

European gas market & Gazprom's price changes in Europe: between LTGEC oil formulaes and spot/futures market (an analysis within the broader historical & economic framework)

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Annual Honorary Fellow's lecture at the CEPMLP, University of Dundee,
Dundee, Scotland, UK, 14 October 2010

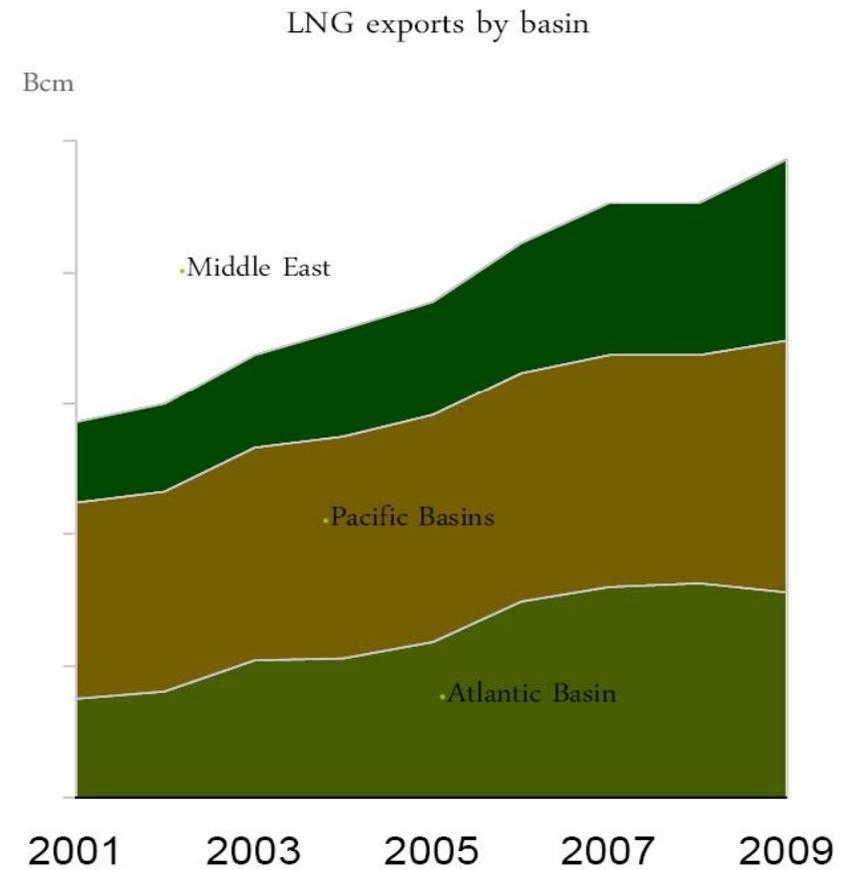
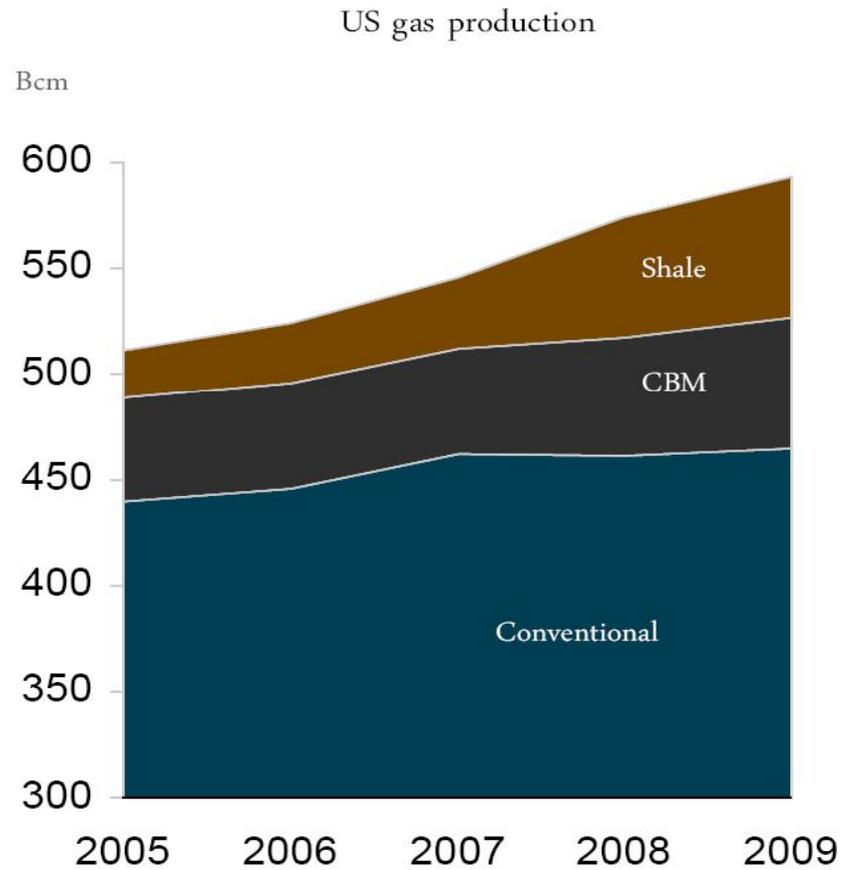
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The most immediate challenge

- The **most immediate challenge** for natural gas industry, affecting gas prices, is “**acute gas glut**” (IEA) reflecting collision of:
 - Unprecedented collapse in gas demand (recession/economic crisis), and
 - New waves of supply resulting in sum-total from:
 - New waves of LNG supplies
 - New pipeline supply of conventional gas,
 - Effects of “quiet/shale gas revolution” taking place in unconventional gas production in North America
- “There is ***no map of the new energy landscape*** and Europe’s gas and energy companies are having to adapt rapidly based on an ***emerging understanding of the environment***” (*“Europe’s gas industry need transformation to adapt to energy revolution. Key messages from the 24th European Autumn Gas Conference, held in Bilbao in northern Spain in November 2009”, December 2009*)
- Russian exports have declined much more than those of Norway or Algeria and **Russia’s lack of contract flexibility** was a “**very strong warning** for the Russian gas industry. It is a **call for change**, in order to adapt to a market that has so profoundly shifted in its fundamentals in such a little time” (*Domenico Dispenza, President, Eurogas, November 2009*)

4. Natural Gas: The “Silent Revolution”



Source: Oil Market Perspectives. Christof Ruhl, Group Chief Economist, BP plc, Stavanger, August 2010

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Gazprom & its main competitors in Europe: changing market shares

Company	Share of European market, %*			
	2006	2007	2008	2009
Gazprom**	23,9	23,9	28,4	26,3****
StatoilHydro***	9,7	12,1	17,5	18,5
Sonatrach	9,8	9	9,9	9,6
GasTerra	8,9	8,6	13,4	9,1
Qatargas	0,9	1,2	1,4	3,5

* Without gas consumption of CIS & Baltic states

** Supplies of GazpromExport to 21 EU states (EU w/o Baltic states) plus Switzerland & Turkey

*** W/o figures from NorskHydro (which was merged by Statoil in October 2007) but considering gas sales on behalf of Norway

**** (a) figure for 2009 includes undersupplies of gas to Europe from Russia in January 2009 in result of Russia-Ukraine gas crisis and temporary cut-off of gas transit to Europe; this is why the fall of Gazprom's market share in 2009 reflects this force-majeur element. If 2009 data is cleared-up from January 2009 transit cut-off effect, the figure of Gazprom's market share in Europe will be higher;

(b) according to Gazprom's estimates, its market share in EU in 2010 equals to 25%; difference in figures is explained not by further reduction of its share, but by particularities of statistical accounting in the given publication, which includes EU non-members Switzerland and Turkey, the latter being the second largest gas importer of Gazprom in Europe, but not accounting EU members Baltic states.)

Source: «Vedomosti», 18.08.2010

Russia in German gas supplies

	2009 (estimated)	2020 (forecast)
Norway	29	28
Germany, Netherlands, UK, Denmark, others	39	36
Russia	32	36

Source: Natural Gas Markets in Europe – Challenges and Development. Klaus Schafer, Chairman of the Board of Management of E.ON Ruhrgas AG. - Presentation at the Conference “ONS-2010 – Secure, Sustain, Supply”, Stavanger, August 25th, 2010

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Evolving architecture of international gas markets

- **Two principally different models of gas market organisation** (see: *“Putting a Price on Energy”*, ECS, 2007, chapter 4.1, <www.encharter.org>):
 - “Anglo-Saxon” = liquid marketplaces (USA, UK)
 - “Continental” = vertical integration + (long)term contracts (Continental Europe, Asia)
- **Three models of international gas pricing:**
 - Cost-plus (initial stages of any market development)
 - Net-back replacement value at consumer-end (Continental Europe – since 1962 till nowadays, Asia) - within competitive markets of physical gas
 - Commodities exchanges (USA, UK) – within competitive markets of paper gas
- **Continental Europe – further development of pricing:**
 - According to Anglo-Saxon model ?, or
 - Further modification of LTGEC Groningen formula ?, or
 - Third way ? (Return to cost-plus ? Other ?)
- **Two models of adaptation of gas pricing formulae within LTGEC:**
 - Approaching “oil parity” (thus de facto moving away from “replacement value principle”), or
 - Expanding the basket of alternative to gas ingredients in LTGEC pricing formulae (thus following the “replacement value” principle & de facto deviating from “oil parity”)

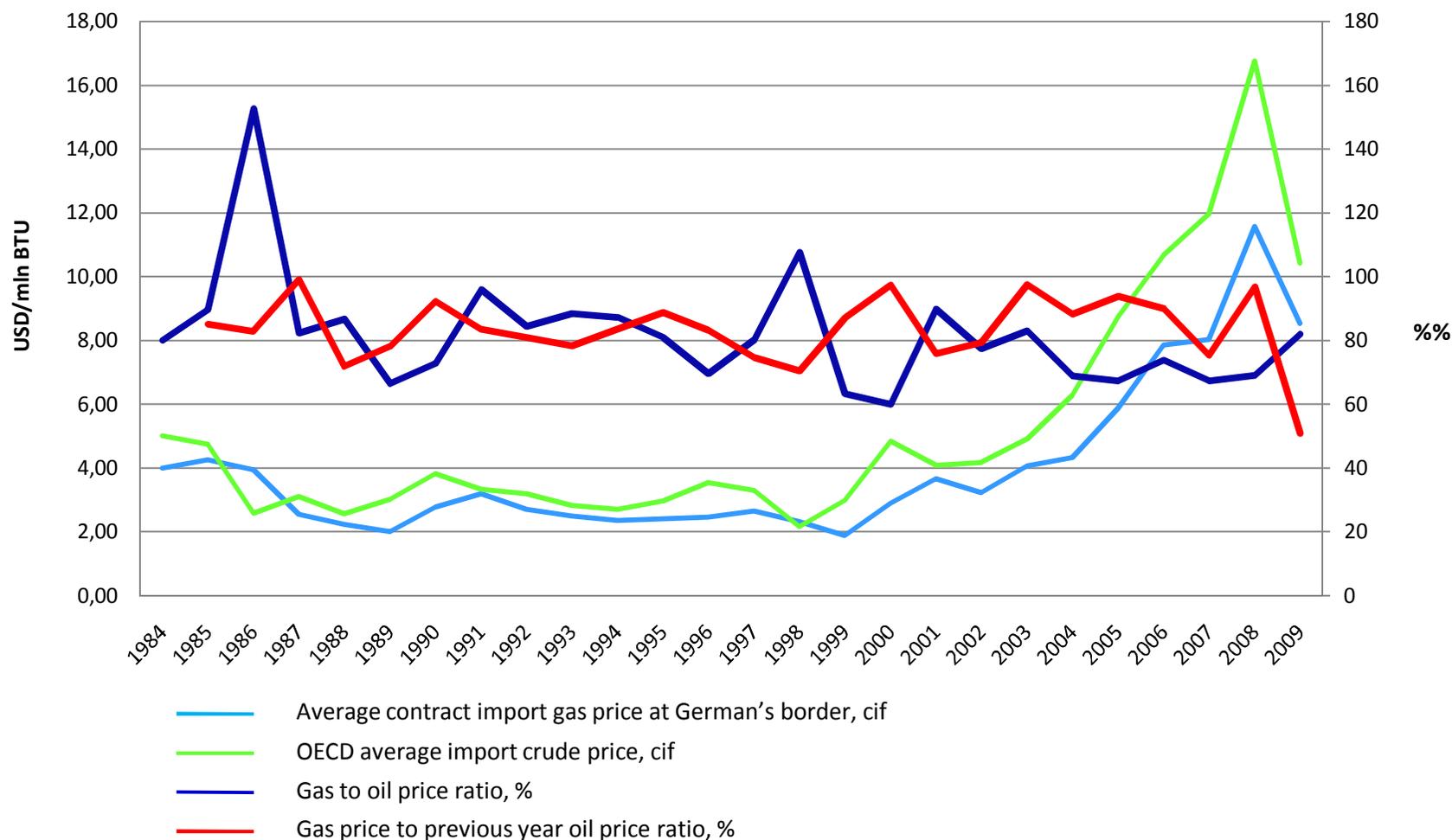
Beginning of LTGEC: replacement value is based on oil parity (1)

- “Replacement value” corresponded to “oil parity” at the stage of formation (1962) and further implementation of LTGEC Groningen formulae
- In the 1960-ies RFO (industry & electricity generation) & gasoil/diesel (households) were in fact gas-replacing fuels (with low efficiency, but low prices + stable & abundant supplies from MENA),
- Price of gasoil/diesel is by 15% higher, and of RFO – by 30% lower than crude oil price (ARA) => if RFO/LFO = 60/40(50/50) in LTGEC gas pricing formulae, then gas price/oil price = 60-80%
- Advanced decrease of the share of cheap RFO in the formulae leads to increase of gas price/oil price ratio towards 100% (arithmetic effect)

Beginning of LTGEC: replacement value is based on oil parity (2)

- Later on, for convenience / simplification of implementation / calculations, they moved:
 - From economic substance of the contractual gas pricing formulae as mean value of gas replacement values – to calculation of arithmetic equivalent of the-then existed “gas-to-oil parity”, and
 - From calculating gas replacement value at end-user – to calculating crude oil price at EU-15 border: the German border (mean import price) or in Italian ports
- LTGEC = fixation of formulae with oil parity for the coming decades (despite the contractual possibilities for price/formulae review) => LTGEC & its prolongation = prolongation of action of current formulae with oil parity despite diminishing role of oil (petroleum products) as gas-replacement fuel (inertia of contractual structures)

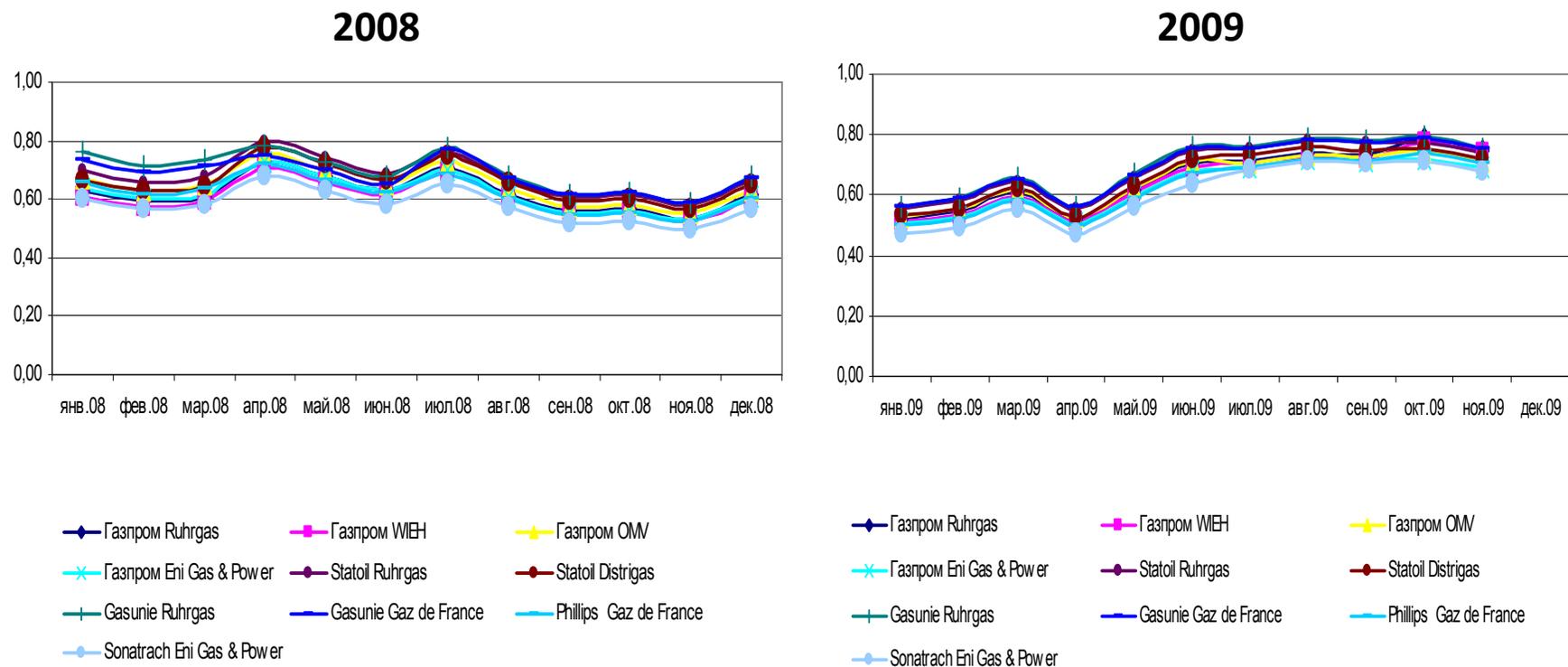
Correlation between gas & oil price in Europe, 1984-2009



Рассчитано по: BP Statistical Review of World Energy 2010, BP, June 2010, p.31.

A.Konoplyanik, Annual Lecture at CEPMLP, University of Dundee, 14.10.2010

Correlation between gas price in long-term European contracts & Brent spot price with 9 months lag, 2008-2009



Source: В.Фейгин, В.Ревенков. Природный газ в международной торговле: совершенствование традиционных методов ценообразования и новые подходы. Международном научном семинаре “Современные рынки природного газа: барьеры и стимулы развития”, Москва, РГУ нефти и газа им. И.М.Губкина, 24 ноября 2009 г.

After 1970-ies: oil parity formulae remains, but replacement value deviates away from oil parity (1)

- RFO is no more a gas-replacement fuel in industry & electricity generation (only as reserve fuel), but role of gasoil/diesel in the EU households (individual housing) is preserved
- New energies alternative to gas appeared in major spheres of its consumption: coal, primary electricity (hydro, nuclear), NRES, energy saving
- Specific (individualized) package of gas-competing energies in each sphere of gas consumption in different states => pricing formulae is to consider specificity of the state & consumption area => contract prices for neighbouring states not necessarily should be equal, but: price arbitrage within open markets => transfer of part of resource rent from producer to reseller => problem: replacement value vs. open markets (liquid marketplaces) = economics vs. law
- Negative Algeria experience on implementation of direct “oil parity” in pricing at LNG market in the 1980-ies (see: “Putting a Price on Energy”, ch. 4.4.4.4 & 4.5.3.2)
- New sources of gas supplies appeared (LNG, unconventional gas (shale, CBM, etc.), spot gas) => gas-to-gas competition is added to fuel mix in the formulae => Q: spot/futures (exchange/commodities) pricing - as a new element of pricing formulae or instead of the formulae at all ?

After 1970-ies: oil parity formulae remains, but replacement value deviates away from oil parity (2)

Nevertheless:

- Gazprom continuous statements in support of “oil parity” (as stabilization factor of gas prices),
- Gas Exporting Countries Forum Declaration of 19.04.2010 in support of “oil parity”

???

Gas-to-gas competition

- **Systematic factors:** as result of formation far-reaching infrastructure (diversification effect) for new consumers (downstream), supply routes (midstream) & for new gas (upstream) + unconventional gas (the volume does not matter)
- **Non-systematic (?) factors:** within periods of short-term local oversupplies:
 - **UK (1990-ies):** UKNS development => administrative ban on flaring associating gas => permission to market crude oil only after full utilization of associated gas => excessive gas supply at domestic UK market => spot + exchange/futures trade at understated prices => relatively/marginally liquid UK hub NBP
 - **Europe (end-2000-ies):** global economic crisis + unconventional gas production in US (shale gas, CBM) => fall US import LNG demand => reorientation LNG flows within the Atlantic basin from US to Europe => LNG oversupply in Europe => price dumping from new LNG suppliers (to recoup project financing of new on-stream LNG projects) => quick & flexible dumping pricing for new LNG vs. slow adaptation of formulae pricing for pipeline gas => short-term decrease of Gazprom market share, but stimuli for adaptation of contractual structures & pricing mechanisms => enforced adaptation
- **Systematic factors are the key ones !!!**

Gas markets early & mature stages: difference

- **Early stages of gas markets development:**
 - From non-competitive to competitive market of physical energy,
 - From cost-plus to replacement-value-based pricing
- **Later (mature) stages of gas market development:**
 - From competitive physical market to competitive paper market
 - From replacement-value-based pricing to commodities pricing
 - No return to cost-based pricing (non-competitive pricing mechanism)

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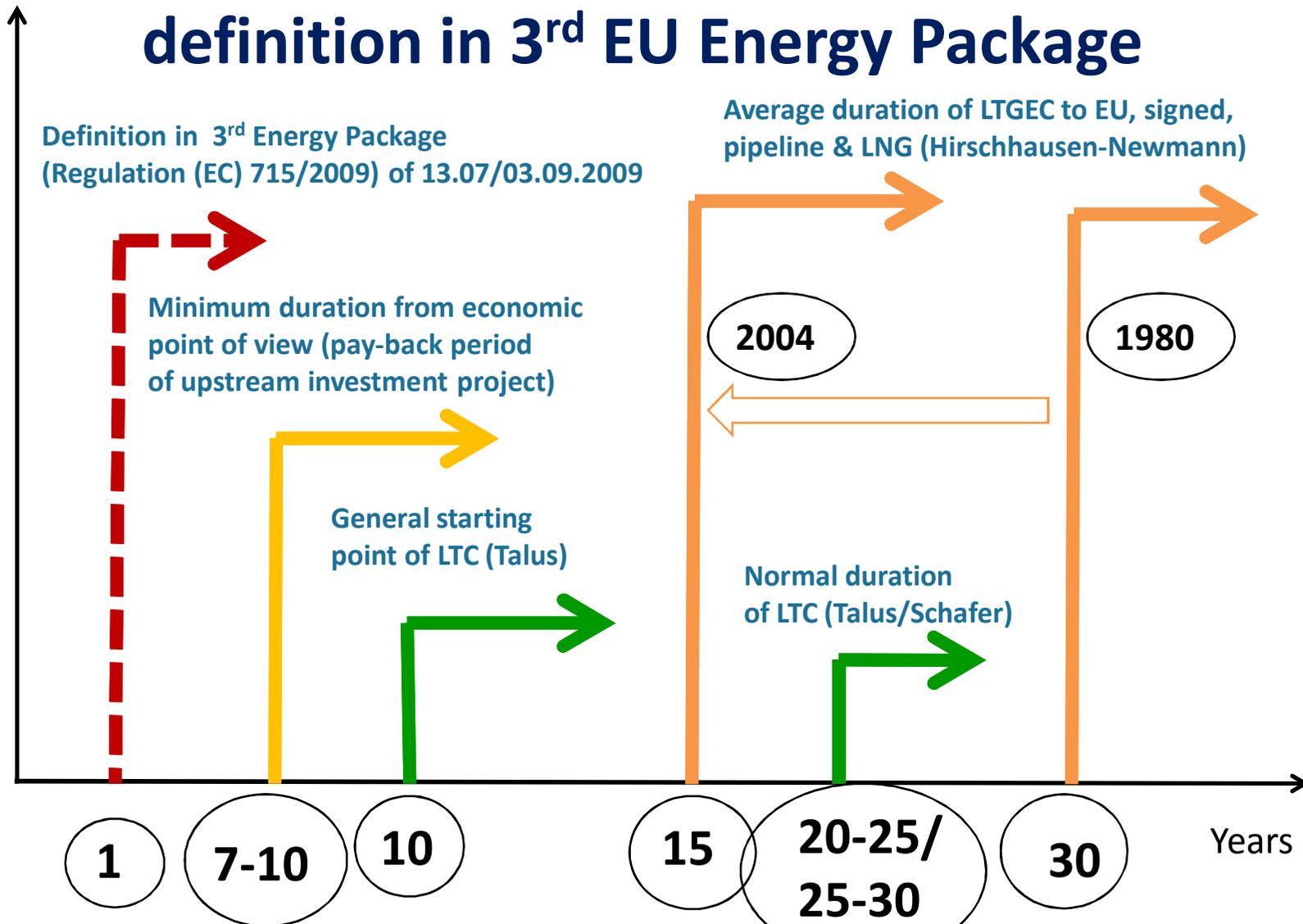
LTC: not a trade instrument, but an investment vehicle

- “It is not possible to plan investments aiming at spot prices, which today does not cover even production & transportation costs, and, as experience have shown, can be even lower. **Gas will not be produced unless it is sold, and the pipeline will not be built unless the gas designated for transportation is sold. This is major principle of investing into any transportation system...** (*Alexander Medvedev, Gazprom Deputy CEO, 22.06.2010 press-conference*)
- **LTC = project financing tool:** “We only decide to develop new pipelines if we already have the gas off-take contractually guaranteed”. (*Andrey Kruglov, Head of Gazprom Finance Department, “Gas Matters”, April 2010, p.26*)
- **Nord Stream project financing:** 30% - shareholders, 70% - external financing, the first financing phase of Nord Stream project was 60% oversubscribed

P.Voser/RD-Shell: correlation spot vs. LTC

- **Q:** Which type of contracts – spot or long-term – can guarantee stability & sustainability of the market?
- **A:** I think this is **LTC** since the question is **about long-term investments**, both on the part of producers – producing companies, as well as of consumers – owners of power stations and distribution grids. For power stations work we need stability which can be provided by the long-term contracts between suppliers and consumers...
- **In South-East Asia and Asia-Pacific share of LTC – 90% and they are linked to oil prices. In Europe this figure is about 70%, and there LTC are also linked to oil prices, and share of spot is about 30%. In the US practically all the contracts are spot due to availability of the Henry Hub marketplace. (Peter Voser, Chief Executive Officer Royal Dutch Shell, “Vedomosti”, 14.07.2010)**

“Long-term” (gas export contracts): different durations in historical European practice & its definition in 3rd EU Energy Package



LTC “normal durations”: BOTAS

Table 2: Botas’ natural gas sale and purchase agreements

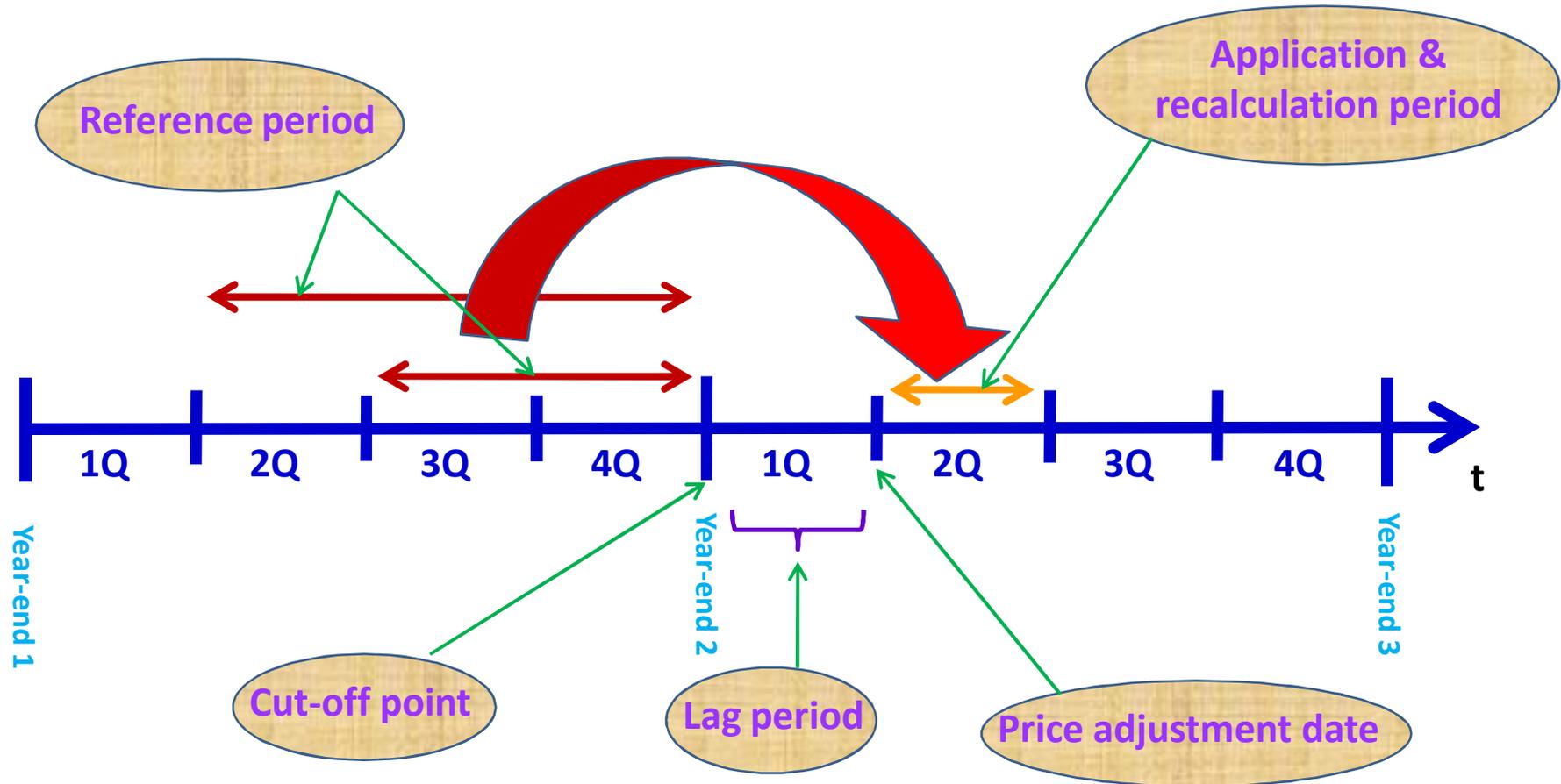
Agreements	Volume Bcm/yr (During The Plateau Period)	Date Of Signature	Duration (Years)
Russian Fed. (Westward)	6	14 February 1986	25
Algeria (LNG)	4	14 April 1988	20
Nigeria (LNG)	1.2	9 November 1995	22
Iran	10	8 August 1996	25
Russian Fed. (Black Sea)	16	15 December 1997	25
Russian Fed. (Westward)	8	18 February 1998	23
Turkmenistan*	16	21 May 1999	30
Azerbaijan	6.6	12 March 2001	15
*This project is currently pending			
Source: Botas			

Source: Gas Matters, Dec.2009-Jan/2010, p.6

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LTGEC price recalculation mechanism



Reference period: 1 calendar year (3-5- years) => 6-9 months sliding scale

Application period: 1 calendar year => 3 months sliding scale

Lag period: few weeks/months => zero

LTGEC pricing mechanism tendencies under indexation formulae

- **More turbulent/volatile reference price (replacement value)** stimulates for:
 - Shorter reference period,
 - More frequent price adjustment dates,
 - Shorter application period (mechanism of sliding mean value),
 - No big difference between durations of reference & application period(s) within shorter durations of both
- **More stable reference price (replacement value)** stimulates for:
 - Longer reference period (up to 1 year),
 - Less frequent price adjustment dates,
 - Longer application period (up to 1 year, mechanism of sliding mean value),
 - No big difference between durations of both reference & application period(s) within long duration of both

Replacement value concept: gas price indexation formulae possible ingredients

	Electricity generation	Industry	Households
Crude oil prices	Yes / history (Japan, few other importers)	Yes / history (Japan, few other importers)	No
Oil product prices	Yes (RFO / HFO)	Yes (RFO / HFO)	Yes (Gasoil / Diesel / LFO)
Electricity prices	Yes (primary / NRES)	Yes	Yes
Coal prices	Yes	Yes	Yes (minor – ecology)
Gas prices	Yes (spot / futures)	Yes (spot / futures)	Yes (spot / futures)
Inflation	Yes	Yes	Yes

Typical LTGEC pricing formulae based on net-back replacement value, and its evolution

$$P_m = \left\{ \begin{array}{l} [P_o] \\ + [0.60] \times [0.80] \times 0.0078 \times (LFO_m - LFO_o) \{growth/fall\} \\ + [0.40] \times [0.90] \times 0.0076 \times (HFO_m - HFO_o) \{growth/fall\} \\ + [...] \quad (coal) \quad \{growth/fall\} \\ + [...] \quad (electricity) \quad \{growth/fall\} \\ + [...] \quad (gas-to-gas competition) \quad \{growth/fall\} \end{array} \right.$$

NB: [...] – parameters in brackets – usually subject of negotiations on review; in **bold** – elements of original Groningen formulae; ***bold Italics*** in figure brackets – dominant changes of competing fuels shares in pricing formulae

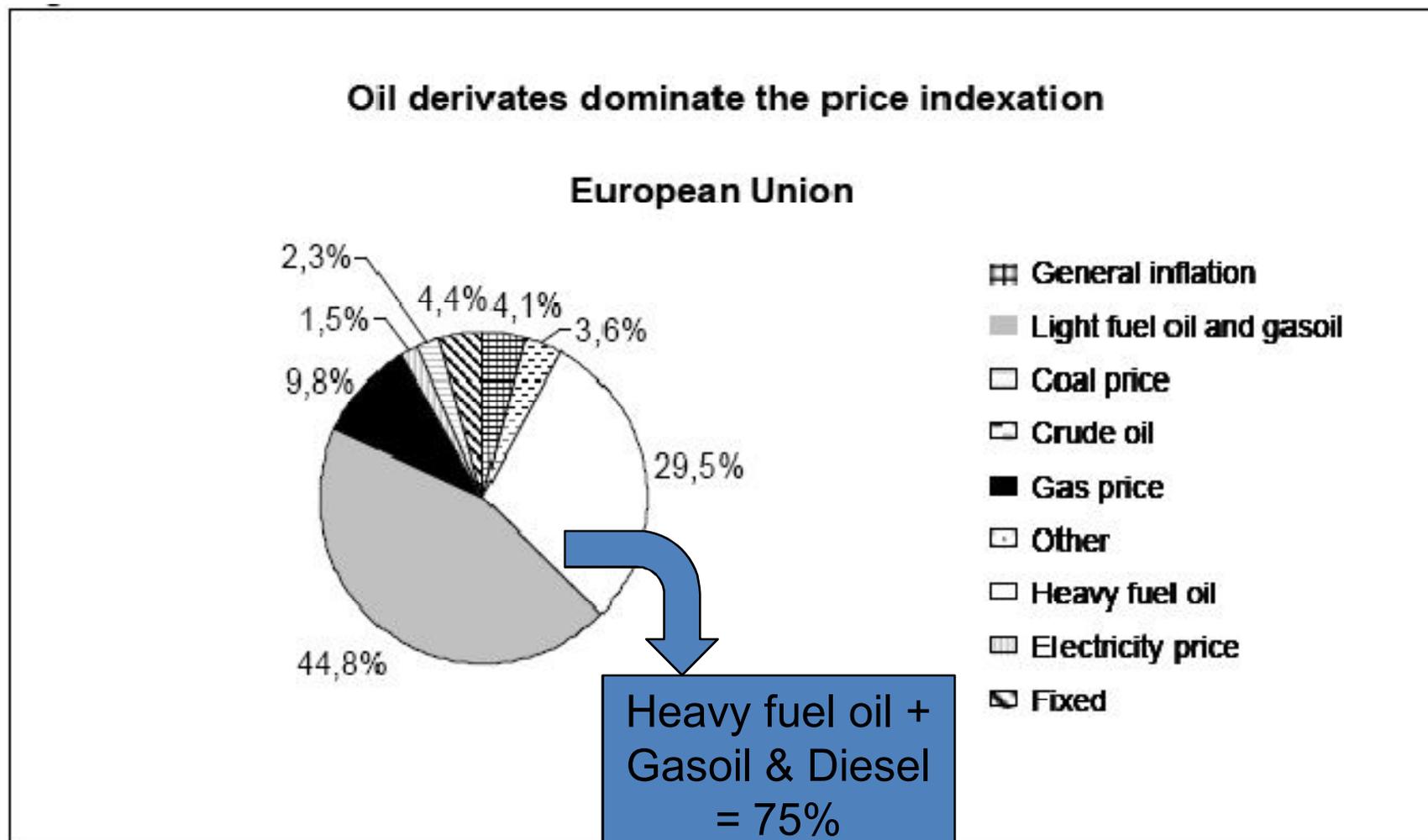
Long-term evolution of review mechanism of pricing formulae:

- Reflects adaptation of the formulae to new conditions of energy markets development,
- Takes place by competitive changes of shares of gas-competing fuels that already present in the formulae (fall RFO, growth LFO) and by inclusion in the formulae of new gas-competing fuels & gas-tj-gas competition,

but

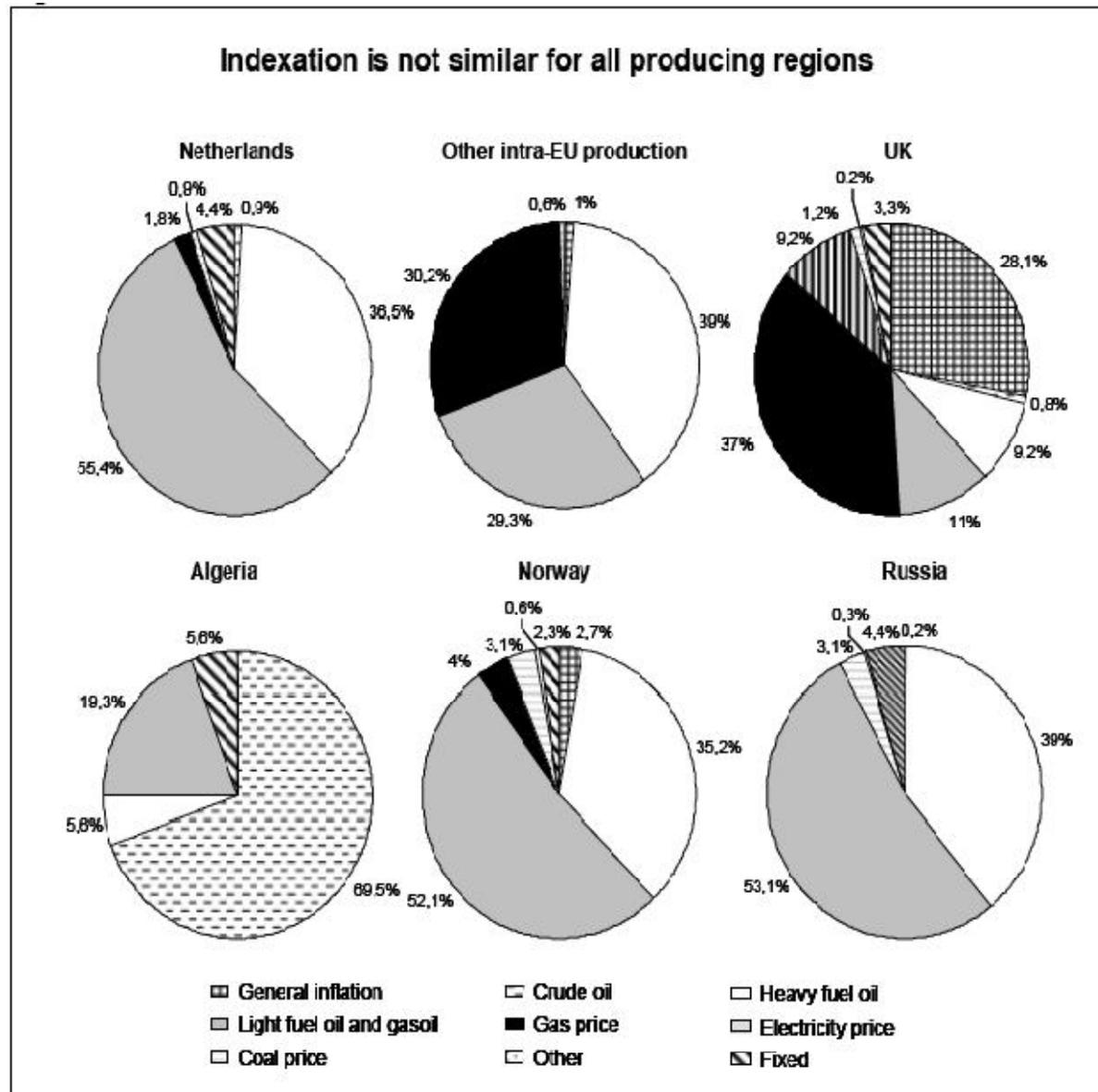
Gasoil/diesel & RFO still dominate in LTGEC pricing formulaes

Price indexation structure in the EU



Source: Energy Sector Inquiry 2005/2006

LTGEC in the EU: Indexation by Producer



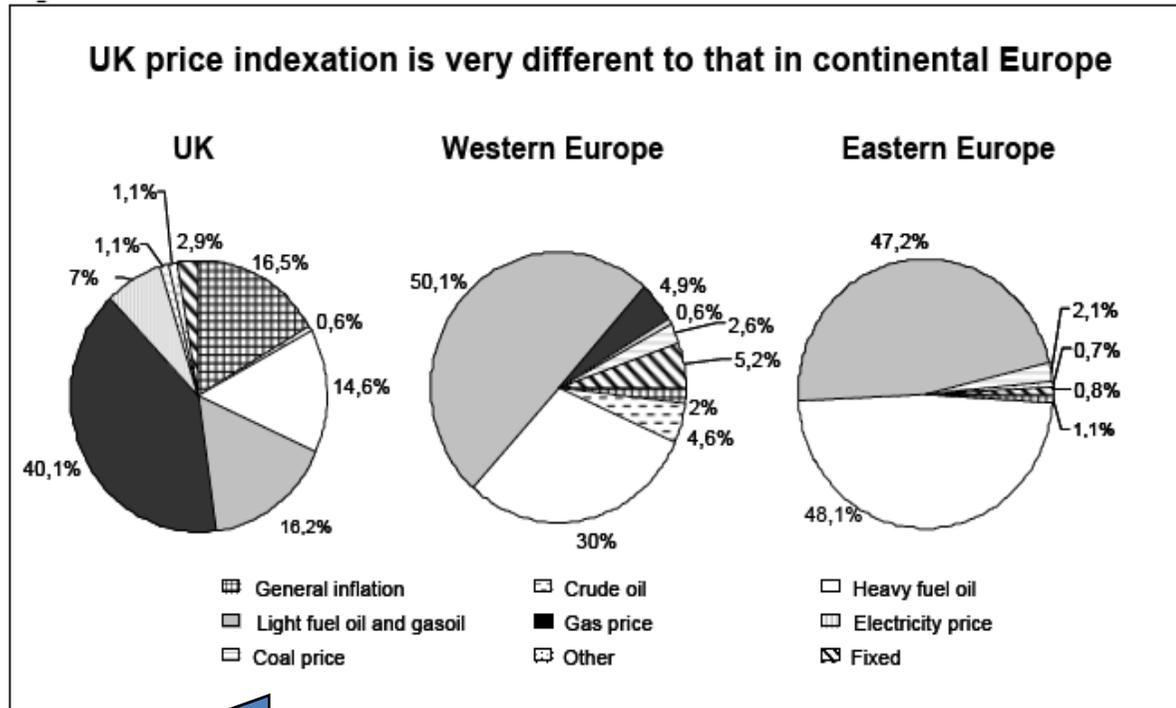
Netherlands, Norway, Russia:
 HFO = 35-39%;
 diesel & gasoil = 52-55%;
 Sum-total HFO+ Diesel & Gasoil:
Netherlands = 92%,
Norway = 87%,
Russia = 92%



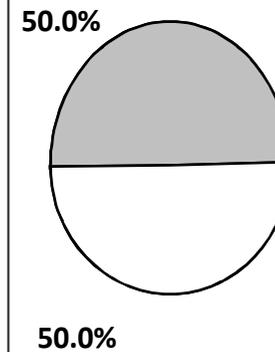
Major gas exporters to the EU: mostly oil indexation

Source: Energy Sector Inquiry 2005/2006

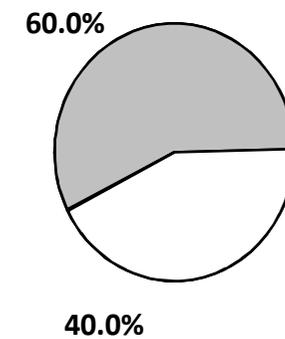
LTGEC in Europe: Indexation by Region - Historical Evolution from Less to More Liberalized Markets



Russia-Ukraine LTGEC (2009-2019)



Basic Groningen LTGEC model (since 1962)



Source: Energy Economics, 2005/2006

Evolution of LTGEC pricing formula structure: from more simple to more complicated

NB: Russia-Ukraine 2009 LTGEC structure rationale: more practical (understandable & sustainable) to start with less sophisticated pricing formula => similar to basic Groningen formula

Further development (most likely): towards EE-type => WE-type => UK-type price indexation

=> away from oil parity?

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Continental Europe: a battleground between two gas pricing models (a view)

“...long-term sale and purchase contracts ...**priced differently** in the main markets around the world:

- crude oil indexation in Asia,
- oil product indexation in Continental Europe, and
- gas trading hub-based pricing in North America and North-West Europe (primarily UK).

Many have anticipated that amid the turmoil and emergence of global trade, the differences would be eroded as prices converged with the result **that oil indexation mechanisms would be replaced** by some form of gas market indexation.

Today, on the contrary, oil indexation of long-term contracts appears to be holding up, albeit coming under renewed strain in Europe. ...

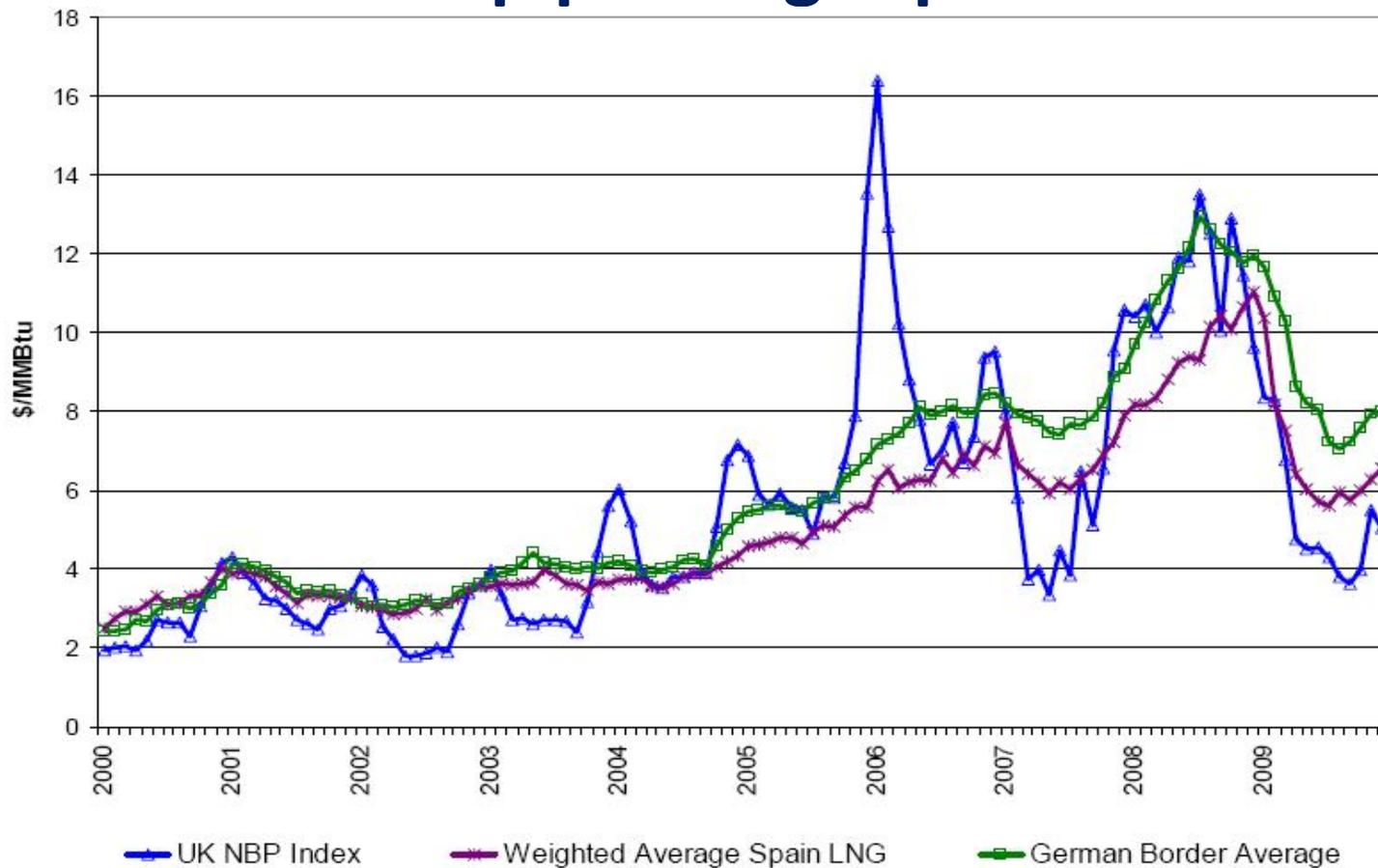
Continental Europe is increasingly emerging as a battleground for pricing, between oil-product indexed LNG and pipeline gas on one hand and hub-based pipeline gas and LNG on the other.

(Rob Fenton, James Ball. Can price terms in yesterday's LNG contracts survive the upheaval of today's markets? Gas Strategies, www.gasstrategies.com)

C.Ruehl/BP: LTCs are reaching back? (alternative view)

- “Old scheme with three gas markets: Europe, Asia & North America, do not linked regarding prices, is reaching back. While trade at the spot market has been substituting LTC, pipeline gas suppliers would become less and less competitive (??? - disagree/A.K.). The first winner from dissolution of LTC will be consumer: this will lead to price decrease. (??? – disagree/A.K.) Other winners will be states & companies having access to new gas reserves. (??? – disagree/A.K.) And finally **such companies will win who are rather flexible to spurt into the lead**". (Christof Ruehl, BP Chief Economist,
<http://www.lawtek.ru/news/tek/62706.html?print>)

Comparison of NBP and European long-term LNG and pipeline gas prices



Source: Gas Strategies

Source: Rob Fenton, James Ball. Can price terms in yesterday's LNG contracts survive the upheaval of today's markets? Gas Strategies, <www.gasstrategies.com>

A.Konoplyanik, Annual Lecture at CEPMLP, University of Dundee, 14.10.2010

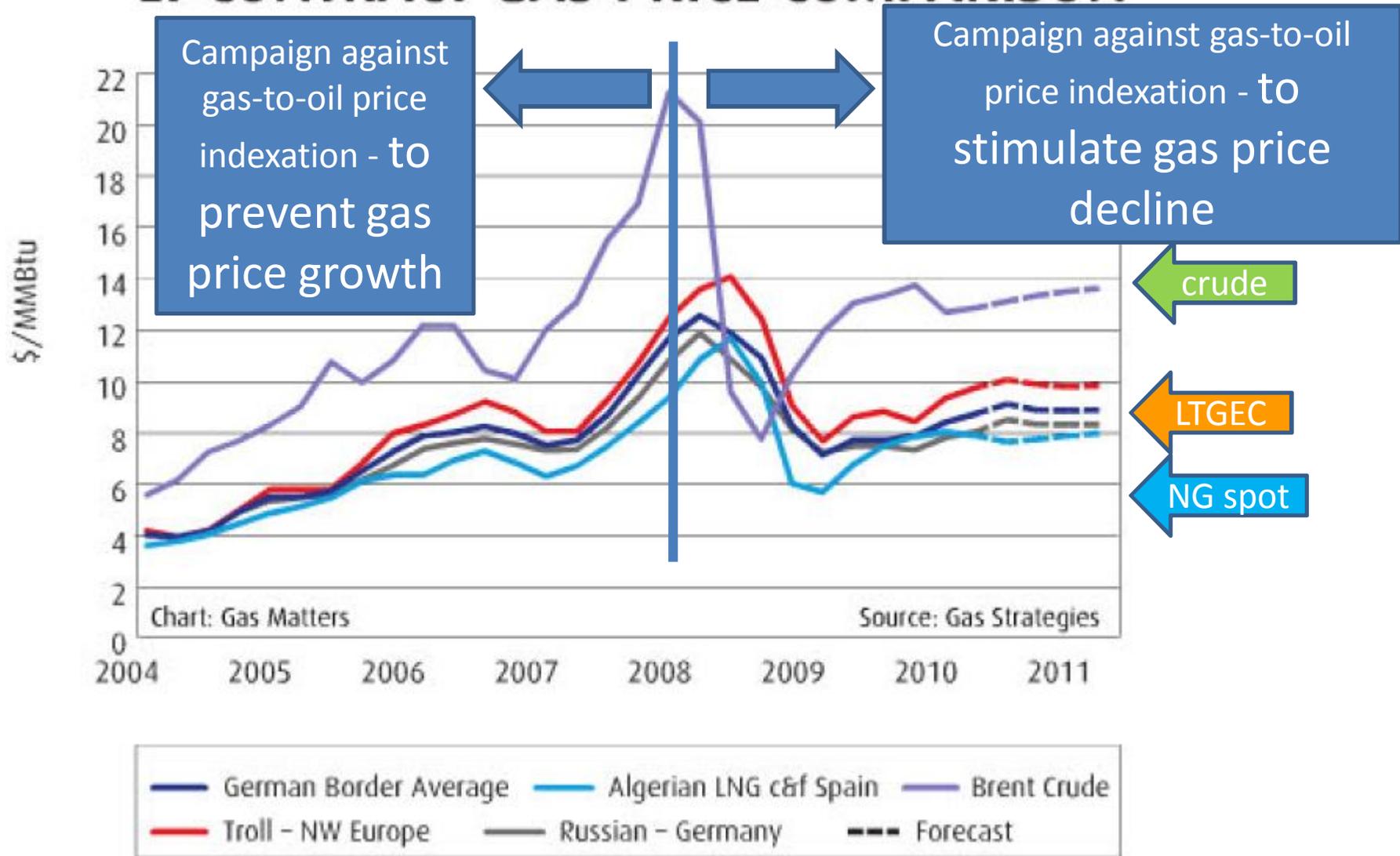
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Two stages of campaign for review of gas contract pricing: different motivations and preconditions

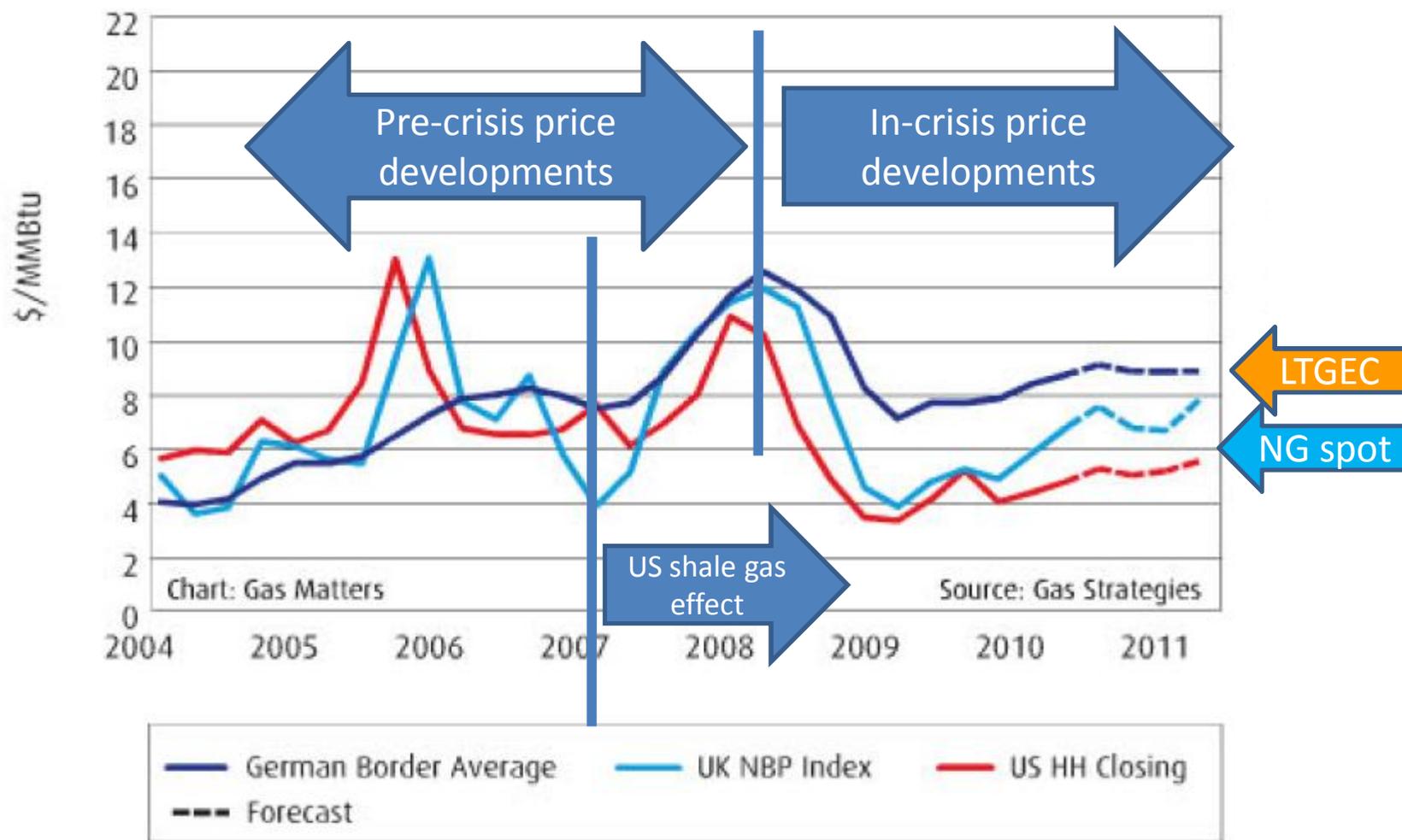
- **2004-2008:**
 - Period of oil price growth,
 - Oil indexation within LTGEC gas pricing formulae led to growth (though deterred) of gas prices following oil prices =>
 - Demands for downgrading of gas prices (their delinking from oil prices) as a will to **prevent their further growth**
- **2008 – till nowadays:**
 - 2/2-2008: first fall, then stabilization of oil price,
 - 1/2-2009: lagged diminishment of gas prices following downfallen oil prices – effect of 6-9 months-long reference period,
 - 2009-2010: global economic crisis & gas demand fall + US shale gas, closure of US market for LNG import, reorientation of LNG flows within the Atlantic basin from US towards Europe in addition to originally Europe-destined LNG + new LNG => supply/demand fisbalance =>
 - Crisis-based gas oversupply in Europe => competition pipeline gas & LNG => dumping LNG spot => advanced diminishment spot prices (in mid-crisis spot prices were 50% lower LNC prices) => slow/lagged adaptation of LTGEC & formula pricing => loss competitive positions of LTGEC against spot supplies =>
 - Demands for downgrading of gas prices (their decoupling from oil prices, waiver from formula pricing & of LTGEC) as intention to **provide their further decline**

LT CONTRACT GAS PRICE COMPARISON



Source: Gas Matters, July-August 2010, p.33.

TRADED GAS PRICE COMPARISON

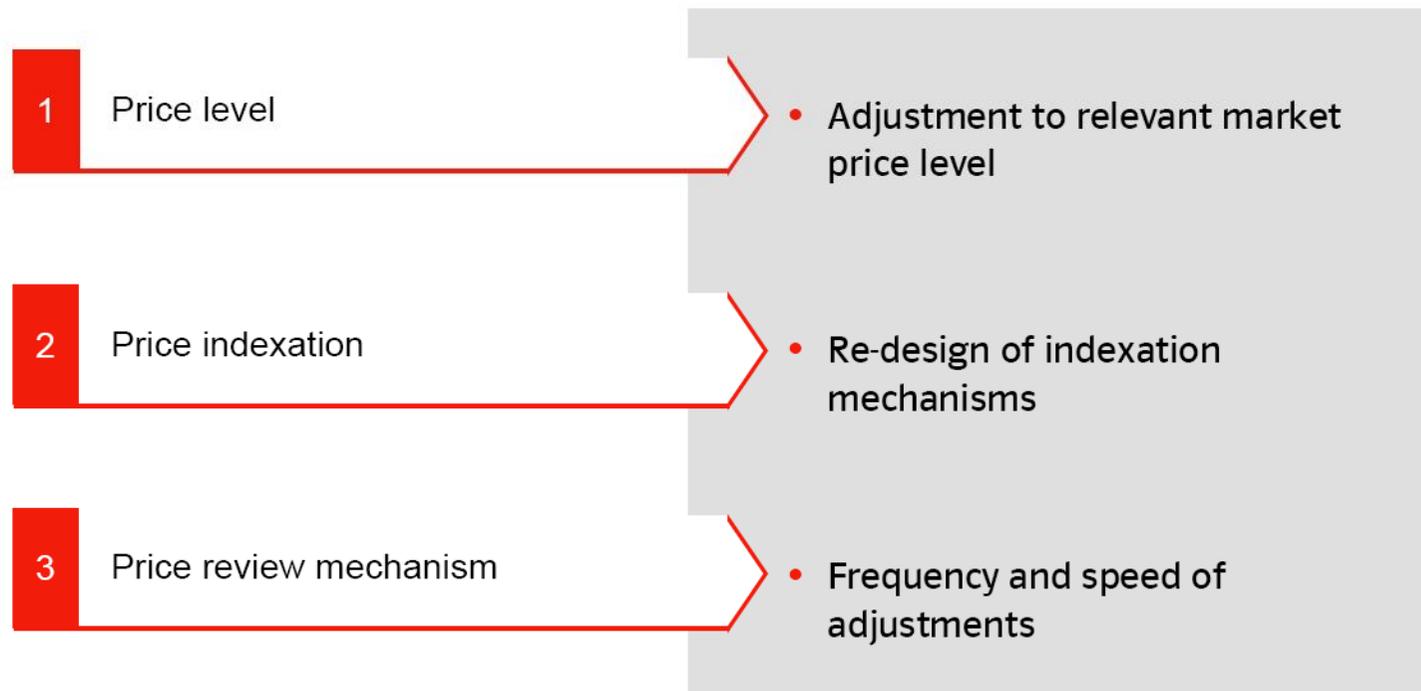


Source: Gas Matters, July-August 2010, p.33.

“Necessity has grown at the market to review pricing methodology within long term gas contracts”

- “We face already today specific difficulties with **LTC** – they were drafted considering other economic realities and today they are not fully actual. ... **They should better consider this new economic reality which does exist nowadays.** Simply said, prices should be decreased. (??? – A.K.) There are **two possibilities**: either to **link gas prices within LTC to some spot gas quotations**, either to **preserve**, as it has been done in many cases, **oil indexation**, but to **draft it slightly differently**. ... To use gas price indicators for determination of contractual (gas) price within LTC creates concerns (within gas industry representatives) due to this particular volatility that we have been facing nowadays at the gas markets. This is why **market participants consider oil quotations as more reliable pricing instrument** just because they are less volatile. But there is a **need for re-tuning of pricing formulaes** so that gas price will be lower. ... **Totally new pricing system** has been emerging, I will call it a “**mixed**” or a “**hybrid**” one. (*Lawrence Neal, President Platts, “Vedomosti”, 16.08.2010*)

Traditional LTC pricing needs to be adjusted to new market conditions

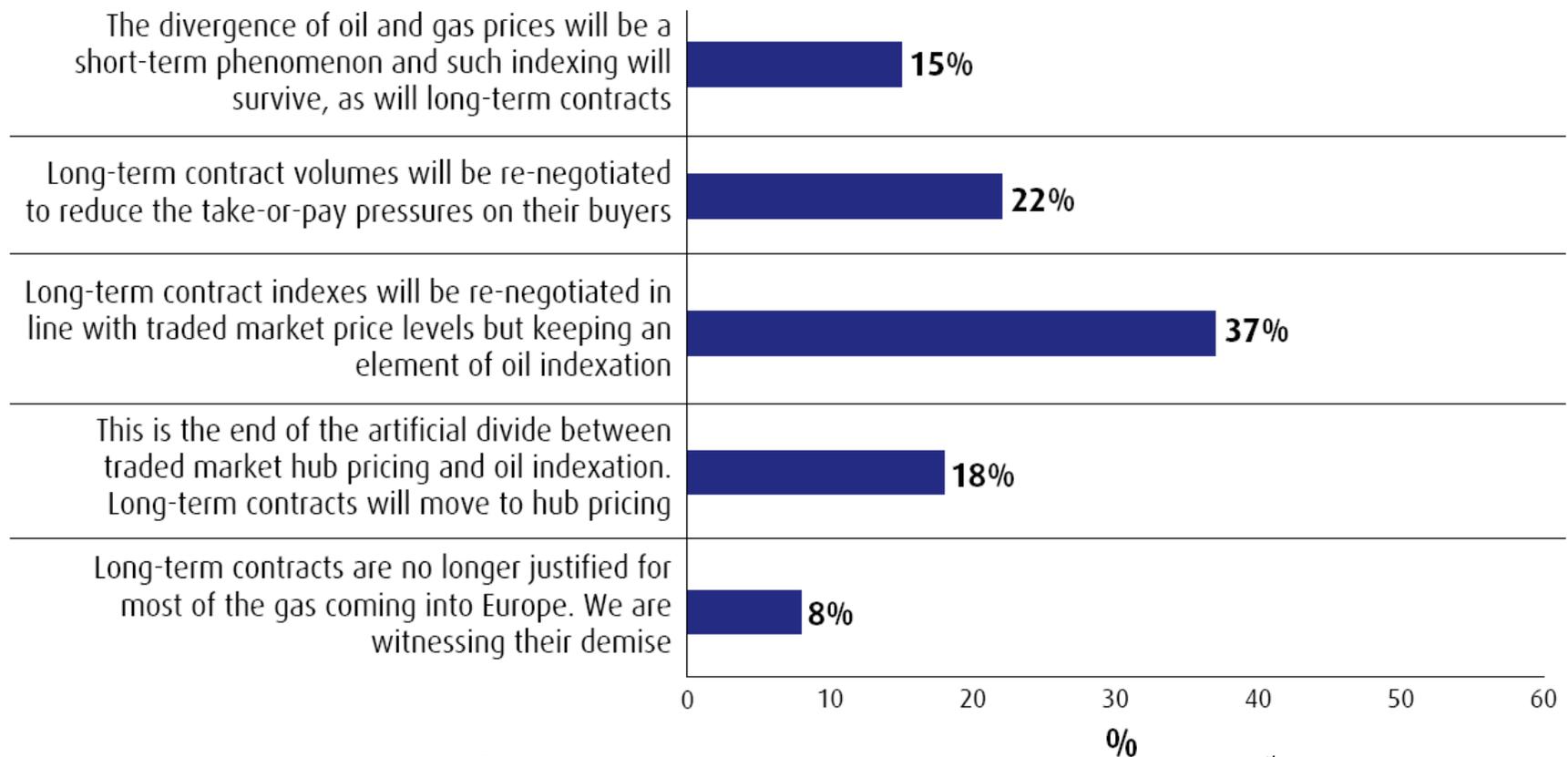


Source: Natural Gas Markets in Europe – Challenges and Development. Klaus Schafer, Chairman of the Board of Management of E.ON Ruhrgas AG. - Presentation at the Conference “ONS-2010 – Secure, Sustain, Supply”, Stavanger, August 25th, 2010

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Future of LTGEC: industry view

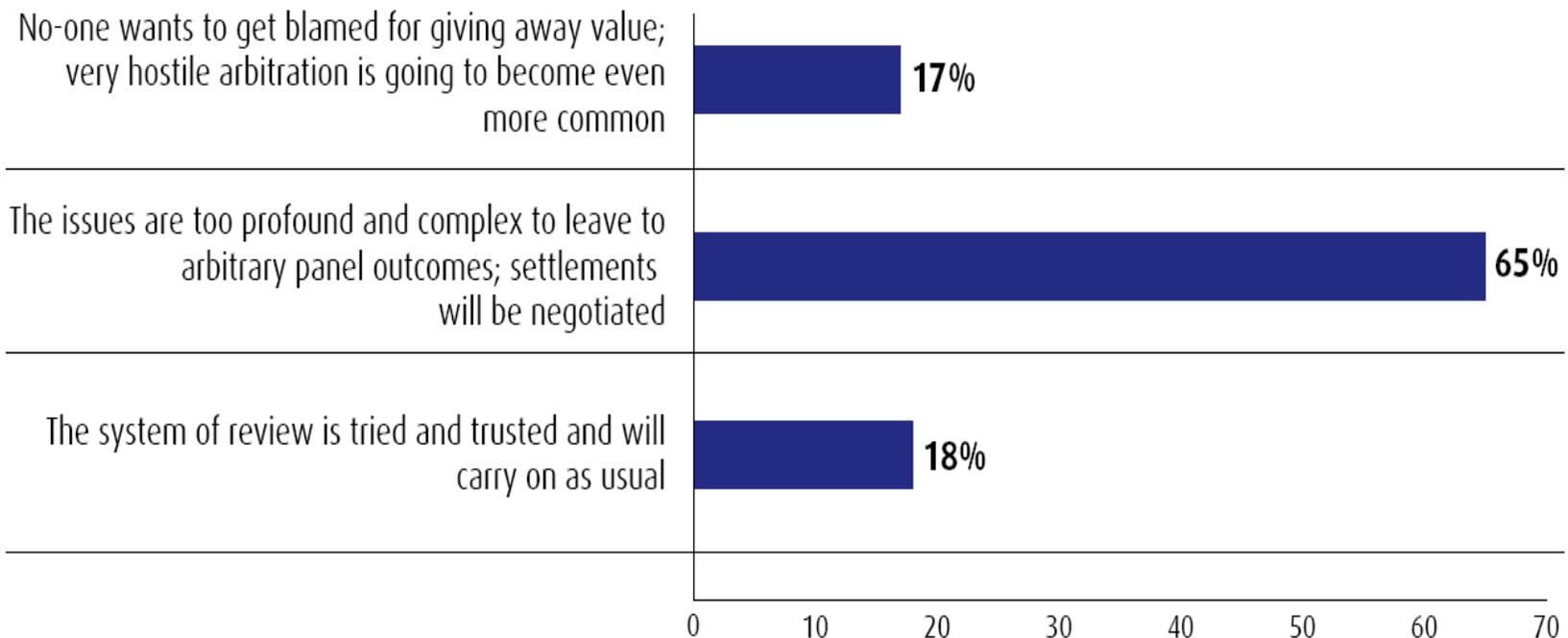
Q9 Oil-indexed long-term gas contracts are increasingly exposed to unprecedented take-or-pay pressures in Europe. Where are we heading?



Source: *Europe's gas industry need transformation to adapt to energy revolution. Key messages from the 24th European Autumn Gas Conference, held in Bilbao in northern Spain in November 2009*, December 2009, p.14.

How to adapt LTGEC: industry view

Q10 With an increasing number of long-term contracts under review pressure, how do you think this is most likely to be resolved, given the large amount of value embedded in them?



Source: Europe's gas industry need transformation to adapt to energy revolution. Key messages from the 24th European Autumn Gas Conference, held in Bilbao in northern Spain in November 2009", December 2009, p.15.

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B.Reutersberg, E.ON Ruhrgas CEO, on LTC

“Gas purchased under LTC guarantees security of supply and gives the buyer the flexibility of make-up gas and daily nominations. On spot markets, you have no guarantee to get the gas volumes you want for a fixed prices. Spot gas and LTC are two entirely different products. ... LTC are not out of fashion. They have always been and will remain the back-bone of European gas supply ... element of sustainability and reliability”. E.ON Ruhrgas is prepared to stick to gas purchase on long-term oil-linked contracts, despite the availability of cheap gas at spot markets.

(“Gas Matters”, March 2010, p.18)

Gas market: no more bubbles...

“...I really hope that **speculation doesn't take over**. Having many players in the market and having financial instruments linked to commodities is important to make the market more liquid and efficient, but I think also there should be controls and regulation in place **to avoid a bubble emerging**; and we all know how difficult that is to unravel.

I wouldn't want gas to become the next dot-com or real estate or credit-derivative. I like to think that people in this business are level-headed and a three-year or two-year spot market will develop, which the industry should try to make work as best as possible.”

(Riccardo Puliti, Managing Director of Energy and Natural Resources, EBRD, “Gas Matters”, June 2010, p.11)

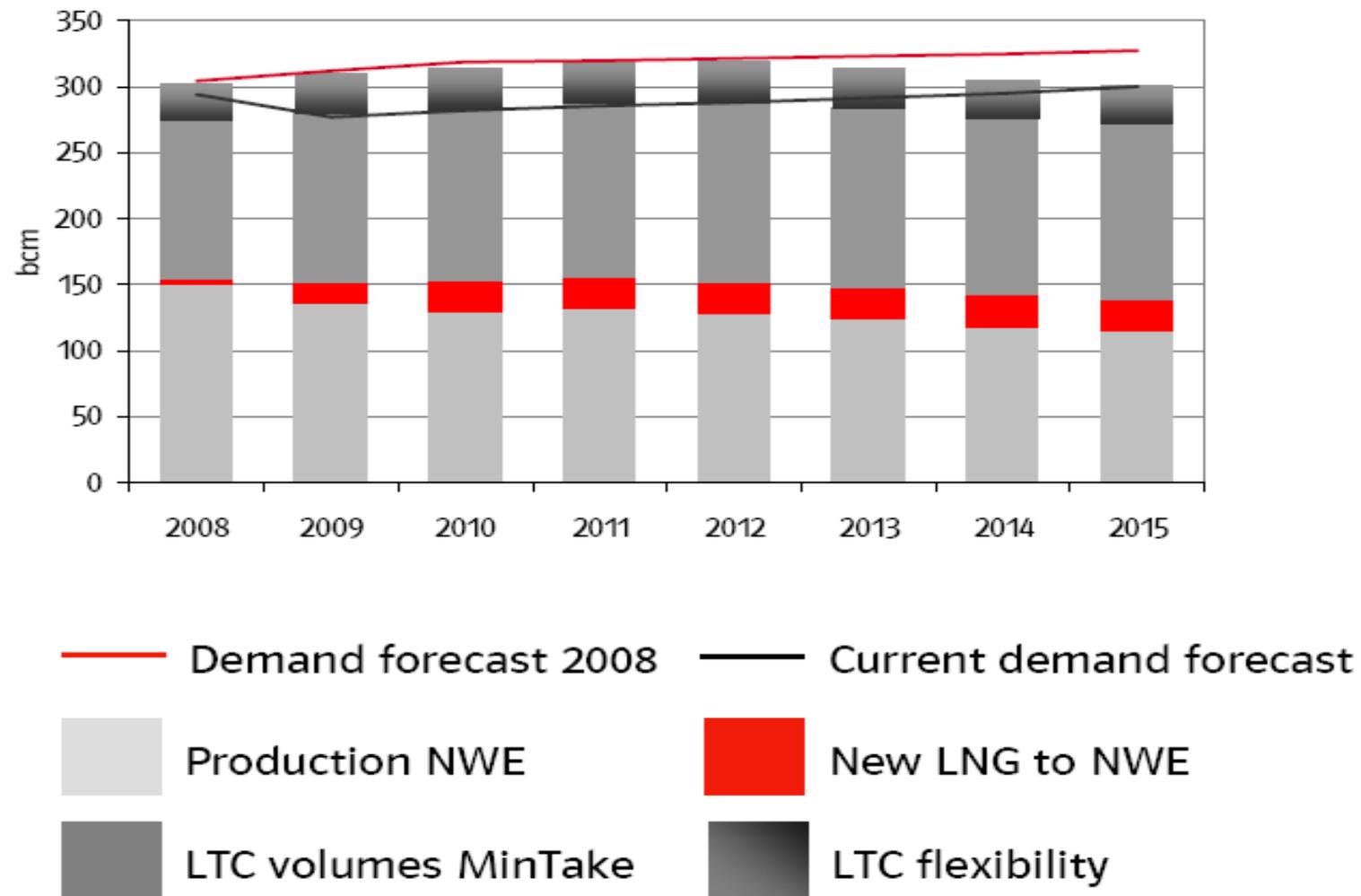
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When European market will survive

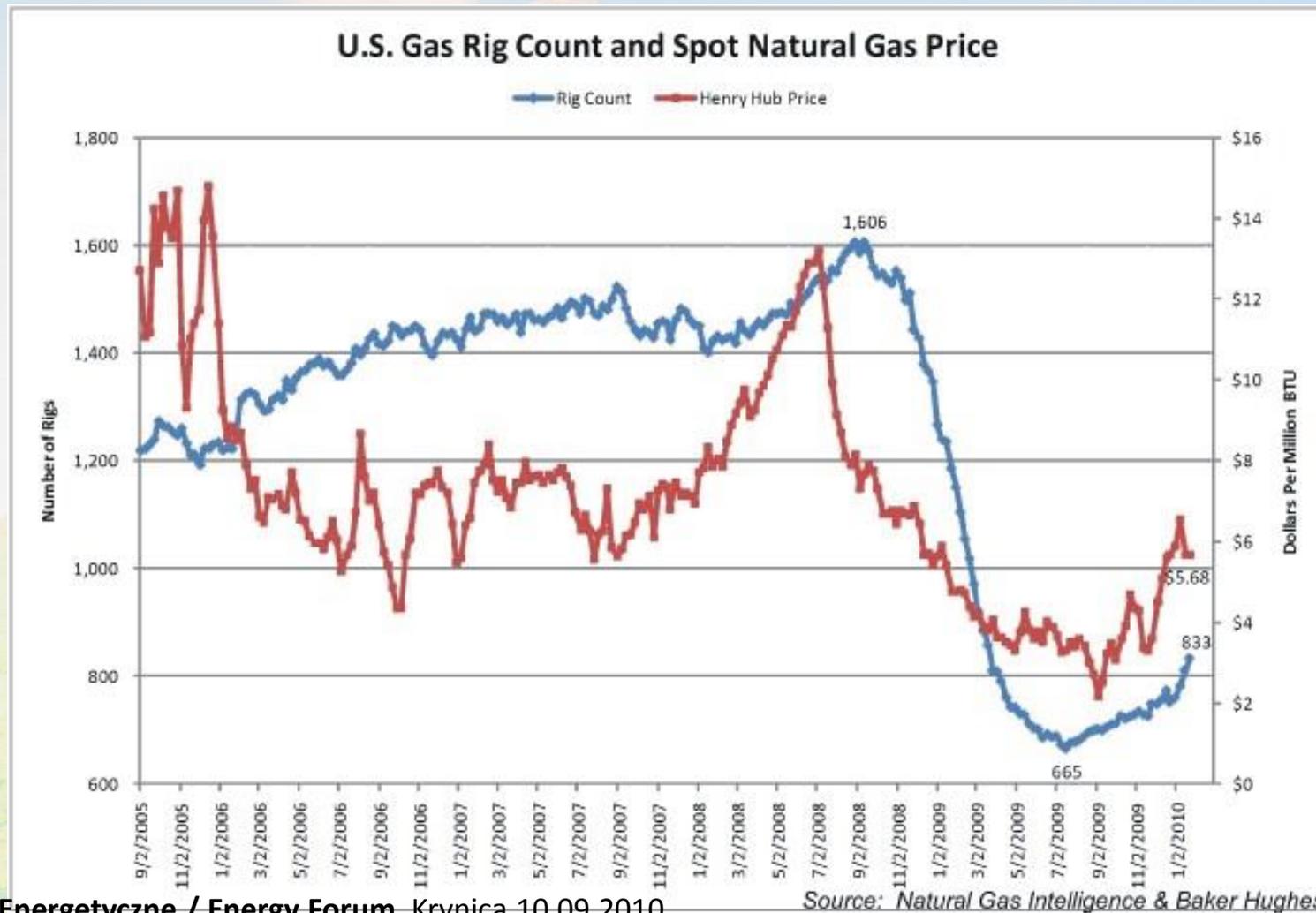
- “Gazprom expects that current temporary gas oversupply at the European market will disappear **already in 2011**” (*Alexander Medvedev, VII International Forum “Gas of Russia 2009”, 17.11.2009*)
- “ We foresee full recovery of pre-crisis demand nor later than **beginning of 2013** ... (Spot & LTGEC) prices must match **to 2012** ... at this time supply-demand balance at European market will recover” (*Alexander Medvedev, press-conferences 19.03.2010 & 22.06.2010*)
- “Up to our view, **before 2012** prices will reach pre-crisis level” (*Alexander Medvedev, interview to Financial Times Deutschland 25.08.2010*).
- “The market is still oversupplied, but in Europe it must **recover in 2013**” (*Bernhard Reutersberg, CEO E.ON Ruhrgas, “Reuter”, 02.07.2010*)
- Since August 2009 spot gas price at Zeebrugge (Belgium) has grown more than twice – to 243 USD/mcm compared while contract price (with spot component) is about 305 USD/mcm (*“Kommersant”, 31.08.2010*) => whether buyers pressure on Gazprom to deviate from oil indexation will erode?

Supply & demand balance North-West Europe



Source: Natural Gas Markets in Europe – Challenges and Development. Klaus Schafer, Chairman of the Board of Management of E.ON Ruhrgas AG. - Presentation at the Conference “ONS-2010 – Secure, Sustain, Supply”, Stavanger, August 25th, 2010

USA gas price decrease due to increase of unconventional gas production



Forum Energetyczne / Energy Forum, Krynica 10.09.2010

Source: Pawel Poprawa. Will unconventional gas change global energy structure? – Moderator’s Opening Presentation at the Session “Will the Unconventional Gas Change the Traditional Energy Relations in the World?”, 10.09.2010, Energy Forum. - 20th Krynica Economic Forum, 8-11 .09.2010, Poland.

A. Medvedev on Gazprom pricing policy in Europe (1)

- “Gazprom Group was to **consider realities of the in-crisis market** and to **demonstrate flexibility** in relations with partners. Changes that we incorporate in some contracts, are not the one-way-street. At negotiations with partners our company makes advances to them taking into consideration **unprecedented situation at European gas market**.
- Our partners also **do not put under question** necessity to follow their **contractual obligations**, but endeavour only to **reschedule some of those to later periods**. At the same time, we propose them a **stimulating package** which motivates the buyers to off-take gas over minimum contractual volumes.
- **Principle “take or pay” stays firm. In no case it is supposed to refuse from the system of LTC & pricing with oil-product link. Discussed measures are temporary.** Gazprom Group plans to come back to pre-crisis conditions after full revival of gas demand in Europe. However, up to this year-end we do not expect this, including equalization of spot prices & LTC prices.”

A. Medvedev on Gazprom pricing policy in Europe (2)

- “We are not indifferent on which conditions to sell our gas. We can not be satisfied with attempts to destroy the system of LTC based on TOP principle with oil-indexed prices. **It is oil-indexation that gives both to producer & consumer predictability & reliability of planning, which finally guarantee pay-back of investments.** *(NB: or gas replacement-value indexation? - AK)*
- Prices, of course, will recover, as well as pre-crisis demand. But today’s state of the market is not a reason to break secure & effective system which provided, provides and will provide security of consumers and suppliers (producers). Current situation does not comfort no gas producer, incl. producers of LNG & shale gas.”
(press-conference 22.06.2010)

Not too many contracts – not too many changes ...

“Anybody who has Norwegian or Russian gas deliveries probably has the same contract. There are a limited number of contracts per country. There are maybe **10 contracts in Austria**, maybe **20 to 30 in Germany**, about **10 in France**. Many of them are very similar ... Commodity contracts might have slightly different price formulae”.

(Walter Boltz, Chairman, Austrian Energy Regulatory Authority E-Control, “Gas Matters”, July-August 2010, p.16)

Shift away from oil-indexation?

“Gazprom is probably a little bit more proactive than the Algerians... Things might develop in a way that we will not have 95% but only 80% of long-term gas contracts sold on an oil-indexed basis. **The shift away from oil-indexation is a trend that cannot be halted.** People will see a growing share of gas contracts which will have **more flexible indexation.** Many gas companies see the current **disadvantages of long-term OIL-INDEXED (A.K.) contracts,** as they are forced to **pay more for gas than prices on the spot market.** Normally, long term gas contracts tend to protect buyer and seller only in a stable (*NB: and growing? – A.K.*) market. But now, a willingness is evolving to renegotiate the terms of long-term oil-indexed contracts with the tendency **to include spot gas and coal prices into the pricing formulae**”.

(Walter Boltz, “Gas Matters”, Dec.2009-Jan.2010, p.27-28)

Gazprom: Evolution of contract provisions and pricing mechanisms in Europe (based on public information)(1)

- **Buyers' demands for price reviews and contract adjustments following "significant market changes"**
(E.On, Wingas, RWE, Botas, Eni, GdF Suez, EconGas, Gasum)
- **Downgrading minimum TOP obligations** from Gazprom's average 85% (E.ON, Botas: 90% to 75%; ENI: 85% to 60% for 3 years) => Gazprom total 15 BCM for 3 years = 5/140-145 BCM (2010) = 3.5% RF gas export volume
- **No penalties for violation of minimum TOP obligations**
(Naftogaz UA, Botas; Eni, E.ON pending)
- **Gas sales above minimum TOP obligations at current spot prices** (E.ON, GdF, Eni)
- **Adding gas-to-gas competition component into pricing formulae** (E.ON, GdF, Eni–Gazprom = 15% based on a basket of European gas hubs, E.ON-Statoil = 25%; Statoil average up to 30%, requests to Gazprom up to 40%) thus decreasing/softening oil-indexation formulae link

Gazprom: Evolution of contract provisions and pricing mechanisms in Europe (based on public information)(2)

- **Increasing flexibility of contractual provisions** (Gazprom's "promotional package")
- **Recalculating base formulae price** (Wingas)
- **Direct price concessions** (Botas)
- **Manoeuvre by contract volumes within contractual time-frame** (E.ON, Eni) + requests to cancel obligation to off-take contracted volumes within 5-year period
- **Stimulating measures** ("packages") for purchases in excess of (downgraded) minimum TOP
- **Shorter contract durations** (Sonatrach)
- **Shortening of recalculation period/interval** (possible)
- **Shortening of reference period** (possible)

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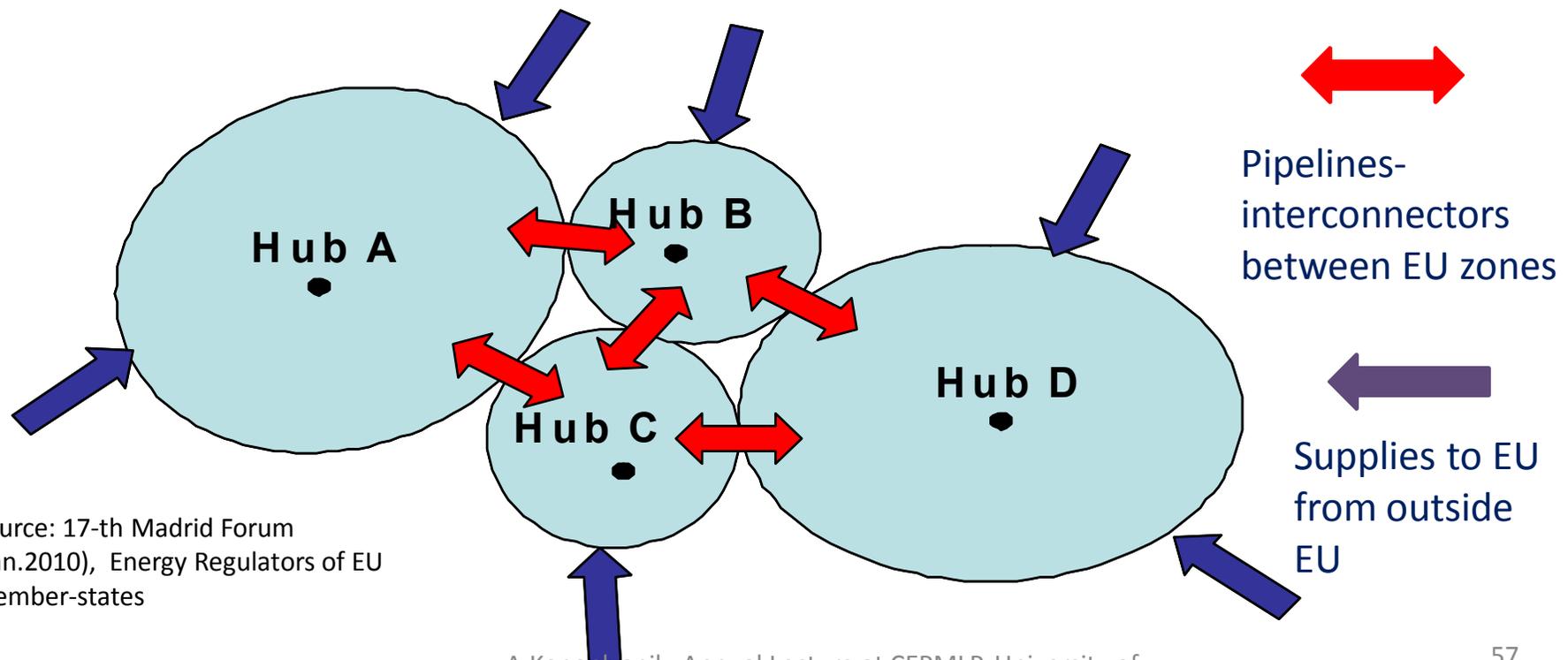
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Future architecture of common internal EU gas market according to Third EU Energy Package

No single (homogenous) internal EU gas market in the near future even as an economic model

All market areas to be organized as **entry–exit zones** with **virtual hubs** => Towards uniform capacity allocation mechanisms & gas pricing mechanisms, but:

Gas pricing at the hubs: on **all** gas volumes **or** just on **a portion** of gas supplies? And when?



Source: 17-th Madrid Forum (Jan.2010), Energy Regulators of EU member-states

Liquidity of European gas hubs, Q4-2009

- **United Kingdom:** National Balancing Point (NBP) **14.9**
- **Belgium:** Zeebrugge (ZEE) **4.9**
- **Austria:** Central European Gas Hub (CEGH) **3.2**
- **Netherlands:** Title Transfer Facility (TTF) **3.0**
- **Italy:** Punto di Scambio Virtuale (PSV) **1.9**
- **France:** Point d'Echange de Gaz (PEG) (av.2009) **1.9**
- **Germany:** NetConnect Germany (NCG) **2.4**

For comparison:

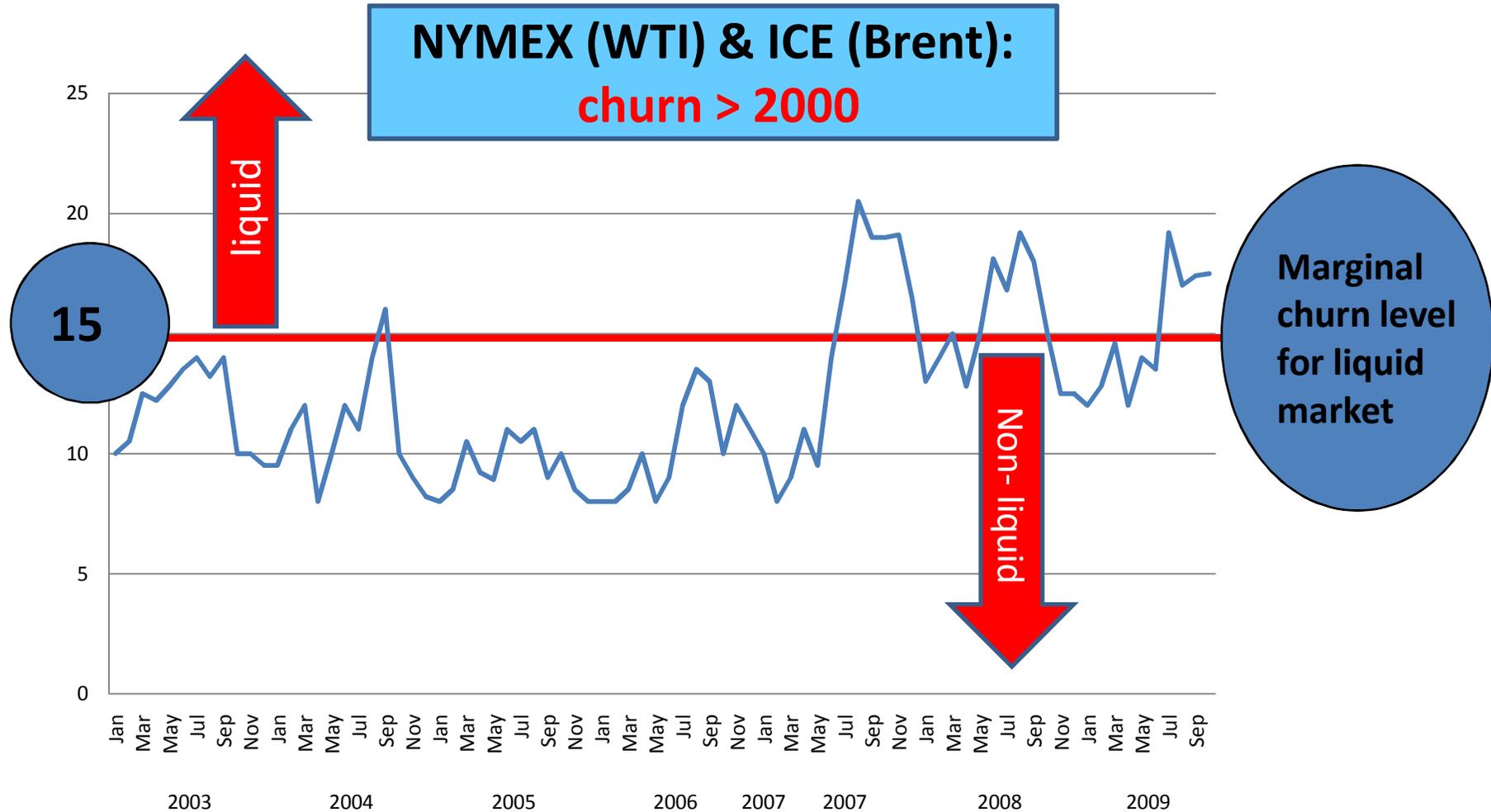
- **USA (oil):** NYMEX (WTI) (Feb.2010) **1680-2240**
- **UK (oil):** ICE (Brent) (Feb.2010) **2014**
- **USA (gas):** NYMEX Henry Hub (av.2009) **377**

Break-even churn level for liquid marketplace 15

Churn is the commonly used parameter for measuring liquidity level of marketplaces & is defined as the ratio of traded volumes to physical gas deliveries after trades

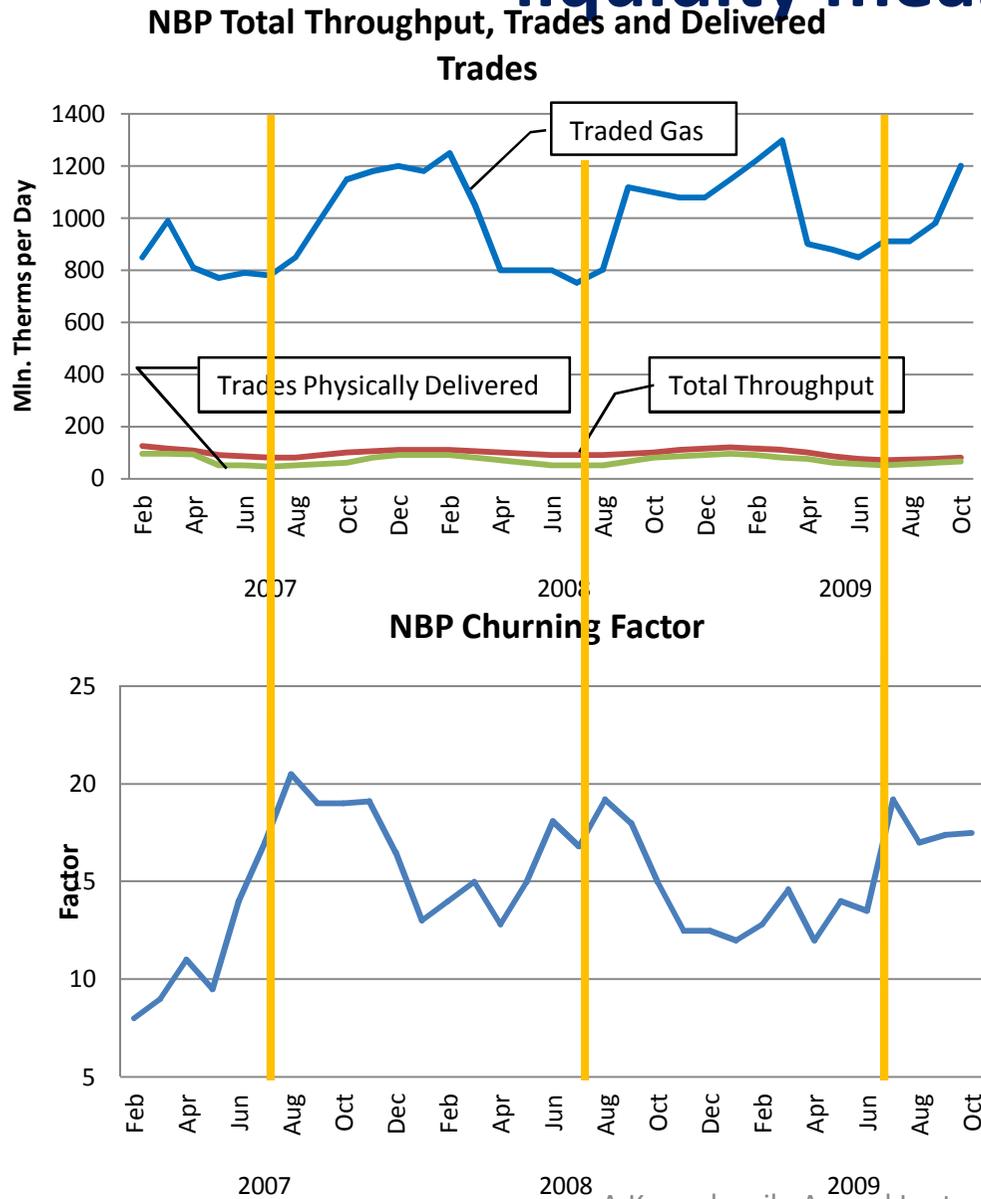
Source: "Gas Matters", IHS-CERA, M.Kanai (ECS)

Churn ratio at UK NBP (gas) & at major petroleum exchanges



Source: "Gas Matters" for corresponding years, WTI/ICE – M.Kanai estimate (ECS)

Churn ratio: the best available, but controversial liquidity measurement



Churn cyclical (?) trend :

- the **highest** churn ratios (within its cycle?) refer to **lowest** volumes of physical & traded volumes within the seasonal trade/supply cycle
- summer **low** traded/physical supplies volumes corresponds to **highest** churn ratios, though
- theoretical concepts of liquid markets consider that the higher is the trade turn-over, the higher is the liquidity level of this marketplace – the higher is churn ratio to be
- churn: whether it could be an easy-to-manipulate, but not necessarily a true measurement ?

Gas pricing: price indexation vs. spot/futures pricing – pros & contras (1)

Price indexation	Spot/futures pricing
Long-term stable non-interruptible gas supply with minimum costs & risks for both LTGEC parties => maximum marketable resource rent	Maximization of profit short-term => to earn on price fluctuations => maximum price fluctuations
Physical gas market => non-liquid, but more stable	Paper gas market => liquid, but less stable
Hedgers => mostly producers / traders of physical gas => limited & stable spectrum of participants	Speculators => mostly traders of gas contracts => inflow / outflow of financial players => open & unstable spectrum of participants

Gas pricing: price indexation vs. spot/futures pricing – pros & contras (2)

Price indexation	Spot/futures pricing
Predictable contract prices => based on stable contractual formulas	Unpredictable spot prices & forward curves since based on frequently changing perceptions of global financial market players
Transparent formula & price review mechanisms <i>though</i> actual price not available to public immediately: (i) price calculated as function of formula ingredients, (ii) LTGEC confidentiality clauses	Transparent & immediate result (price quotations) <i>but</i> non-transparent & unclear decision-making mechanism on price levels (based on perceptions of big & unstable amount of players)

Gas pricing: price indexation vs. spot/futures pricing – pros & contras (3)

Price indexation	Spot/futures pricing
Impossible to manipulate – fixed formula & contractual clauses; adaptation on bilateral basis within legally-binding procedure	Possibility to manipulate: (i) by direct price-manipulations, (ii) by influencing on expectations (perceptions) of market players
To soften price-peaks (narrow corridor of price fluctuations) => to stabilize gas market	To amplify price-peaks (expand corridor of price fluctuations) => to destabilize gas market

Results of J.Stern's FLAME polls on expected time of gas price decoupling from oil prices

Table 1: When do you expect European long term contract gas prices will become decoupled from oil and determined by spot and futures prices? (% of total)

YEAR OF CONFERENCE POLL:	2004	2005	2008	2009
Before end 2010 	24	15	8.7	3.8
Before end 2015 	<u>36</u>	15	22.1	20.3
Later than 2015 	15	<u>39</u>	<u>42.5</u>	<u>44.3</u>
Never 	24	31	28.8	31.6

Source: FLAME Conference for respective years

Source: J.Stern. Continental European Long-Term Gas Contracts: is a transition away from oil product-linked pricing inevitable and imminent?, OIES, NG34, September 2009, p.5

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Evolution/adaptation of gas pricing & contractual mechanisms in Europe: two main options

- **Option 1:** to substitute gas price indexation in LTGECs by spot/futures quotations => **NO**
- **Option 2:** to adapt mostly oil-linked gas price indexation in LTGEC by pricing formulas linked to broader spectrum of parameters & non-oil gas replacement values => **YES** (long-term capacity allocation *must* be available to exclude contractual mismatch problems - supply vs. transportation):
 - **Long-term supplies (basic/base-load) :** more flexible LTGEC (n x 1 year) + “modified” gas replacement value formulas (price indexation *not* limited to oil-pegging);
 - **Short-term supplies (supplementary/peak- & semi-peak load) :** short-term (< 1 year)/spot contracts + futures quotations