin America and Asia. We do not expect a lot of supplies to Europe till 2020.
- Small European shale gas volume in medium-term can not fully compensate a sharp gas production decrease in EU and can not affect the market situation and import flows into the region.
- Shale gas in middle term isn't a real challenge for the Russian gas itself, it is more likely to be a challenge for Gazprom which should take into account this aspect in world gas markets development.

Main directions of the European gas market transformation do not favor Russian export



European supply outlook till 2020, %



Source: ENTSOG "Ten-Year Network Development Plan 2011-2020"

Only two sectors – LNG and Russian export show the same growth up to 2020