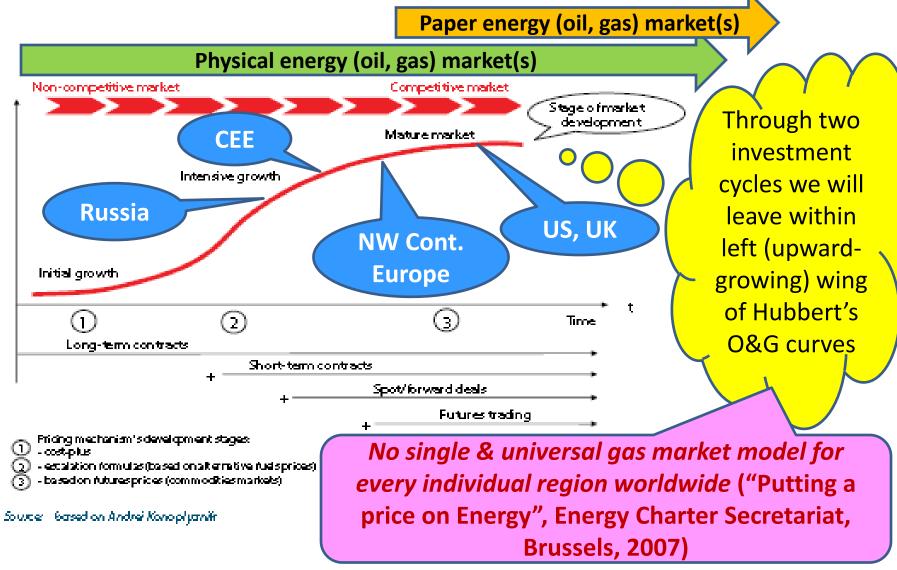
International gas markets nowadays - and what does it mean for Russian gas in Europe

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Lecture at GDF Suez secondment programme, 16 September 2013, Gazprom's Corporate Institute, Moscow, Russia Evolution of oil & gas markets: correlation of development stages, contractual structures, pricing mechanisms on the left (upward-growing) wing of Hubbet's curve (1)



A.Konoplyanik, Budapest, 20.03.2013

US/UK vs Continental Europe: different models of gas markets - different pricing models?

Will Gas Follow Oil to Become a (Global) Commodity?							
Nerth America	a and U	nited Kingdom		Continental Eur	ope a n	d Jap an / Korea	
development based on own resources , no initial dependence on imports				> high import dependence from the start			
> supply based on sma	ll to med	dium sized gas fields		> supply based on imports from giant / super giant fields			
> standardised rent tak deve lopment decisio		va te players		> rent maximisation of exporting countries development decision by exporting country			
> demand elasticity fro	m gas t	power generation		"Single gas pricing" gas			
"Single ga	s pri	cing" gas					
market i	mod	el - YES	Linkages	market model - NO			
market r	s of 198	BO	⇔ model for reform	marke turing as of late 1990s			
North America		UK	LNG trade	Continental EU		Japan/Korea	
Hubs created by industry, chum 100, many players, high LNG absorption potential.	ŧ	NBP created by regulation, churn 15 to 10, many players, limited absorption of LNG.	no LNG Hub but LNG as price transmitter ⇔	few industry hubs, churn <10, few strong players, dominance LTCs.	€	no hub so far, few strong players, dominance LTCs.	

Evolution of oil & gas markets: correlation of development stages, contractual structures, pricing mechanisms on the left (upward-growing) wing of Hubbert's curve (2)

Paper energy (oil, gas) market(s) Physical energy (oil, gas) market(s) Competitive market **Long-term contracts + cost-plus** Stage of market de velopment pricing => lower investment price rket (physical market) ... plus Futures contracts + futures Irii ti pricing (exchange) => trade price (paper 3 (2)market) Long-term contracts dracts Spot/forward deals Fu ... plus Spot contracts + 0 0 0 0 ... plus Long/medium/short-term contracts + spot pricing (OTC) => replacement value pricing => *upper* trade price (physical investment price (physical market) market) based on Andrei Konoplyanifr

The principle: in addition to – not instead of!!!

Non-renewable energy pricing: legal & economic facets of LTGEC

- Resource-owning state: to maximize its long-term resource rent (rent income) for depletion of non-renewable natural resource => price as high as possible => competitive => commodity is just marketable => replacement value principle (lowest price among competing fuels & suppliers) =>
- Sovereign right of exporter/resource-owning state to sell gas to export market with highest replacement value (utilize both Ricardian & Hotelling rents) => EU market for USSR/Russia
- Legal basis: UNGA Res.1803 (1962) + ECT Art.18 (1994/98) = (permanent) State sovereignty on natural/energy resources = Governments should use their natural (non-renewable!) resources to the benefit of their population =>
- Economic mechanism: Groningen concept of LTGEC (1962, Nota de Pous) = long-term TOP contract (to pay-back upstream CAPEX) + pricing formula (price indexation) linked to gas replacement values (prices of replacing fuels within competitive energy market) + net-back to delivery point + regular price review + destination clauses => to market gas within evolving market structure & competitive pricing environment to the mutual benefit of both producer & consumer => at maximum (upper) investment price 5

EU import LTC signed (pipeline + LNG): 1980 (30Y) => 2004 (15Y), (Hirschausen-Newmann)

Economic preconditions for different pricing mechanisms at different stages of investment project life-cycle

Upstream gas project life-cycle (30-40Y+)

Average contract duration (LTC=25-30Y)

Investment price: any price appropriate in between cost-plus (= CAPEX + OPEX + RROR) and NBRV until end of pay-back period => demand for indexation & regular price reviews

Trade price: spot/futurespossible (if above **cost-plus** = OPEX + RROR) since end of pay-back period

Investment period

Pay-back period

Rest of contract (LTC) period

Energy resource enters the market; upfront CAPEX & OPEX assessment incl. risks for acceptable ROR; higher price needed

Energy resource is already at the market; CAPEX recouped; technological possibilities to switch between competing energies in end-use; OPEX determines benchmark price level; lower price needed to stay with acceptable ROR

S-curve approach for indexation in Continental Europe within contractual pricing (author's vision/proposal for discussion) USD/mcm **NBRV Q:** Discount from upper <u>oil-indexed</u> investment price (upper investment $(\uparrow \downarrow Po)$ **OR** other mechanism(s) to reflect price of current price(s): supply-demand balance? Through arbitration *OR* through PP higher/lower) other instruments to adapt contract & pricing structure to indexed the market? price **Maximum investment price 1 Spot**, ..., Maximum i vestment price 2 **Futures** (trade prices) CAPEX+OPEX Not PP **OPEX** indexed **Cost-plus** price (lower Minimum investment price investment price) Return of (mostly debt) Rest of contract Investment + pay-**Main earnings** capital back periods (LTC) period (ROR) A.Konoplyanik, GDF Suez lecture, 16.09.2013,

Maximum investment price: historical & new levels for EU

- Historical = Max investment price 1 (higher) = PP-indexed:
 - High oil prices, but:
 - dependent on oil derivatives market,
 - can be manipulated upward & downward by global financial speculators
- New = Max investment price 2 (lower) = not PP-indexed:
 - Spot gas => EU oversupply (whether short-term or long-term?)
 - Coal => US shale gas effect + low CO2 market (for how long?)
 - RES => must-run + subsidies (long-run policy, but corr. w WTO?)
 - Electricity => influence of gas prices (spark spread)
- If market behaviour unclear (what level of upper investment price?), flexible contractual structure is needed to diminish risks & uncertainties to the tolerable level?
- Competitive niche for LTC (incl. with PP-indexation) within two-segment EU gas market structure depends on their adaptability & flexibility... => ???
- What arguments if favour & against oil-indexed LTC (that will influence on their market niche within term segment)?

Oil-indexation: arguments "in favour" and "against"

	On mackation alguments in lavour and against							
	"In favour"		"Against"					
1. 2.	Contract parties can not manipulate Worked out in practice for 50 years => convenient for users (they got used to it)	1.	Liquid fuel ceased to be a replacement fuel for gas in industry, electricity generation, but just a reserve (back-up) fuel					
3.	Narrows corridor of price fluctuations, increases price predictability, minimizes investment risks	2.	Conservation without changes does not correspond to evolution of "replacement value-based" mechanism within LTGEC (based on inter-fuel competition) =>					
4.	Convenient (well developed) tool for financial institutions => hedging => softens debt financing risks	3.	increasing gap between contractual practice & real life Withhold gas price below oil parity (price of oil in energy equivalent)					
5.6.	High oil prices good for project financiers => shorter pay-back periods Professional, homogenous, stable and	4.	Links gas price to highly liquid, but manipulated and unpredictable futures oil/derivatives market => multiple risks for RF budget earnings					
	narrow circle of wholesale market participants => transparent and	_	RF Gov't aim to diminish oil dependency => oil-indexation increases/holds oil-dependency					
	understandable pricing mechanism (for professionals)	6.	Confidentiality, thus closed and non-transparent for the public					
7.	Proposed alternative (spot/futures) is not better today: gas hubs - low liquidity (EU) => high possibility for manipulations	7.	Post-2009: higher contractual prices compared to spot transactions					

Area of continued debate => How to find a compromise (volume flexibility X price flexibility)? Whether it can be found? What can it possibly be alike? No marginal view to win!!!

From single to multiple contractual structure (1)

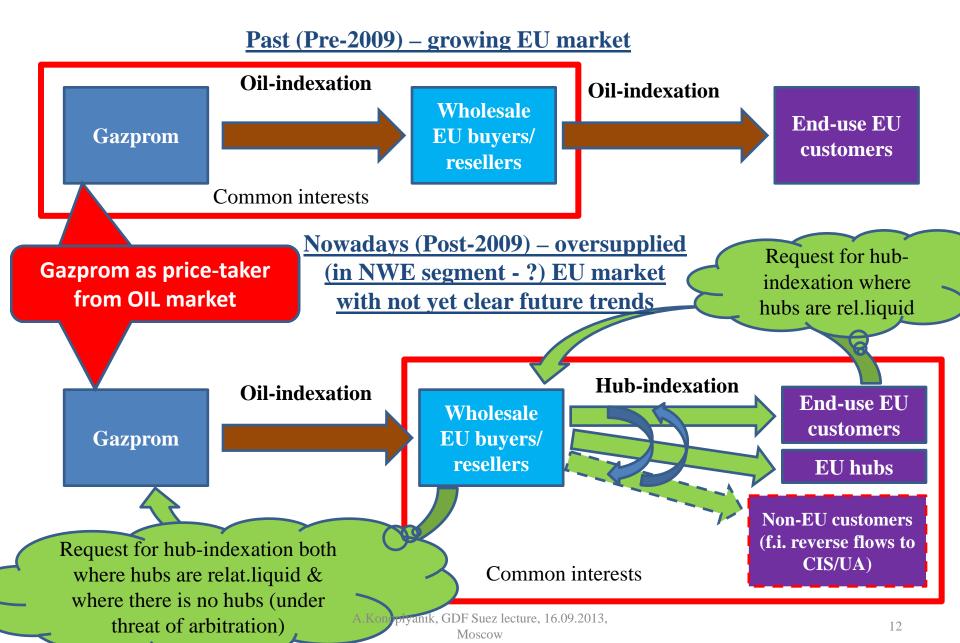
- More diversified contractual mix as a trend:
 - Within two-segment EU physical gas market (term & spot) each with its own mechanisms for providing volume flexibility
 - With multiplicity of pricing mechanisms to provide competitiveness of supplies within given market area
- One of key issues: how to balance volume flexibility vs pricing flexibility (price attractiveness) within more sophisticated contractual mix =>
 - to stay within corridor of attractiveness for all group of old & new buyers => not necessarily for wholesale buyers only (current customers), but both to wholesale & (new) end-users =>
 - potential benefits of the Third EU Energy Package for all group of sellers (in addition to proclaimed benefits for buyers)

From single to multiple contractual structure (2)

- Competitive niche of LTC depends on its comparative attractiveness:
 - Volumes flexibility: contractual (LTC renominations + make-up gas as virtual storage) vs hub-based (NC CAM restricts renominations + yet limited UGS) => whether higher volumes flexibility deserves higher price?
 - Attractive/competitive price levels: if no competitive supplies

 foreign producer/exporter has legal (sovereign) right to
 utilize maximum resource rent unless it depress demand =>
 balance of short/long-term sovereign (!) interests
 - It's for market players to decide based on their evaluation of comparative volume & price combined effect
- No forced (administrative levers) transition away from oilindexation towards hub-indexation in LTC (commodities market) through EU capacities market instruments (NC CAM, etc.)
- No way of staying with current supply scheme (with wholesale intermediaries) & moving to hub-indexation within existing LTC

Evolution of gas value chain & pricing mechanism of Russian gas to EU (1)



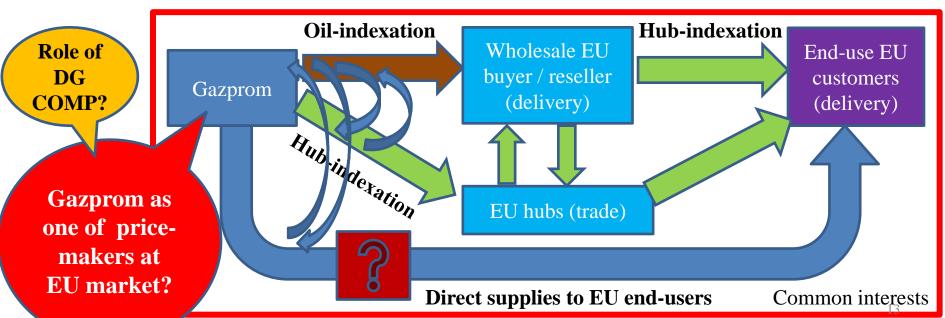
Evolution of gas value chain & pricing mechanism of Russian gas to EU (2)

Future ("NO GO" contractual scheme under any (?) supply-demand scenario)



Gazprom as price-taker from GAS
BUYER's market (with no
participation on it)? => NO GO

Future (what competitive niche for oil-indexed LTC in DELIVERIES to EU?)



Thank you for your attention

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