Gas Market Indexation in Europe - Movement Away from Oil towards Gas?

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- Long-term gas export contracts (LTGEC) formula pricing or spot/futures as preferred type of gas pricing in Europe:
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Three key gas pricing mechanisms worldwide

- **Cost-plus (net-forward) pricing:**
  - Ricardian rent (long-term difference between costs & marginal costs => utilized at physical market)
- **(Net-back) replacement-value-based pricing:**
  - Ricardian rent *plus*
  - Hotelling rent (long-term difference between marginal cost & replacement value of competing fuel(s) => utilized at physical market)
- **Exchange (commodities) pricing (futures / options):**
  - Ricardian rent *plus*
  - Hotelling rent *plus/minus*
  - Windfall profits/losses (to cover short-term supply/demand imbalances; difference between supply/demand "equilibrium" price & replacement value => utilized at paper market)

Non-renewable energy pricing: economic & legal background

- Resource owning state: to maximize long-term resource rent => Sovereign right of exporter/resource-owning state to sell gas to export market with highest replacement value (USSR/Russia => EU)
  - Economic basis: Groningen concept of LTGEC (1962) = long-term contract + pricing formula linked to gas replacement values (prices of replacing fuels within competitive energy market) + price review (+ net-back to delivery point) => to market gas within evolving market structure & competitive pricing environment to the mutual benefit of both producer & consumer
  - Legal basis: UNGA Res.1803 (1962) + ECT Art.18 (1994/98) = (permanent) state sovereignty on natural/energy resources

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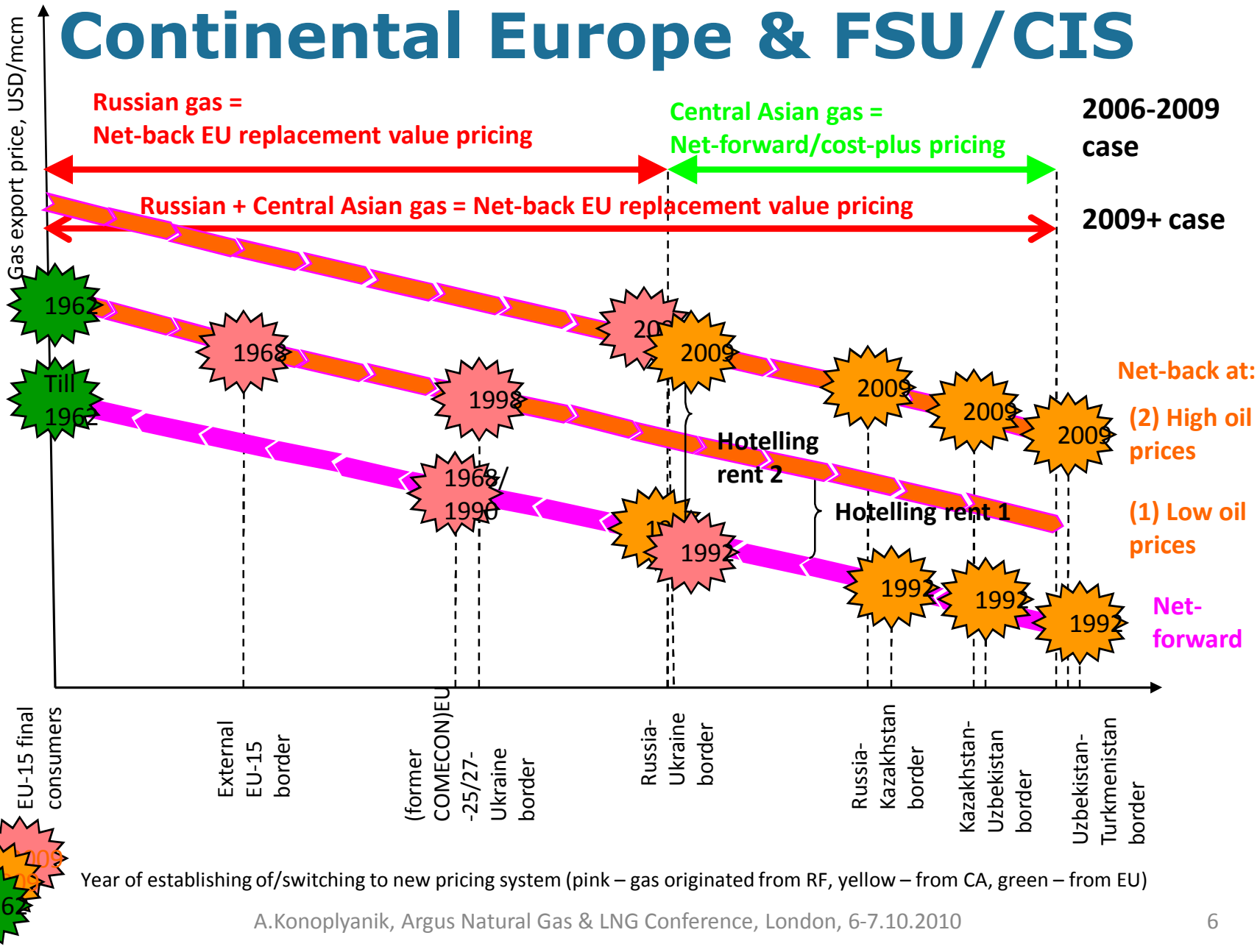
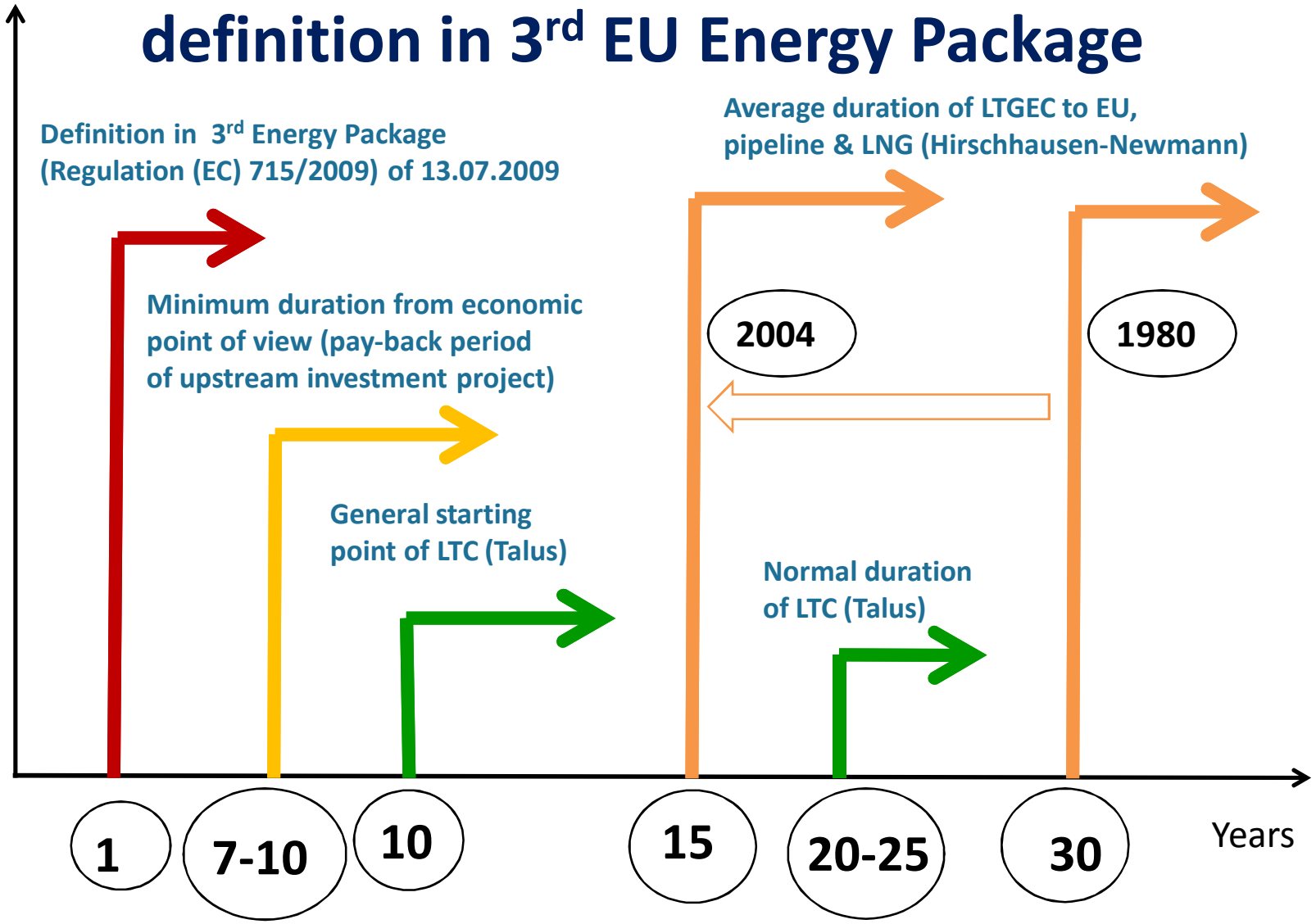
Evolution of gas export pricing in Continental Europe & FSU/CIS



“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

P.Voser/RD-Shell: role of LTC in different regions

- 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.

Source: Peter Voser, CEO Royal Dutch Shell, "Vedomosti", 14.07.2010

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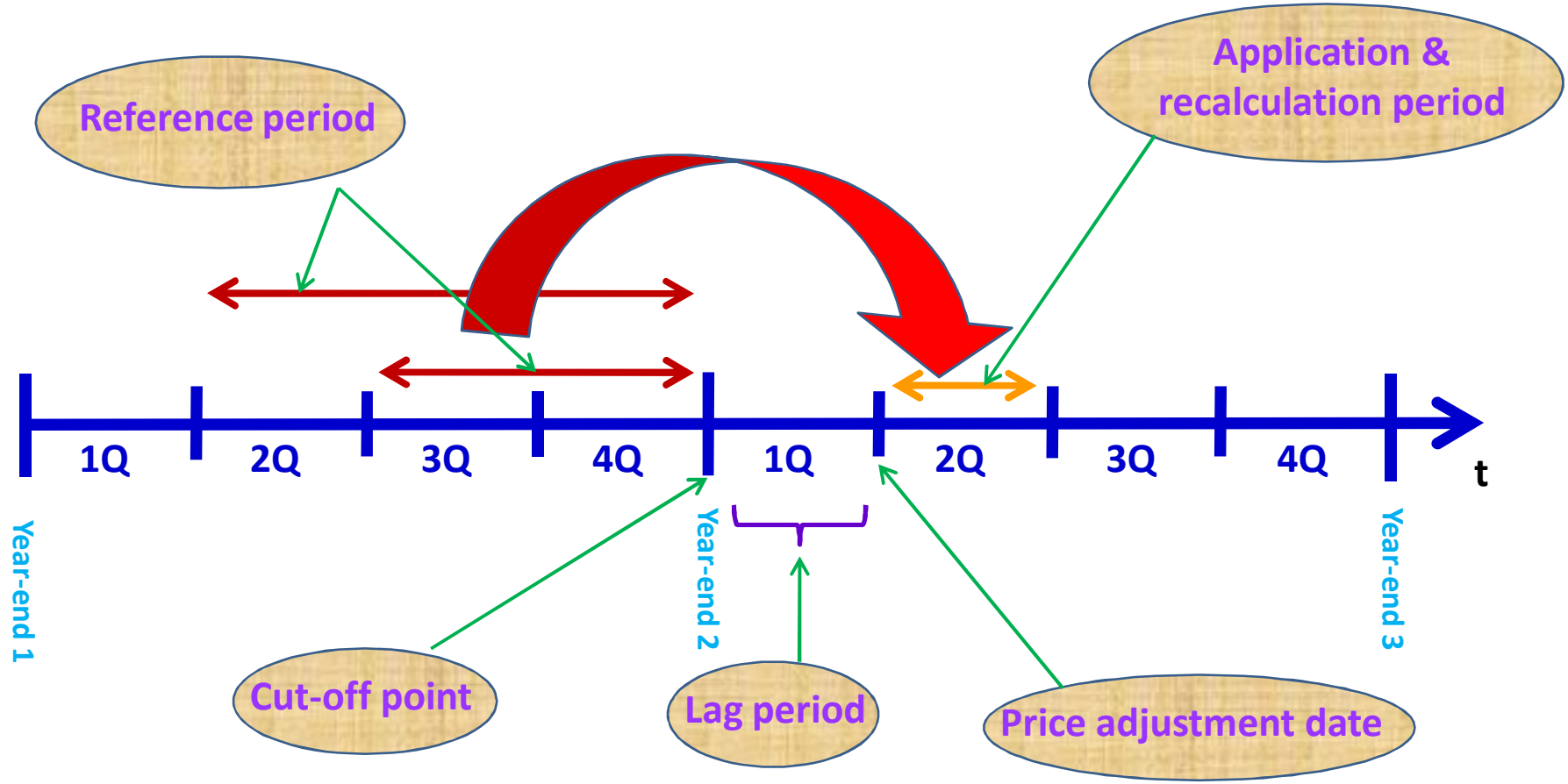
LTGEC price recalculation mechanism



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

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

Pm = **[Po]**
+ [0.60] x [0.80] x 0.0078 x (LFOm - LFOo) {***growth***/*fall*}
+ [0.40] x [0.90] x 0.0076 x (HFOm -HFOo) {*growth*/***fall***}

\+ [… (coal)] {***growth***/*fall*}
\+ [… (electricity)] {***growth***/*fall*}
\+ [… (gas-to-gas competition)] {***growth***/*fall*}

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 cjmpeting 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,

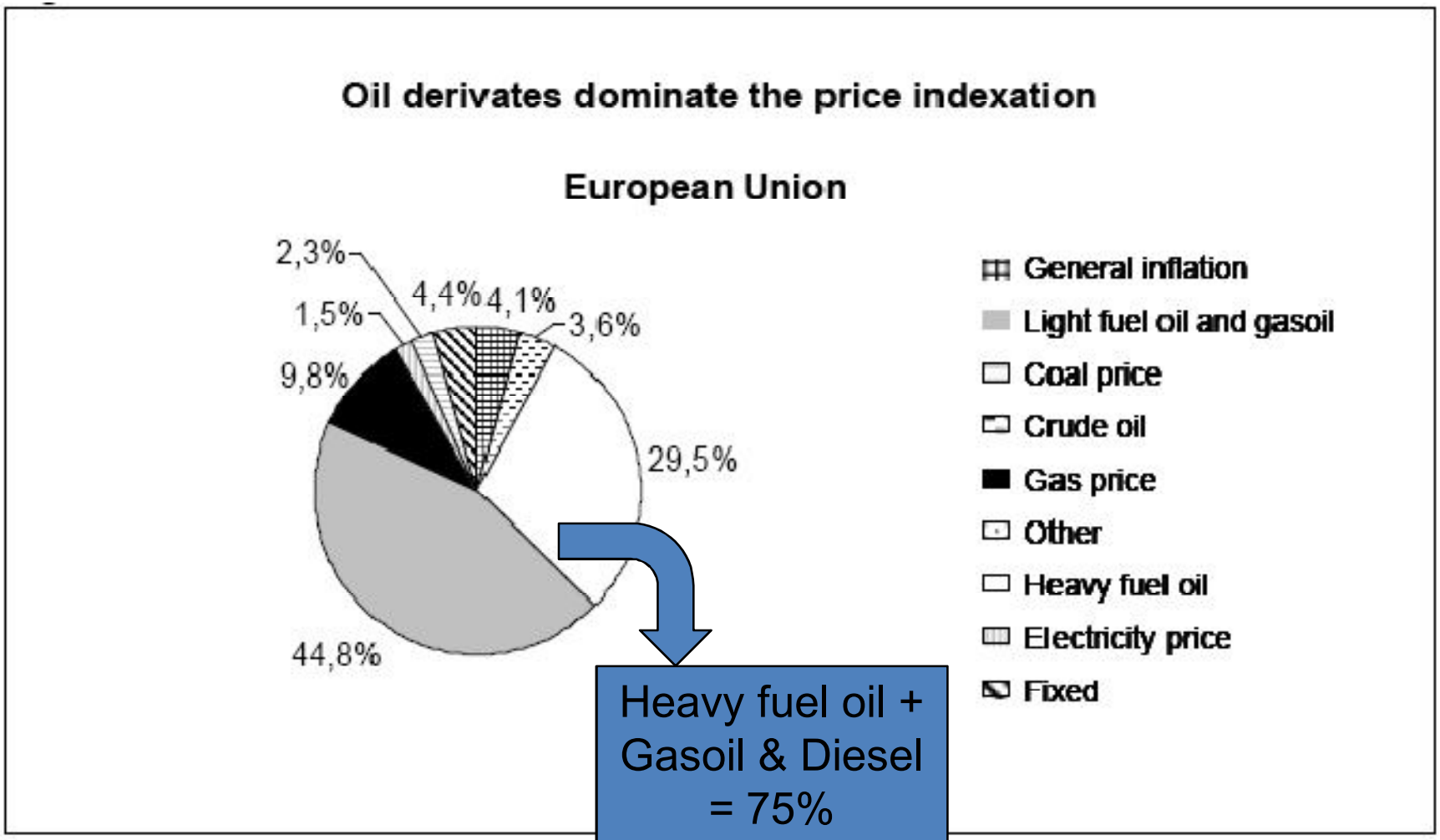
but

Gasoil/diesel & RFO still dominate in LTGEC pricing formulaes

Replacement value concept: gas price indexation formulae possible ingredients

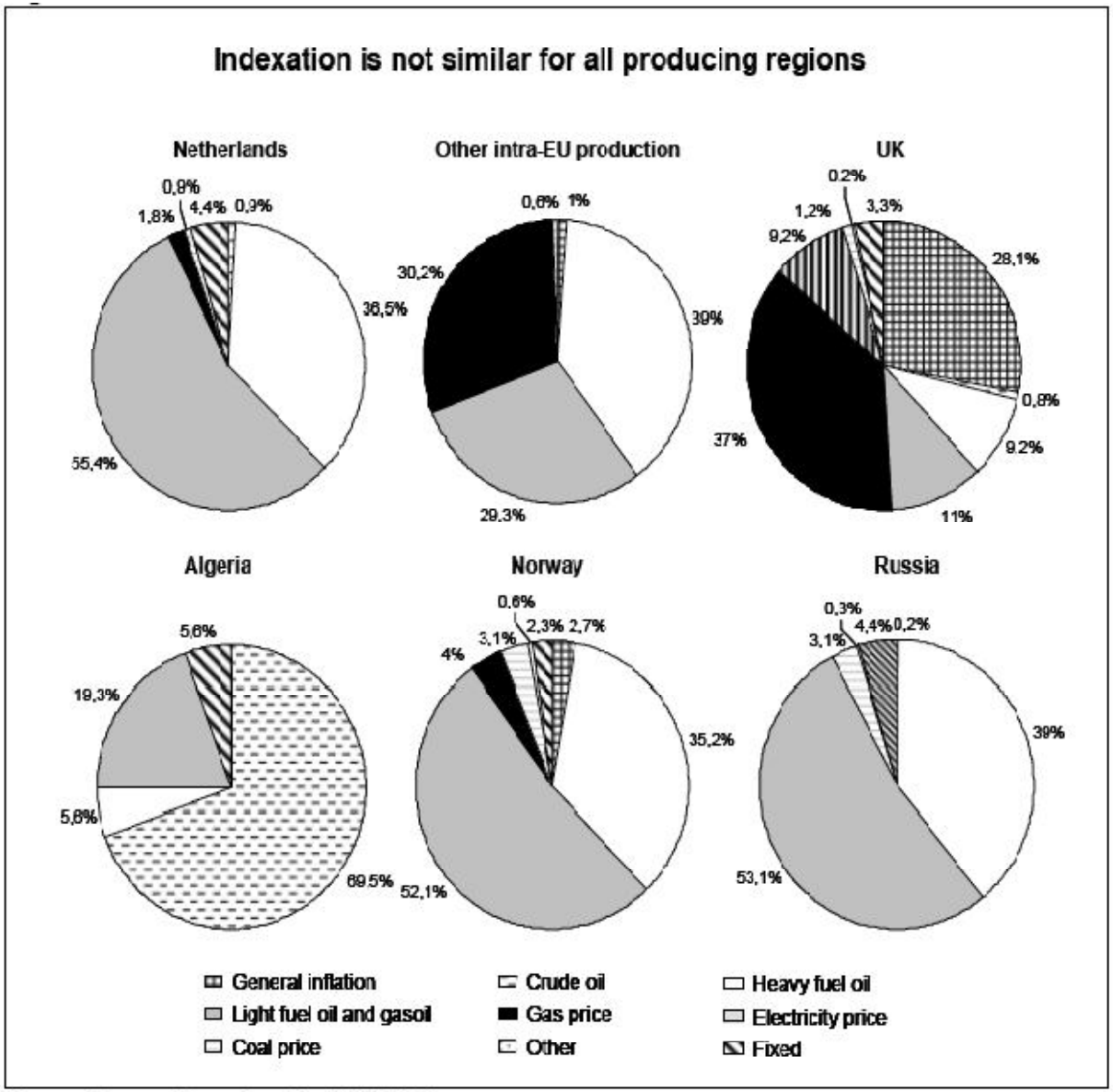
	Electricity generation	Industry	Households
Crude oil prices	Yes / history (Japan, few other importers)	Yes / history (Japan, few other importers)	No
Oil product prices	Yes (RFO / HFO)	Yes (RFO / HFO)	Yes (Gasoil / Diesel / LFO)
Electricity prices	Yes (primary / NRES)	Yes	Yes
Coal prices	Yes	Yes	Yes (minor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

Price indexation structure in the EU



Source: Energy Sector Inquiry 2005/2006

LTGEC in the EU: Indexation by Producer

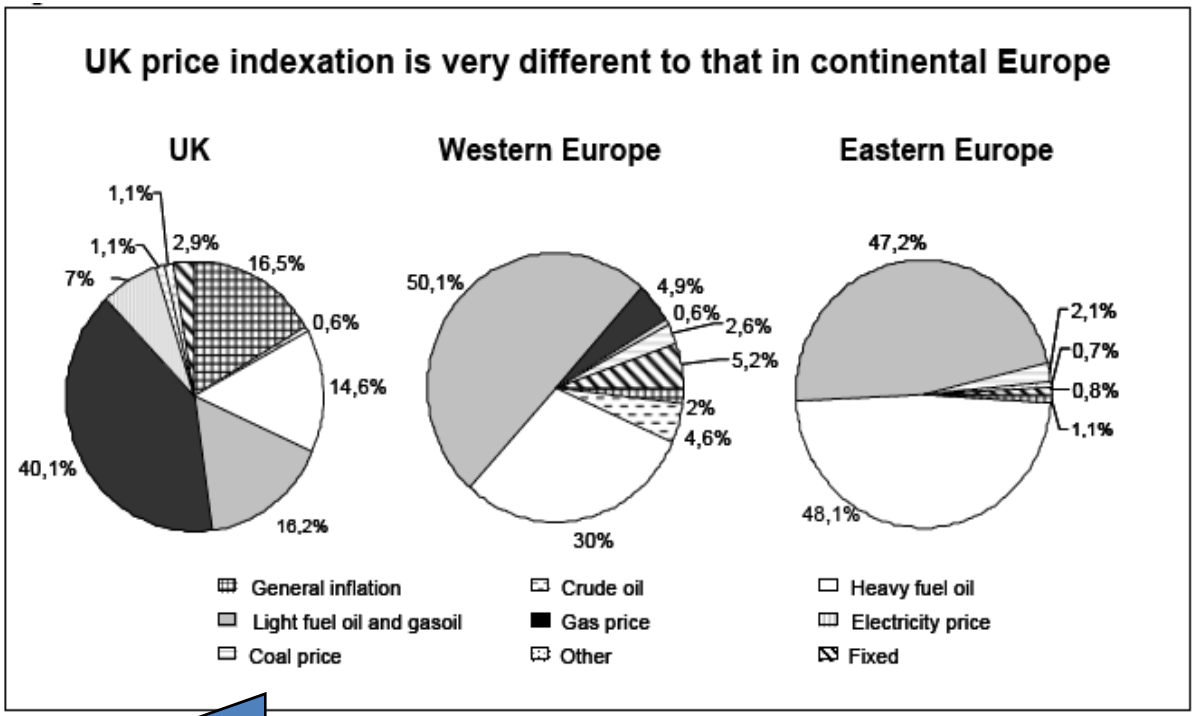


Source: Energy Sector Inquiry 2005/2006

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

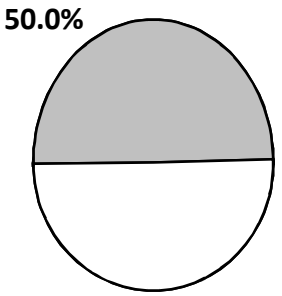
Major gas exporters to the EU: mostly oil indexation

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

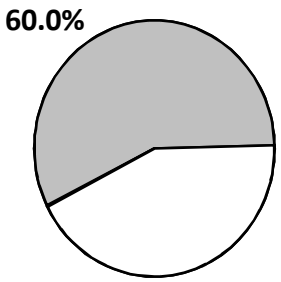


Source: Energy Economics Group, Review 2005/2006

Russia-Ukraine LTGEC (2009-2019)



Basic Groningen LTGEC model (since 1962)



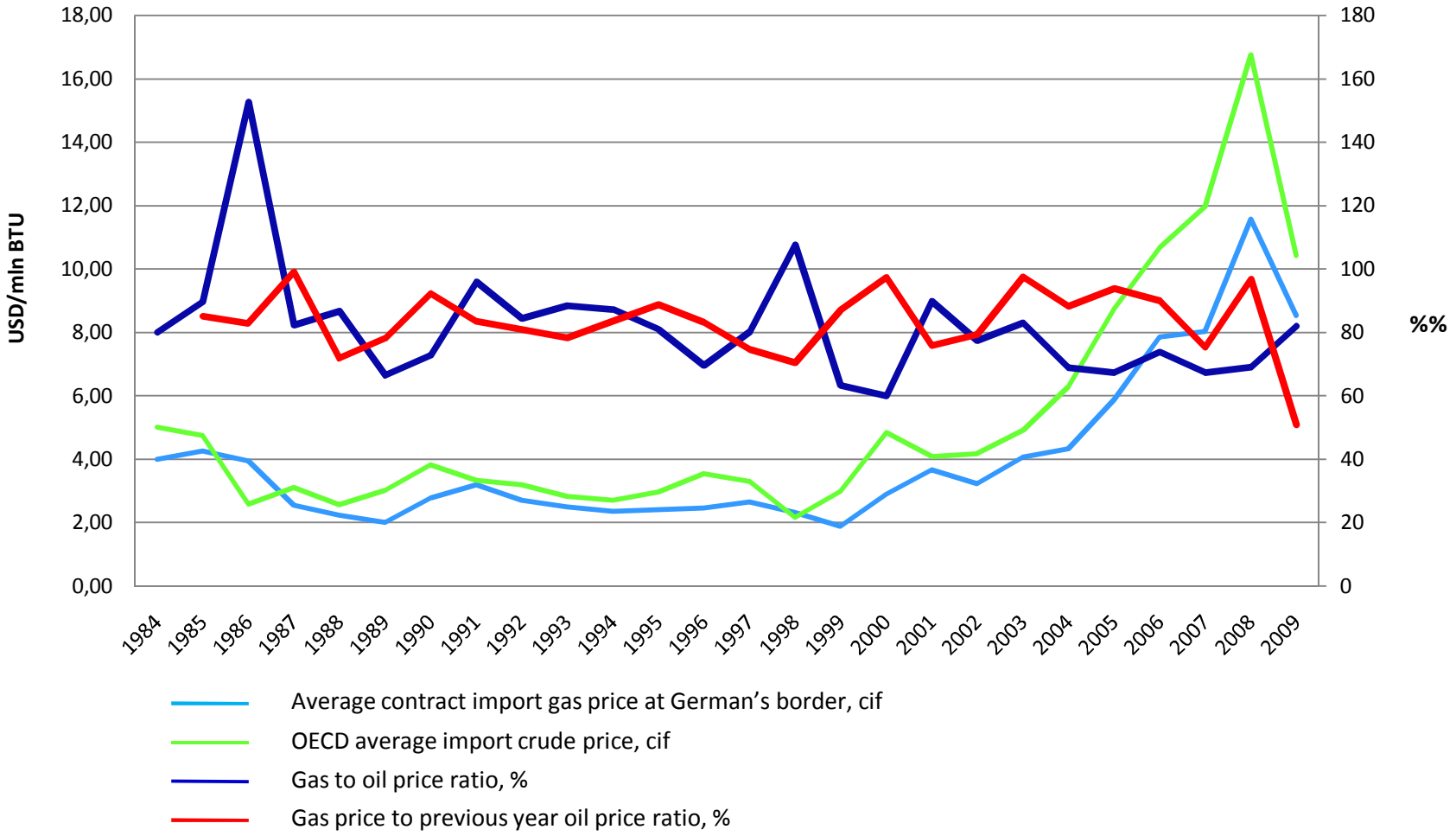
Evolution of LTGEC pricing formula structure: **from more simple to more complicated**

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

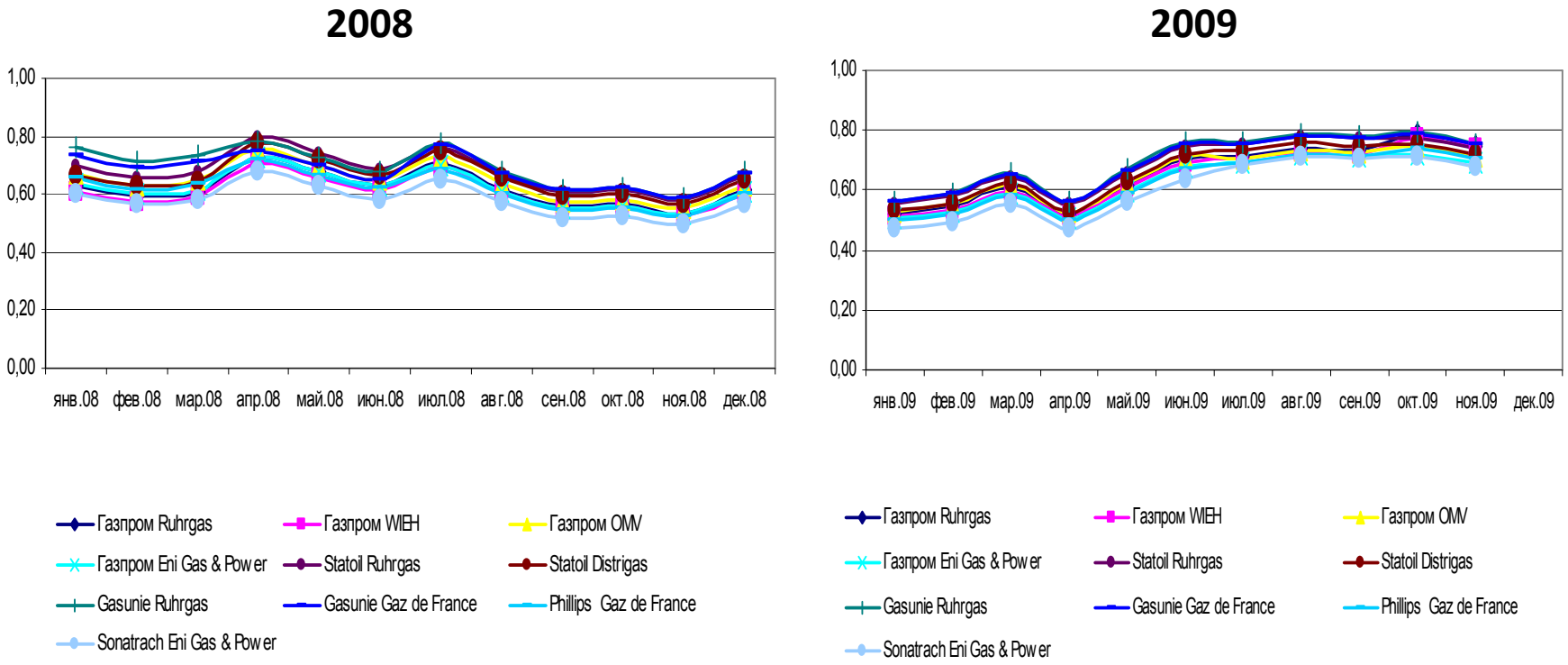
=> away from oil parity?

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



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

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

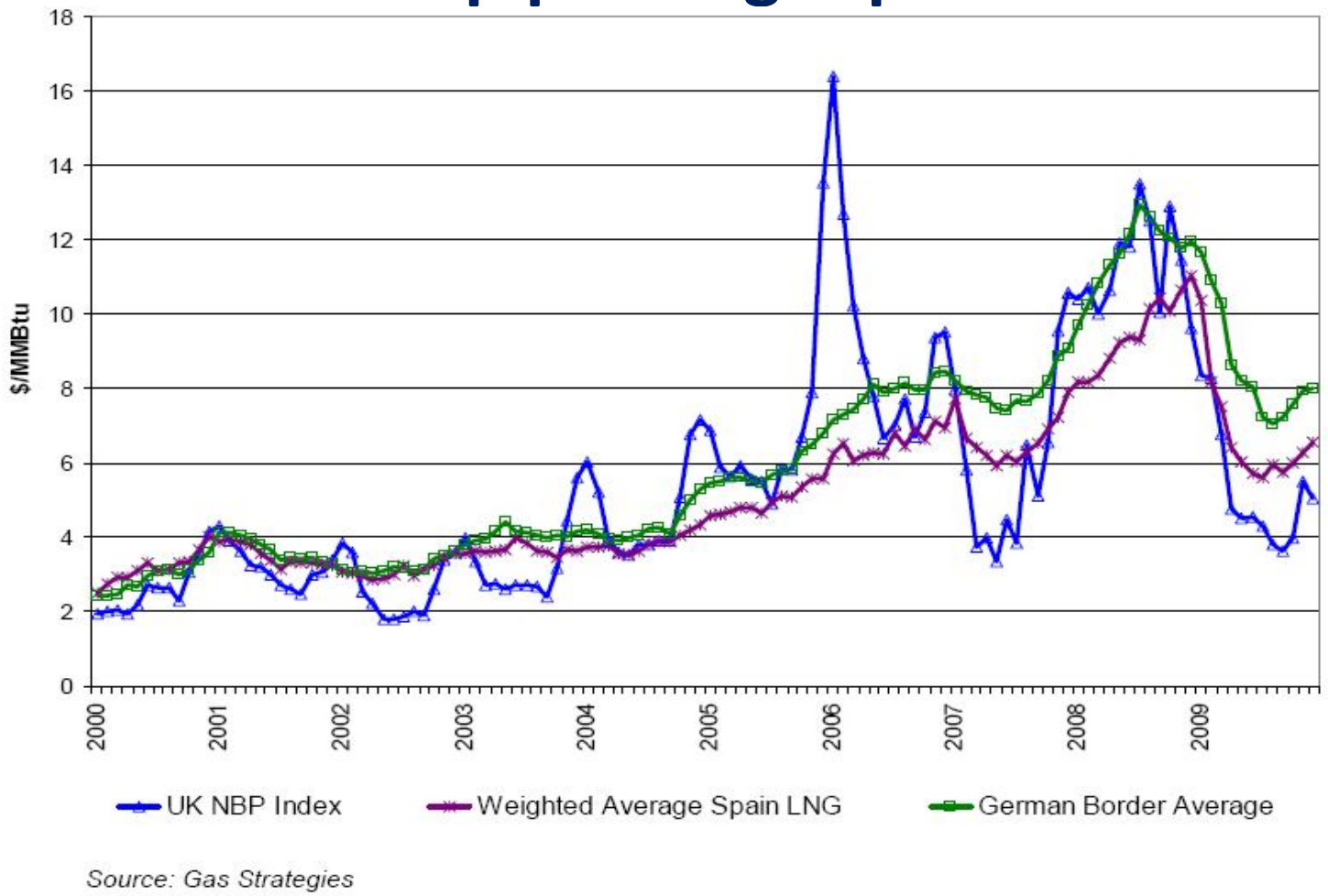


Source: В.Фейгин, В.Ревенков. Природный газ в международной торговле: совершенствование традиционных методов ценообразования и новые подходы. Международном научном семинаре “Современные рынки природного газа: барьеры и стимулы развития”, Москва, РГУ нефти и газа им. И.М.Губкина, 24 ноября 2009 г.

LTGEC oil indexation formulae tendencies

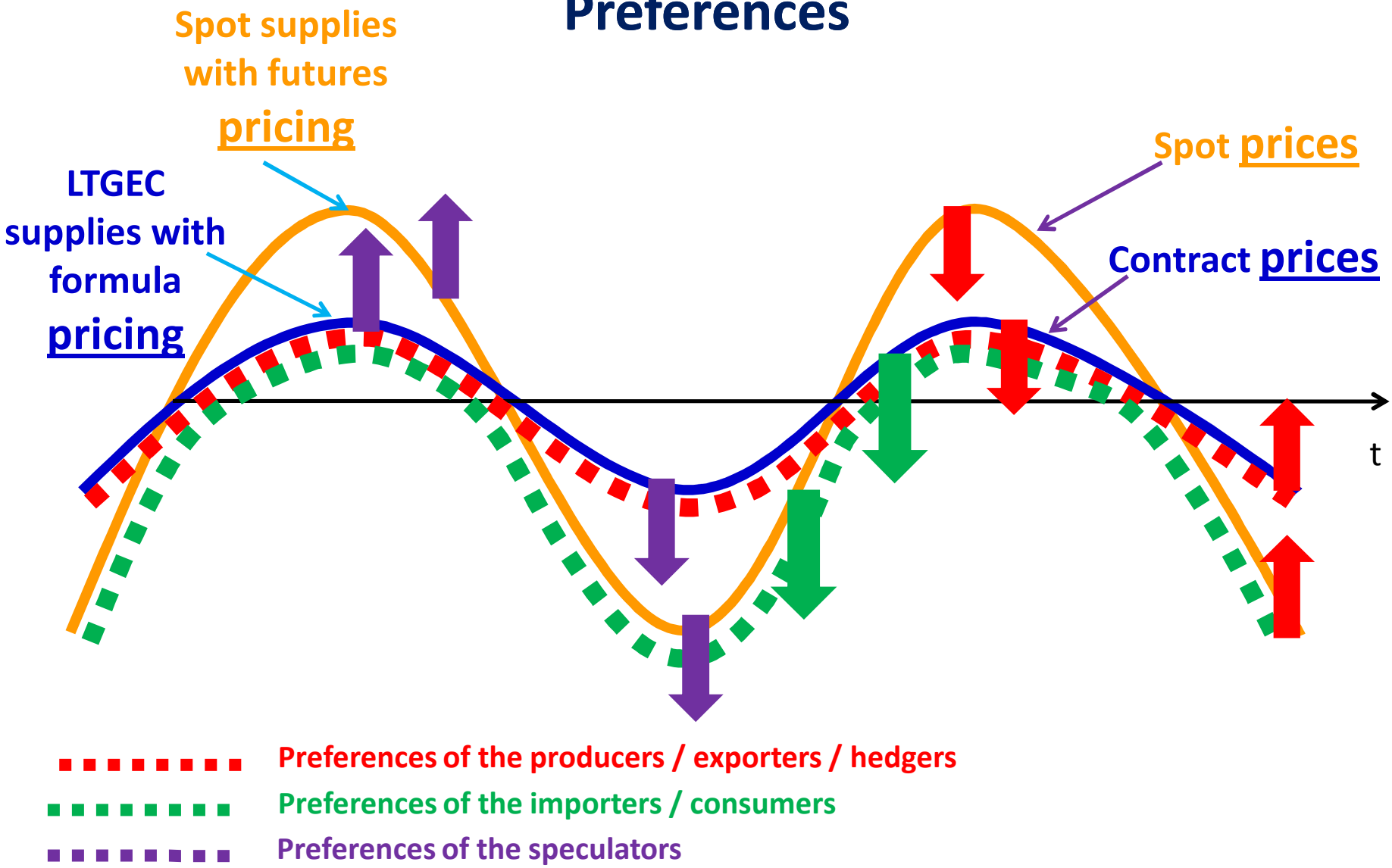
- Beginning of LTGEC (early 1960-ies): gas replacement value is based on oil parity
- After 1970-ies: oil parity formulae remains in LTGECs, but gas replacement value deviates away from oil parity
- Nevertheless (???):
  - Gazprom's continuous statements in support of "oil parity" (as stabilization factor of gas prices),
  - GECF Declaration of 19.04.2010 in support of "oil parity"

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



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>

Producers, Consumers & Speculators Price/Pricing Preferences



A.Konoplyanik, Argus Natural Gas & LNG Conference, London, 6-7.10.2010

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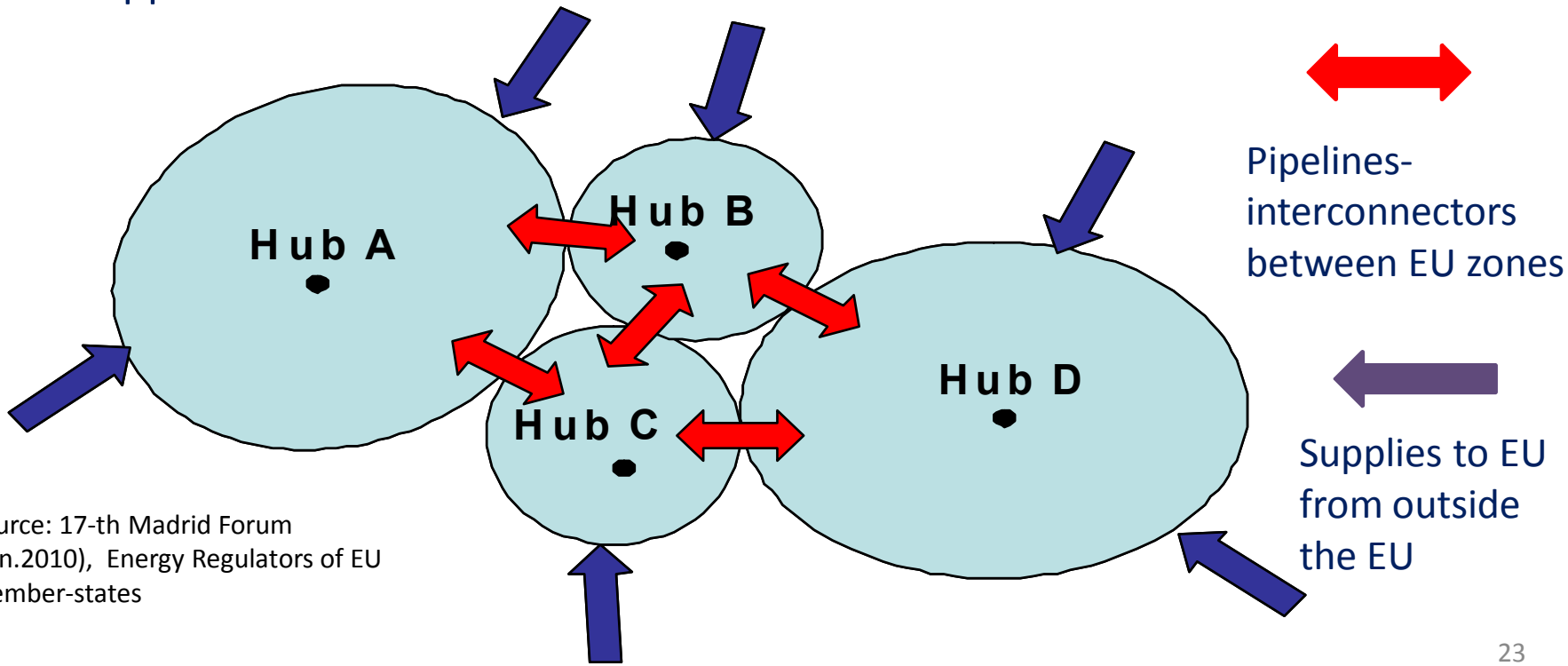
Future architecture of common internal EU gas market according to Third EU Energy Package

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:

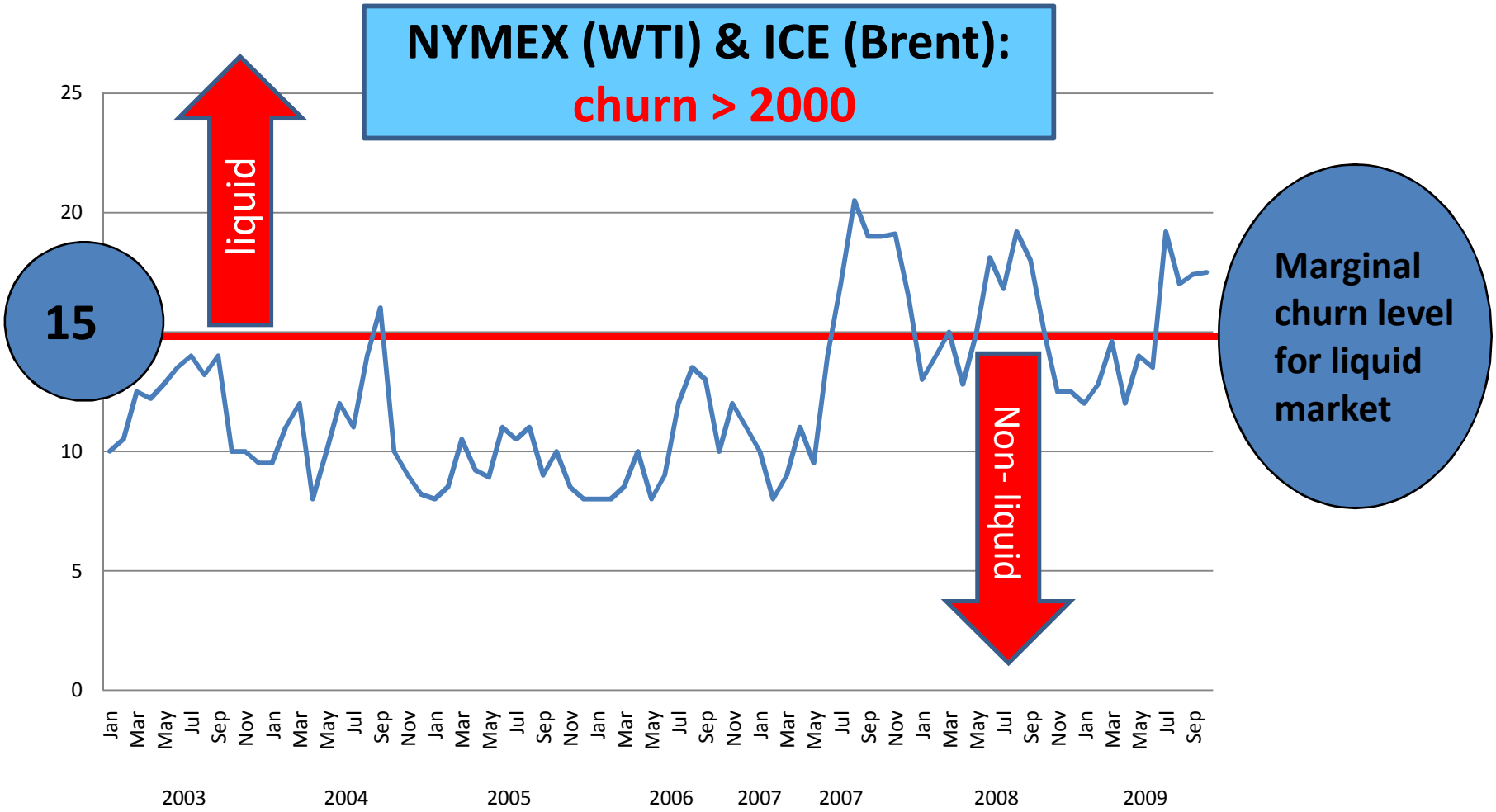
- **USA (oil):** NYMEX (WTI) (Feb.2010) **1680-2240**
- **UK (oil):** ICE (Brent) (Feb.2010) **2014**
- **USA (gas):** NYMEX Henry Hub (av.2009) **377**

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

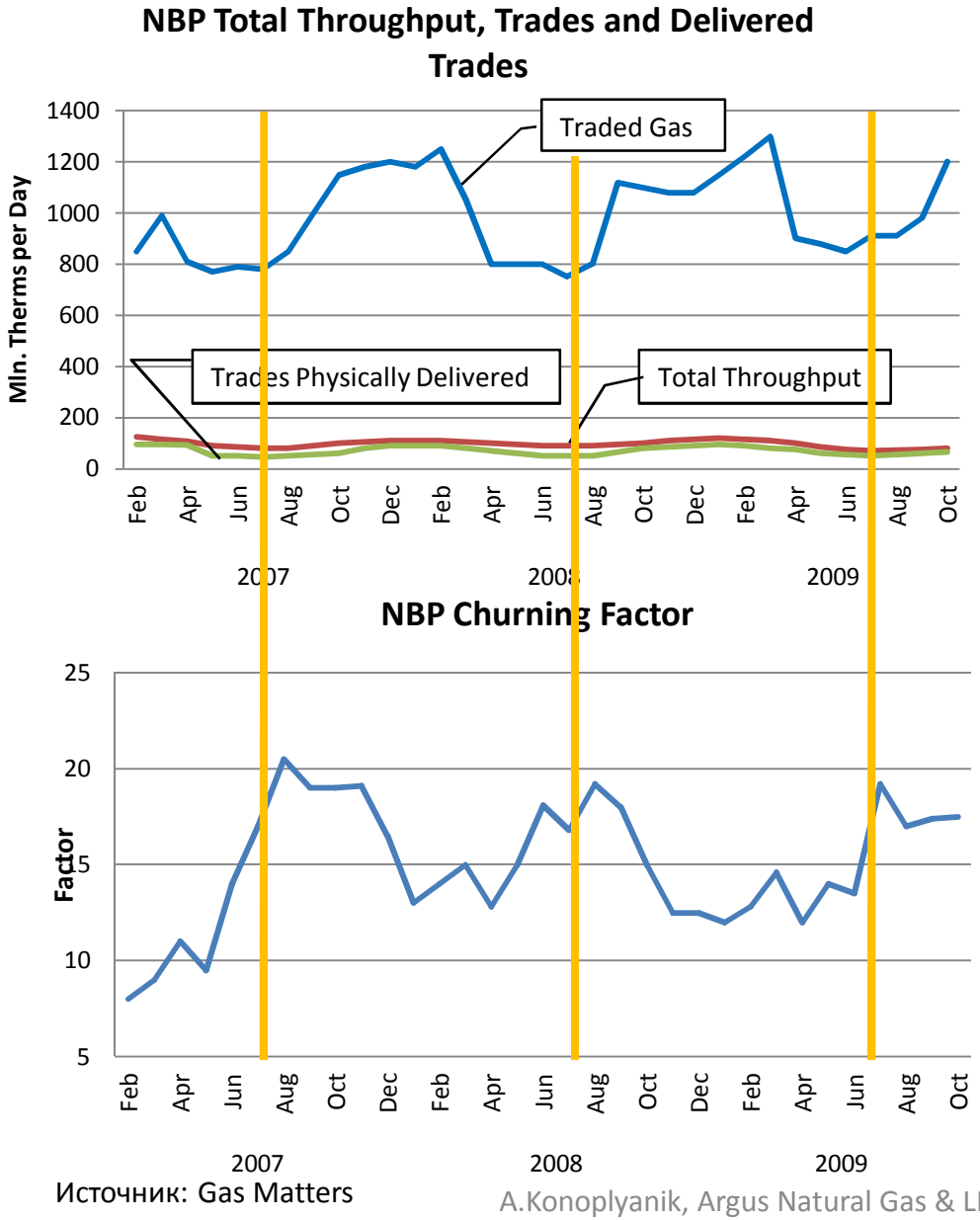
Source: "Gas Matters", IHS-CERA, M.Kanai (ECS)

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



Источник: Gas Matters

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 ?

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

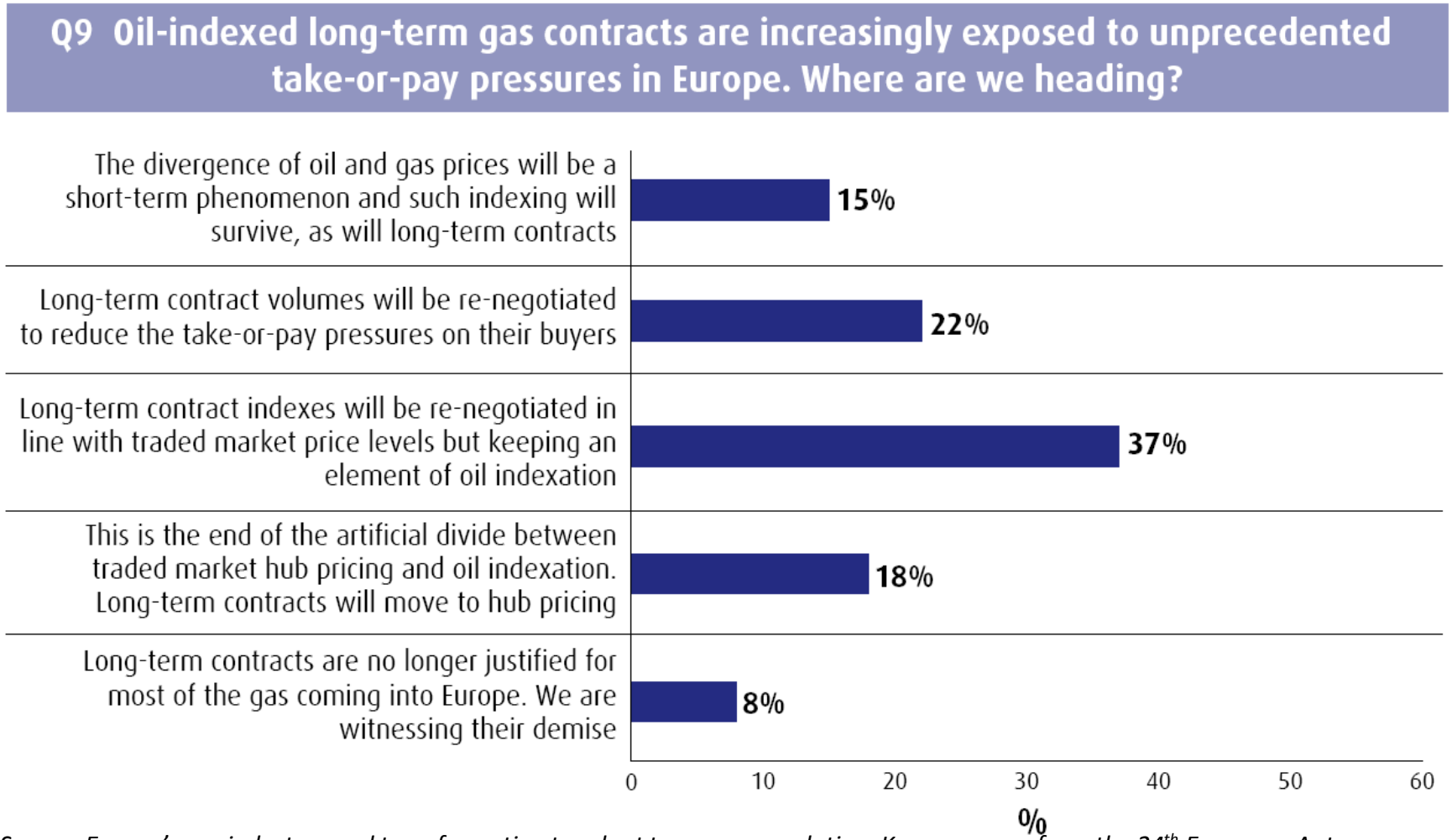
Table 1: When do you expect European long tern contract gas prices will become decoupled from oil and determined by spot and futures prices? (% of total)

YEAR OF CONFERENCE POLL:	2004	2005	2008	2009
Before end 2010 ↘	24	15	8.7	3.8
Before end 2015 ↘	36	15	22.1	20.3
Later than 2015 ↗	15	39	42.5	44.3
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

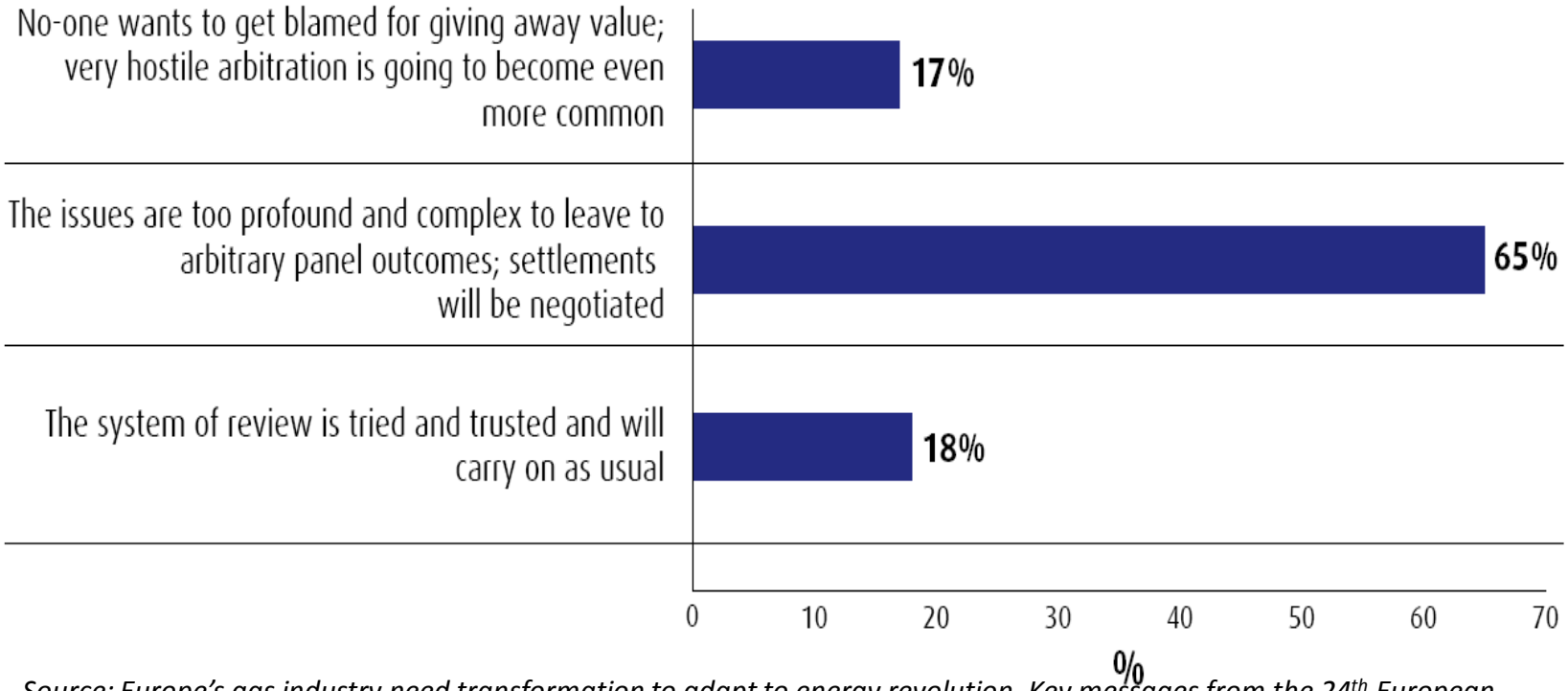
Future of LTGEC: industry view



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.

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)
- Maneouvre 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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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