

Gas pricing trends in Europe and its consequences for Russia-Ukraine gas trade (spot vs. long-term indexation-based pricing)

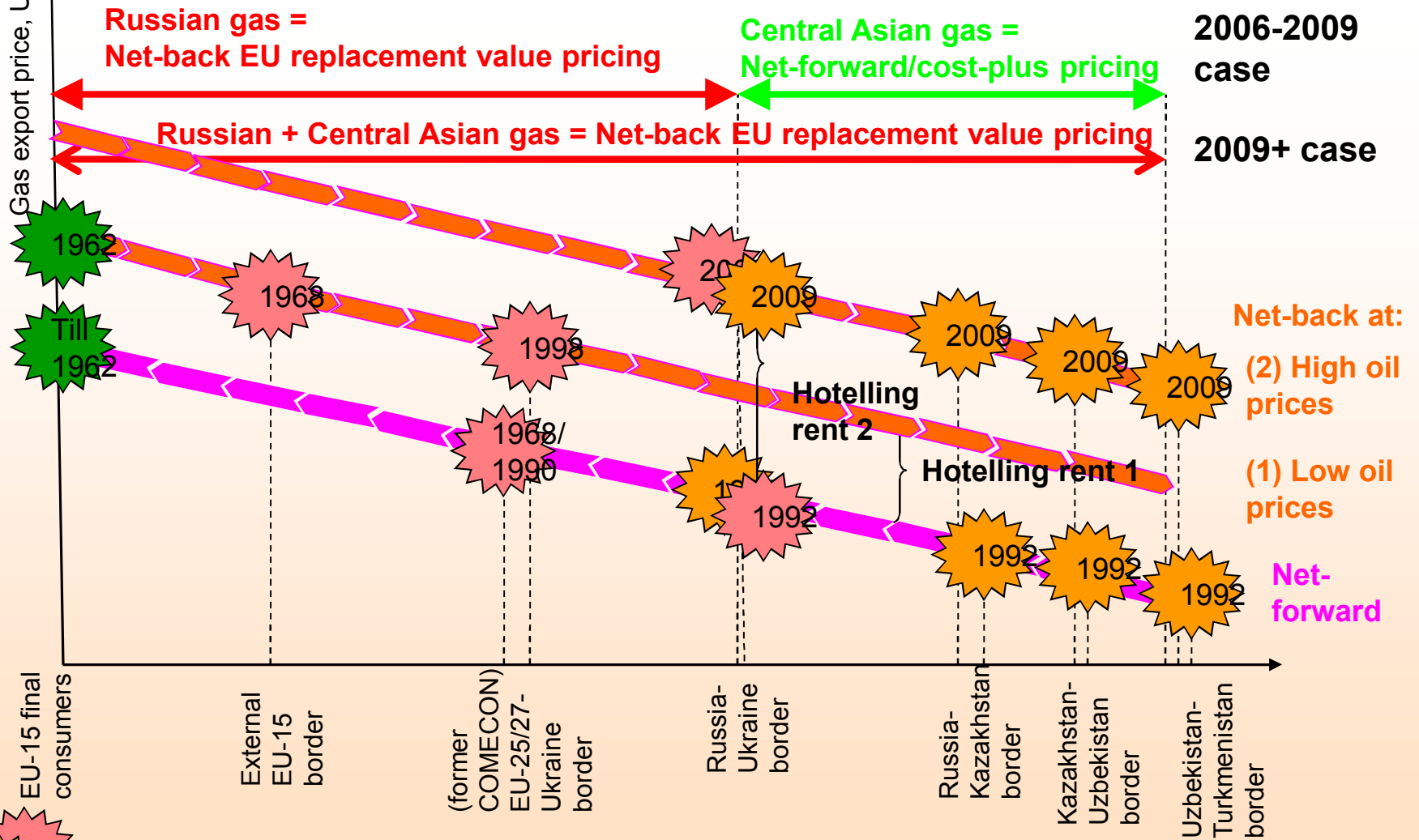
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**Presentation at the WIEN (World Independent Energy Network) Round Table
"ENERGY ISSUES IN EUROPE AND RUSSIA-UKRAINE COOPERATION",
06.12.2010, Kiev, Ukraine**

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- **Evolution of gas pricing in Europe and CIS: 1962-2010**
- Long-term gas export contracts (LTGEC) formula pricing or spot/futures as preferred type of gas pricing in Europe:
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 - Spot/futures pricing
- Future roles of LTGEC: adaptation in line with gas market developments
- Future pricing and contractual developments at European gas market

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



1962
Till 1962

Year of establishing of/switching to new pricing system (pink – gas originated from RF, yellow – from CA, green – from EU)

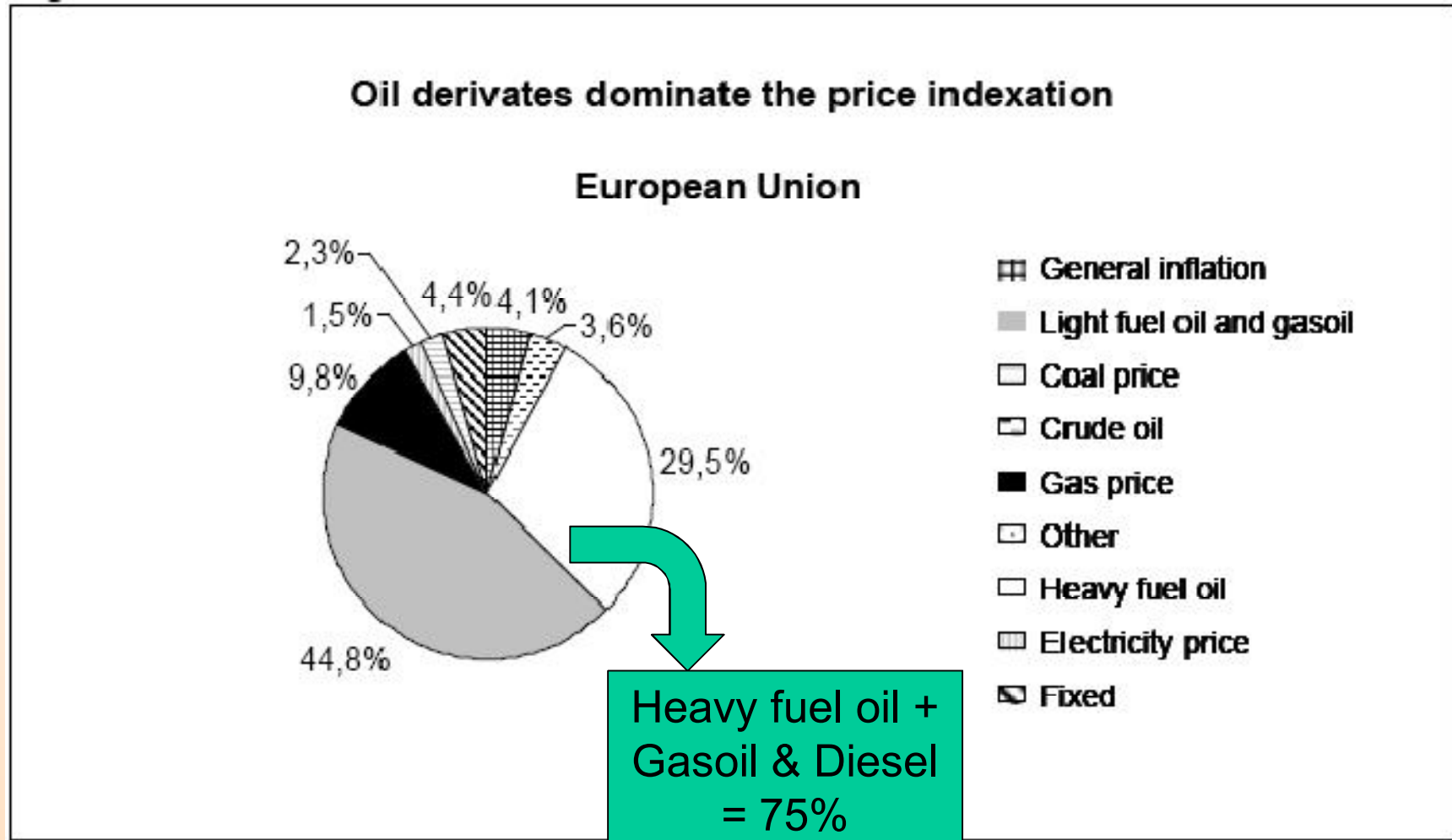
Origin of discounted prices of Soviet/Russian gas for Ukraine

- **Prior to 1992:** internal USSR price based on cost-plus (cost-minus)
- **1992-2005:** discounted political price based on cost-plus principle for most of FSU (while export to EU based on net-back replacement value principle); all discounts provided by both Russia and Central Asia
- **2006-2008:** discounted semi-political price based on combined effect of (a) net-back replacement value (from EU end-use) pricing for gas originated from Russia and (b) cost-plus pricing for gas originated from Central Asia; two flows of gas merged at the balance sheets of RUE providing discounted weighted average import price for Ukraine; all discounts provided by Central Asia only
- **2009:** 20% discount to net-back replacement value (from EU end-use) pricing for all gas volumes imported by Ukraine; all discounts provided by Russia only
- **2010-2019:** up to 30% discount (up to 100 USD/mcm) to net-back replacement value (from EU end-use) pricing for all gas volumes imported by Ukraine; all discounts provided by Russia only

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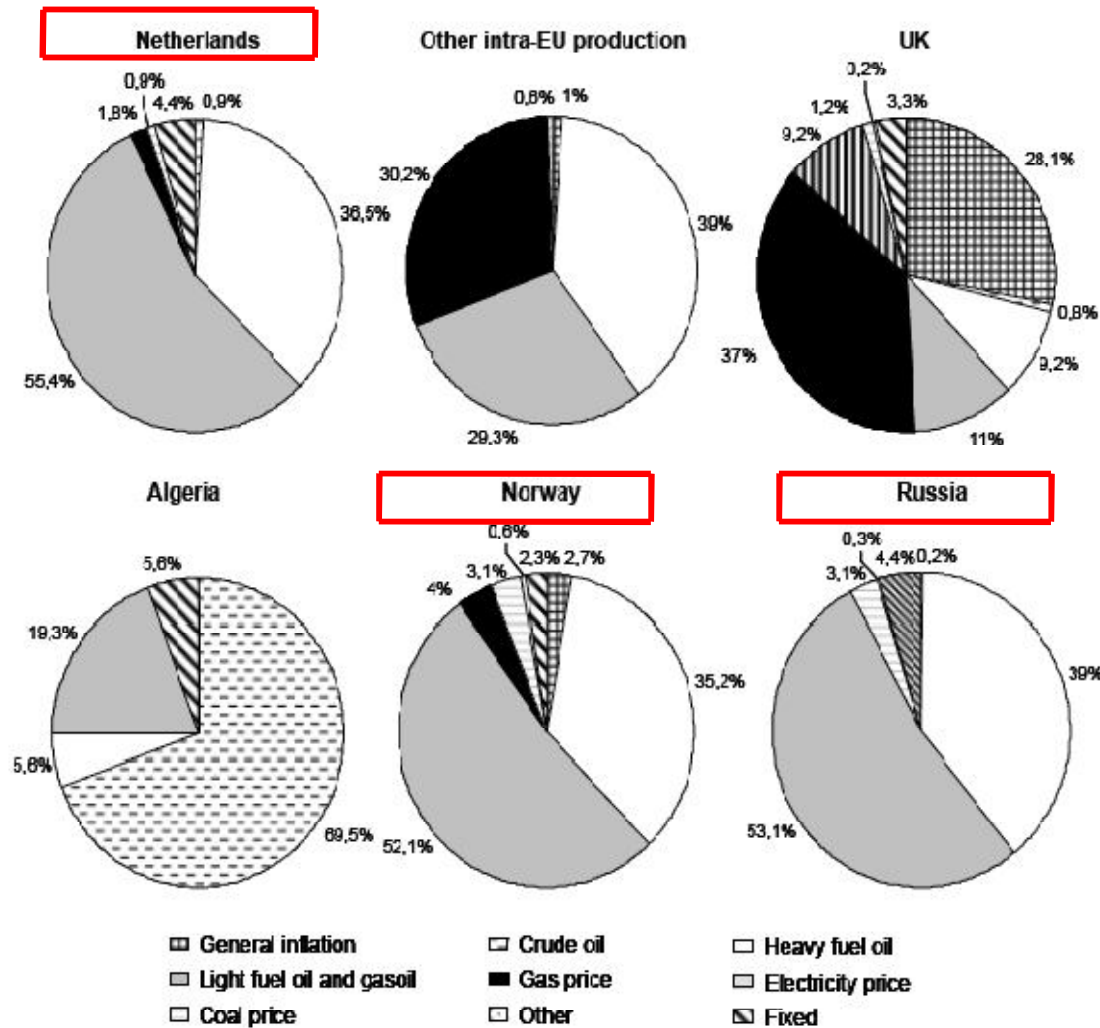
Price indexation structure in the EU



Source: Energy Sector Inquiry 2005/2006

LTGEC in the EU: Indexation by Producer

Indexation is not similar for all producing regions



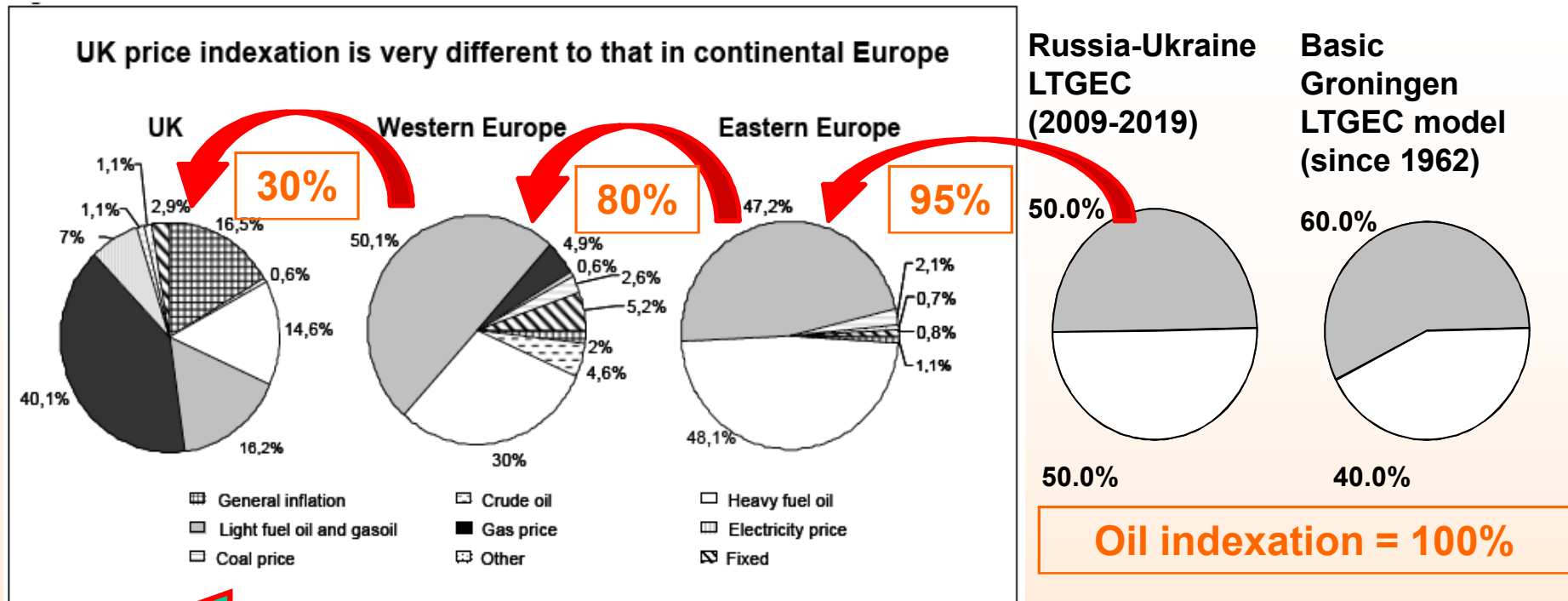
Netherlands, Norway, Russia:
 HFO = 35-39%;
 diesel & gasoil = 52-55%;
 Sum-total HFO+ Diesel & Gasoil:
Netherlands = 92%,
Norway = 87%,
Russia = 92%



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



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?**

LTGEC oil indexation formulae tendencies

- Beginning of LTGEC (**early 1960-ies**): gas replacement value is based on oil-indexation & below oil parity
- **After 1970-ies**: oil-indexation formulae remains in LTGECs (gas/oil price = 0.6-0.8), but gas replacement value deviates further away from oil parity due to diminishing role of oil indexation in the formulae
- Nevertheless (???):
 - Gazprom's continuous statements in support of oil indexation (as stabilization factor of gas prices) & "oil parity" (in USD/BTU terms)
 - GECF Ministerial Declarations of 19.04.2010 & 02.12.2010 in support of "oil parity" (in USD/BTU terms)
 - Most recent: "...general opinion is that gas is underpriced today, gas price does not correlate to its investment costs. US spot price is 4 USD/mmBTU, in UK – about 6 USD. Brent price is about 14 USD/mmBTU. Compared to oil, gas price is to be at least 2-3 times higher" (Bokhanovsky (GECF SG), "Izvestiya", 03.12.2010).

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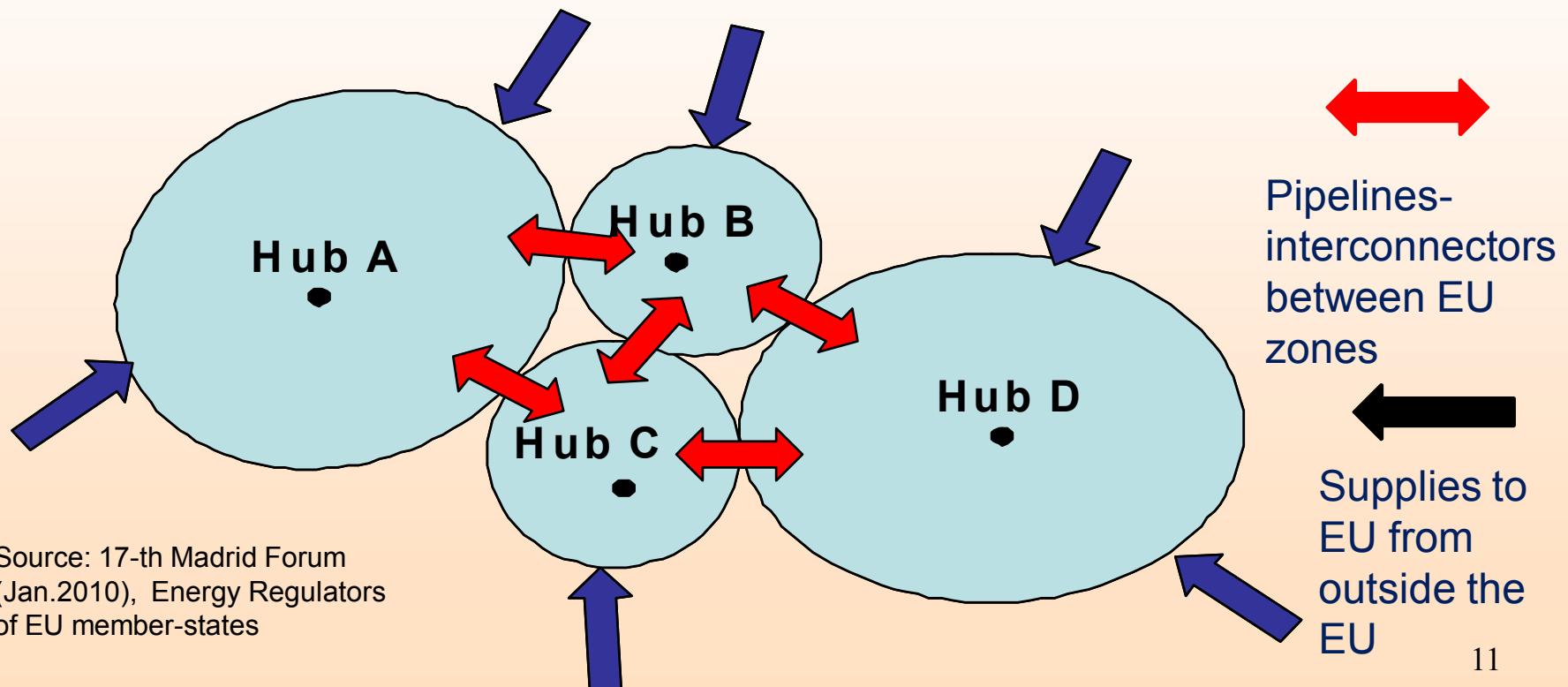
Future architecture of common internal EU gas market according to Third EU Energy Package

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? When gas hubs will become liquid?



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

A.Konoplyanik, WIEN Round Table, 06.12.2010, Kiev, Ukraine

Liquidity of European gas hubs (churn ratio)

	2007	2008	2009
United Kingdom: National Balancing Point (NBP)	13.5	14.4	14.5
Belgium: Zeebrugge (ZEE)	5.1	5.0	5.0
Austria: Central European Gas Hub (CEGH)	2.6	2.9	3.0
Netherlands: Title Transfer Facility (TTF)	3.7	3.2	3.0
Italy: Punto di Scambio Virtuale (PSV)	1.7	2.0	2.1
Germany: NetConnect Germany (NCG, EGT prior 2009)	1.6	1.8	2.1
Germany: GASPOOL (BEB)	-	-	2.2
France: Point d'Echange de Gaz (PEG)	-	-	1.2

For comparison:

USA (oil): NYMEX (WTI) (Feb.2010)

1680-2240

UK (oil): ICE (Brent) (Feb.2010)

2014

USA (gas): NYMEX Henry Hub (av.2009)

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Break-even churn level for liquid marketplace 15

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

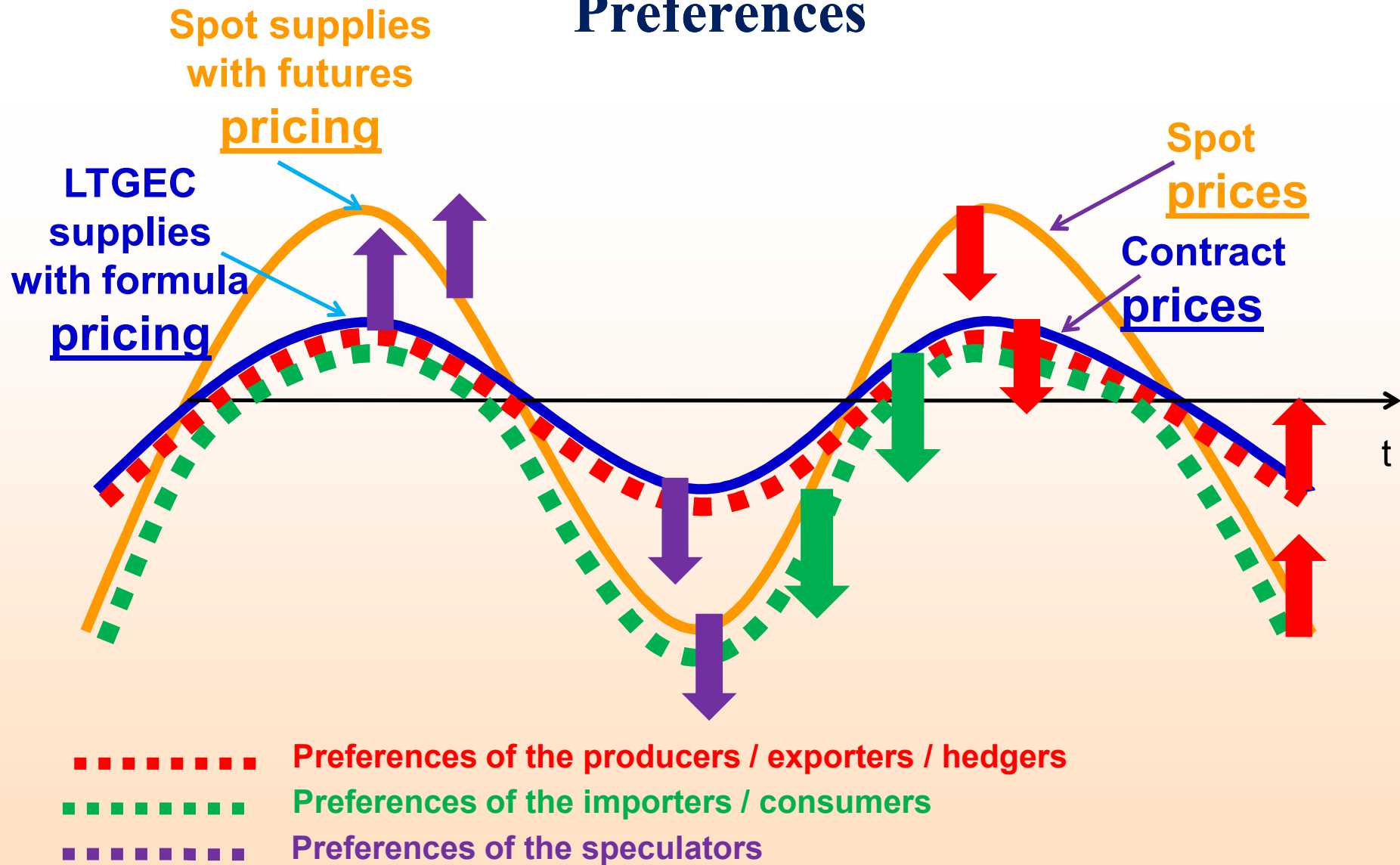
Source: "Gas Matters", IHS-CERA, IEA, M.Kanai (ECS)

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Producers, Consumers & Speculators Price/Pricing Preferences



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

Actions	Companies
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 thus decreasing/softening oil-indexation formulae link	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%

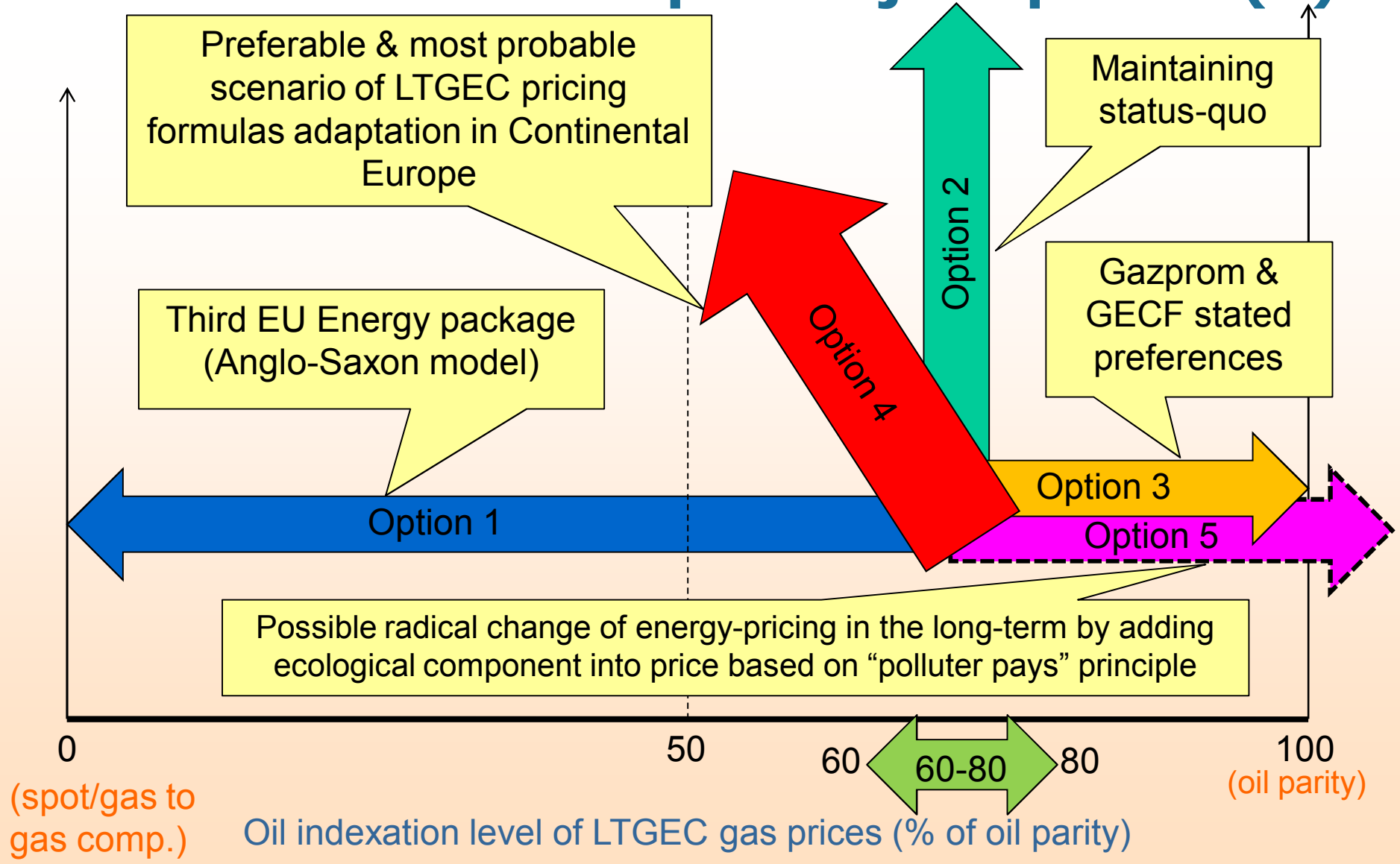
Gazprom: Evolution of contract provisions and pricing mechanisms in Europe (based on public information)(2)

Actions	Companies
Increasing flexibility of contractual provisions	Gazprom's "promotional package"
Recalculating base formulae price	Wingas
Direct price concessions	Botas (tbc)
Manoeuvre by contract volumes within contractual time-frame + requests to cancel obligation to off-take contracted volumes within 5-year period	E.ON, Eni
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
Some buyers files lawsuits against Gazprom over long-term prices (within price review/DS clauses)	Edison S.p.A. (AC SCC), etc.

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Evolution/adaptation of gas pricing mechanisms in Europe: major options (1)



Evolution/adaptation of gas pricing & contractual mechanisms in Europe: major options (2)

- **Option 1:** to substitute gas price indexation in LTGECs by spot/futures quotations => **NO**
- **Option 2:** to maintain status-quo (LTGEC with dominant oil indexation) => **NO**
- **Option 3:** to maintain oil-indexation within LTGEC and to move to oil parity => **NO**
- **Option 4:** 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 (+ access to pipeline adequate to LTGEC volume / duration: 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
- **Option 5:** to develop new pricing concepts leading to exceeding oil parity by gas prices (LTGEC + new indexation ingredients, like comparative ecological (dis)advantages of different fuels, etc.) => **NOT NOW**

Thank you for your attention

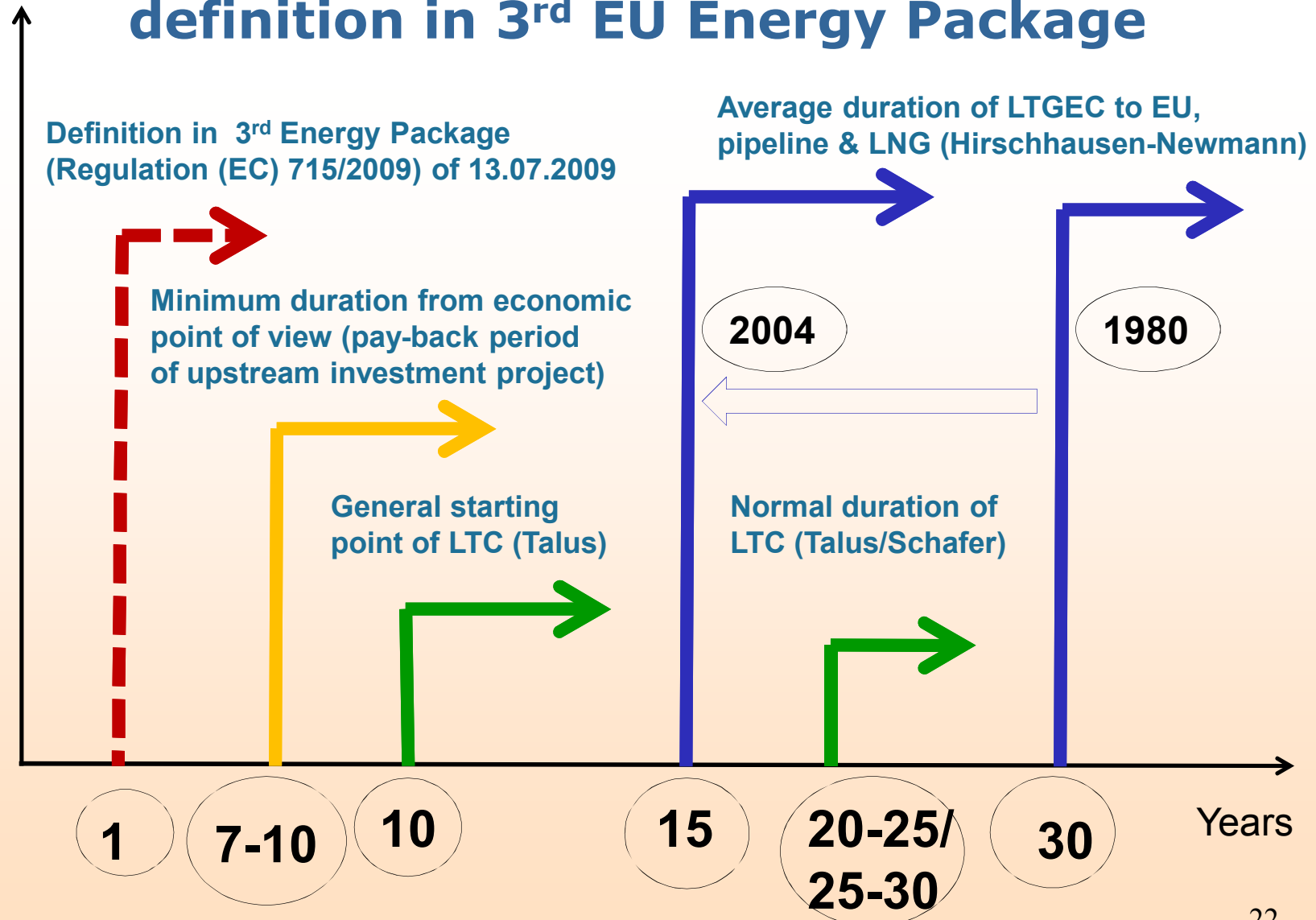
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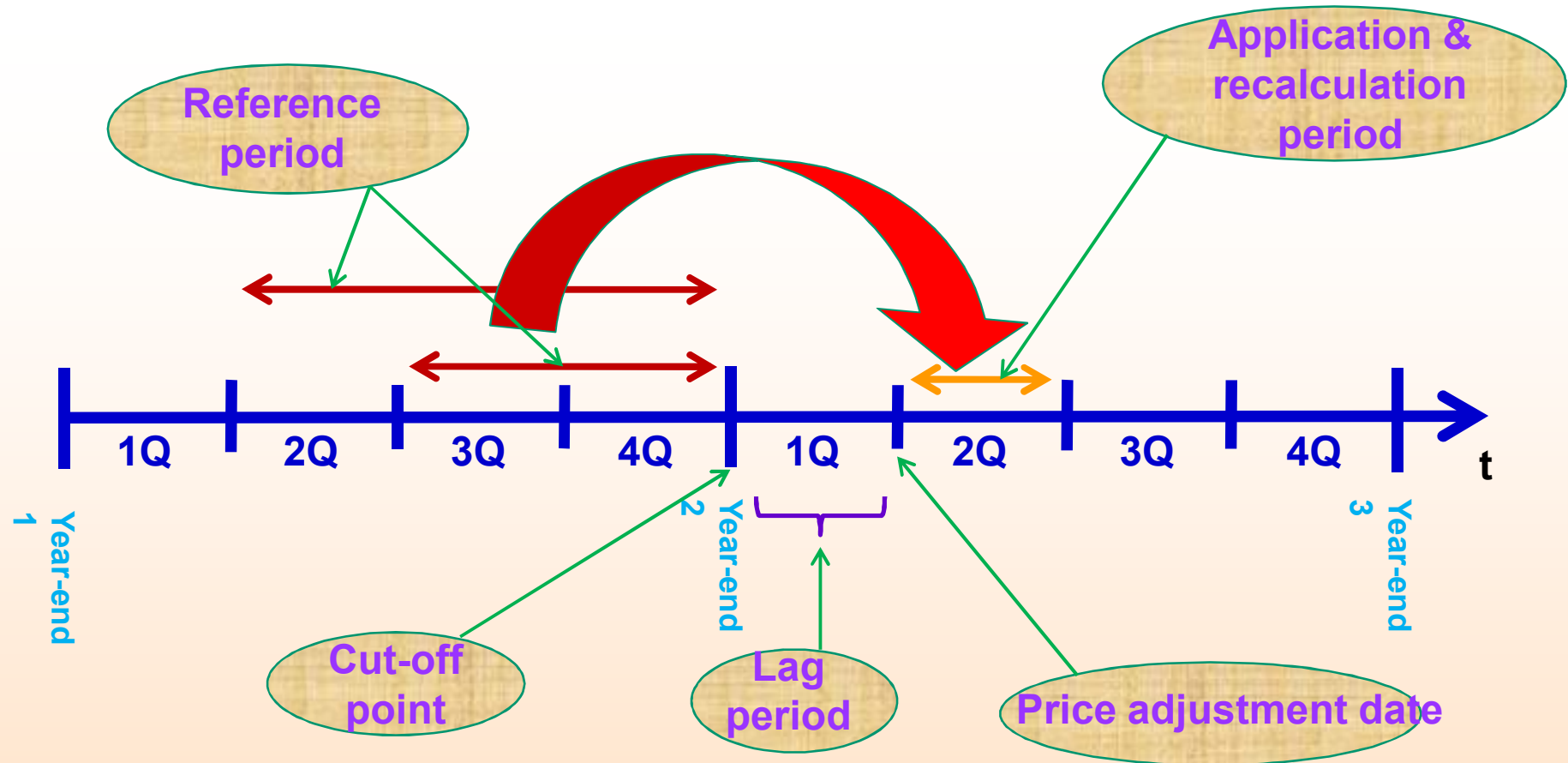
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Reserve slides

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



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

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

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 formulae

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)

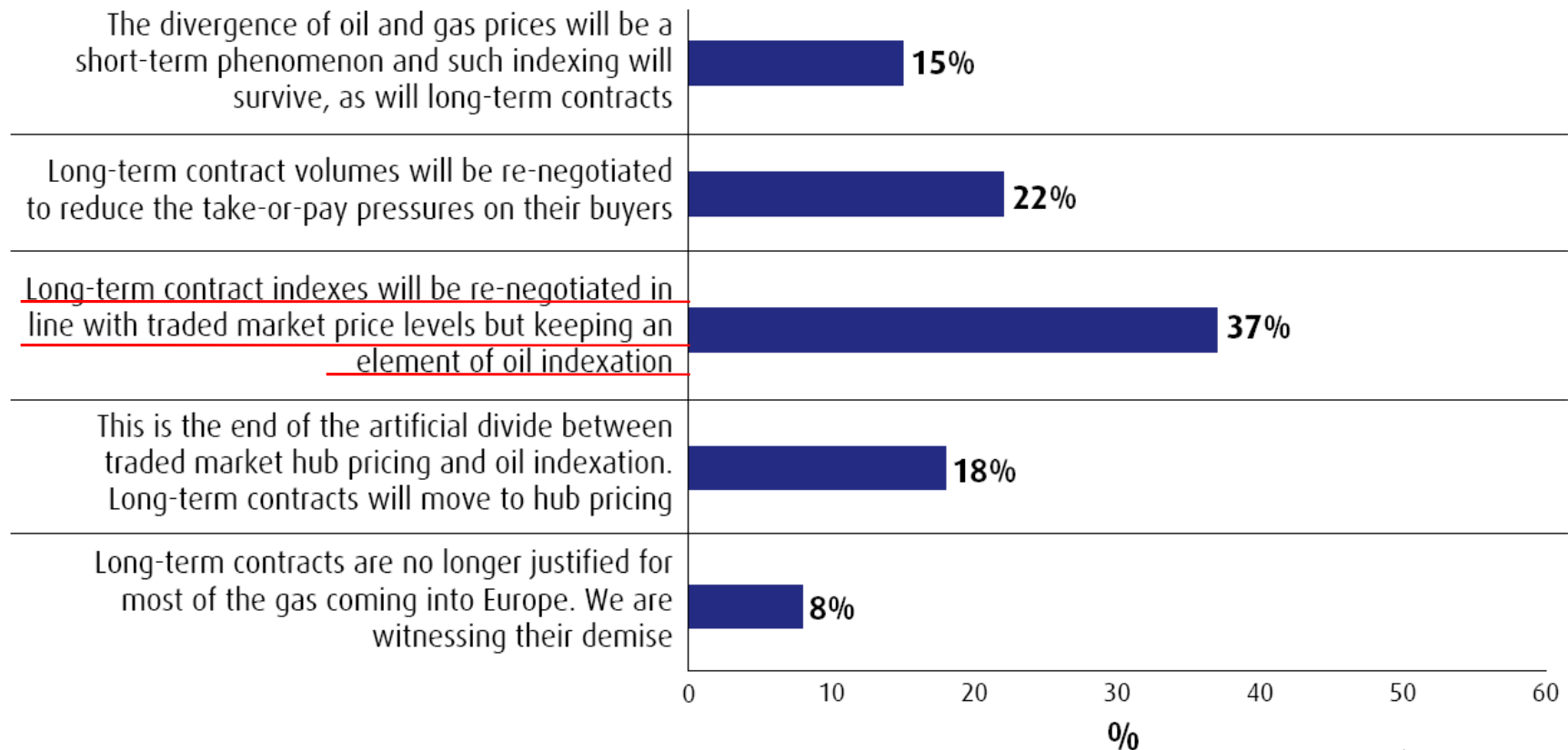
YEAR OF CONFERENCE POLL:	2004	2005	2008	2009	2010
Before end 2010	24	15	8.7	3.8	4
Before end 2015	36	15	22.1	20.3	29
Later than 2015	15	39	42.5	44.3	51
Never	24	31	28.8	31.6	25

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; Ibid. "Gas Price Formation in Europe: rationale and next steps", Presentation at GMT, 8 October 2010.

Future of LTGEC: industry view

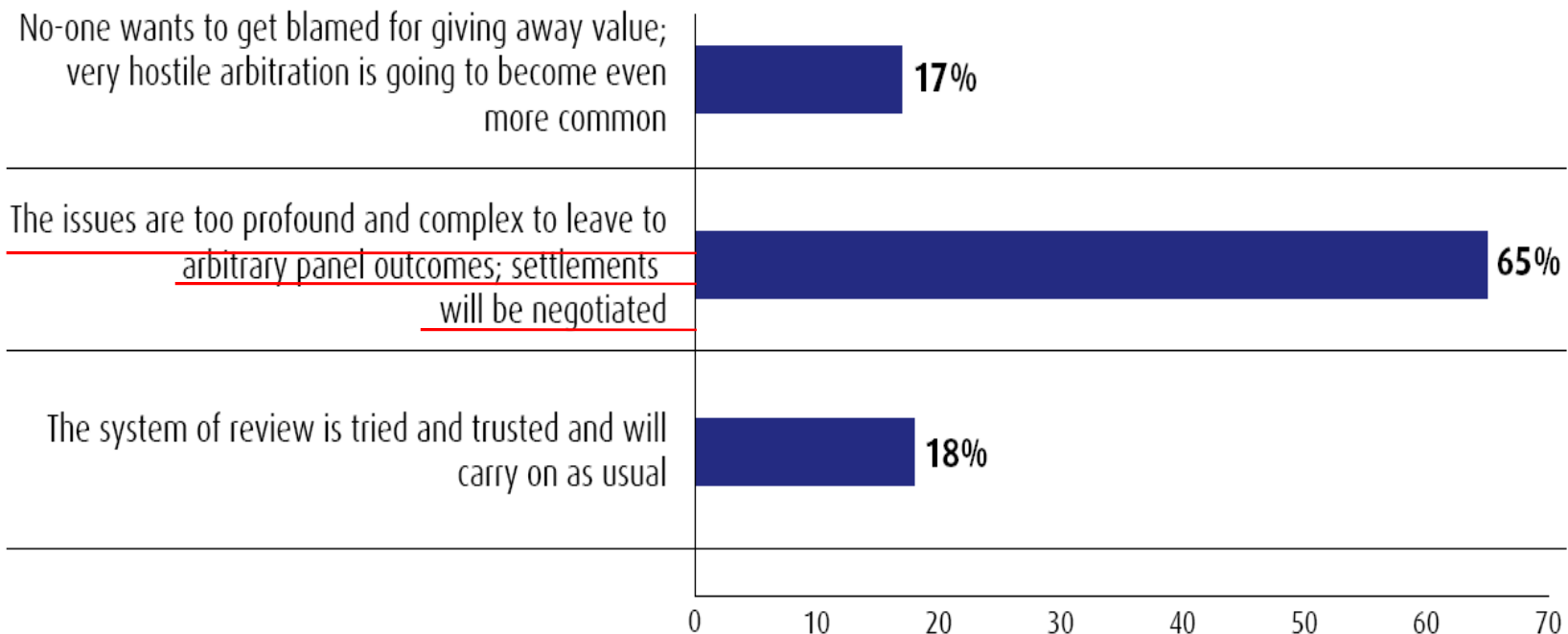
Q9 Oil-indexed long-term gas contracts are increasingly exposed to unprecedented take-or-pay pressures in Europe. Where are we heading?



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.

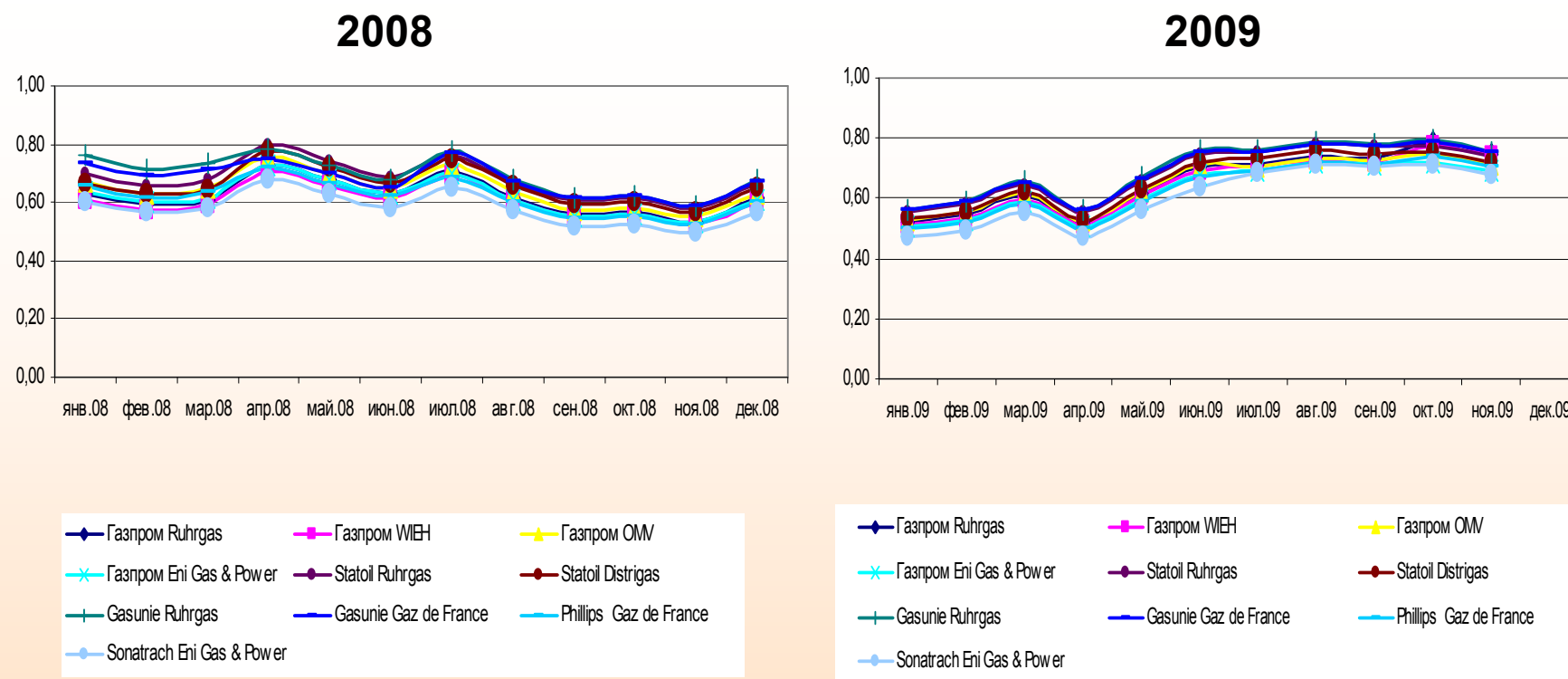
How to adapt LTGEC: industry view

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?



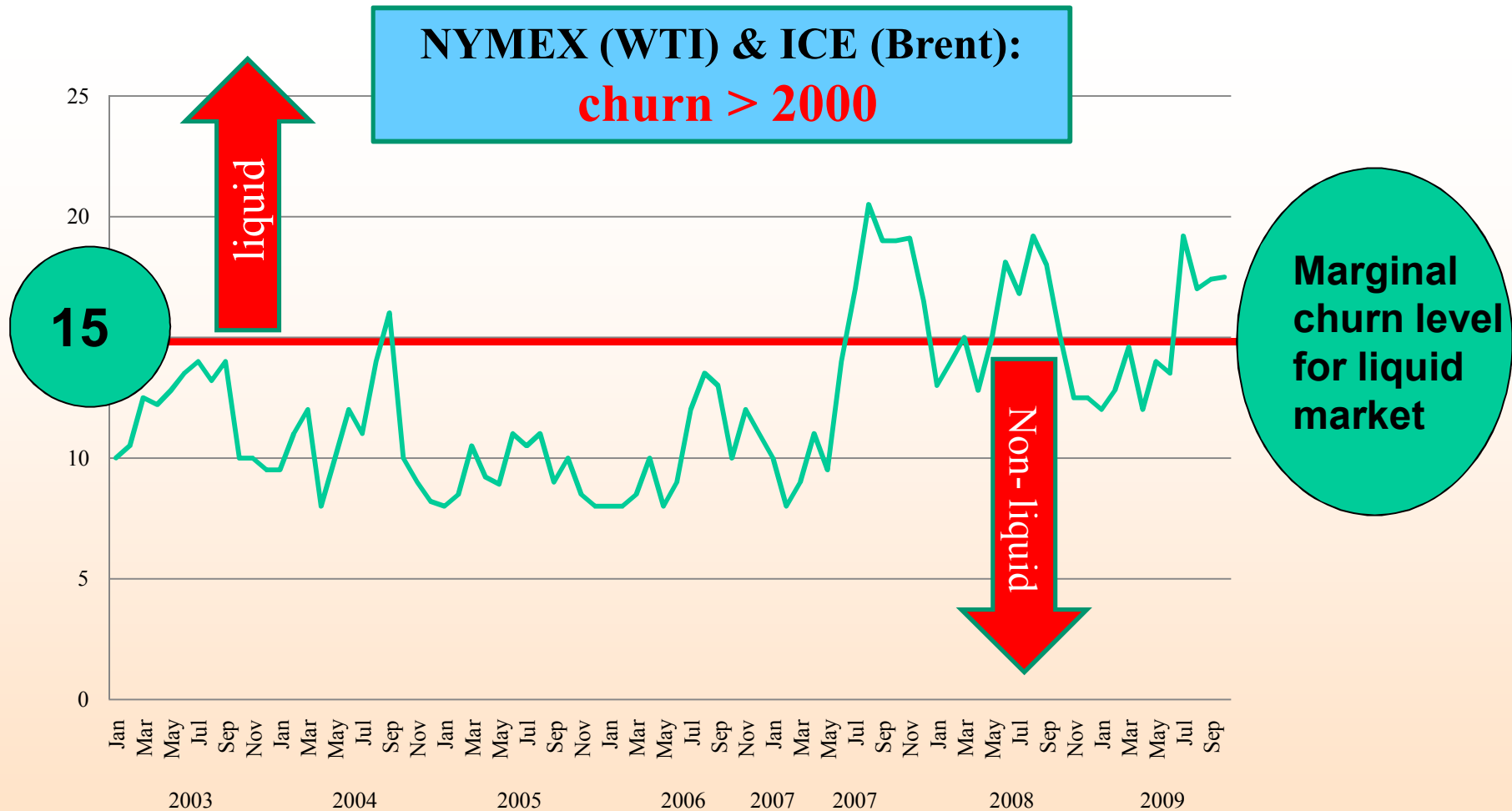
Source: Europe's gas industry need transformation to adapt to energy revolution. Key messages from the 24th European Autumn Gas Conference, held in Bilbao in northern Spain in November 2009, December 2009, p.15.

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.

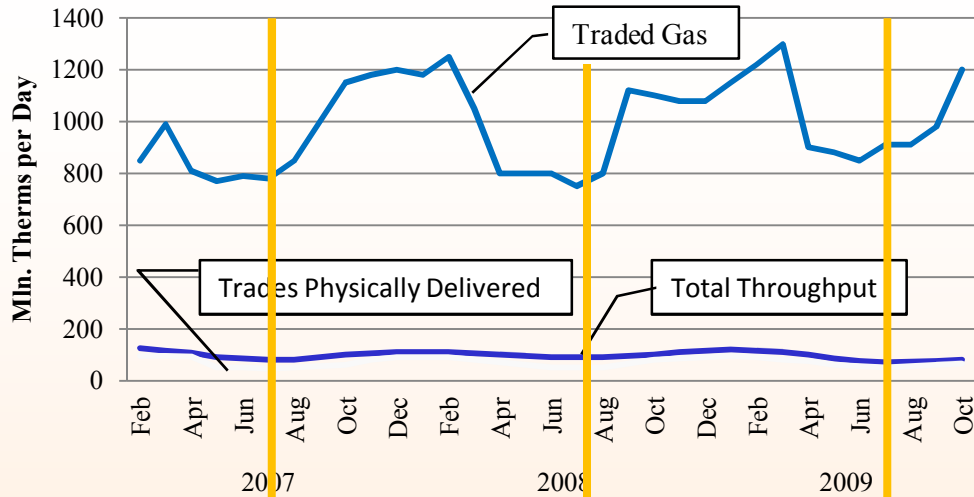
Churn ratio at UK NBP (gas) & at major petroleum exchanges



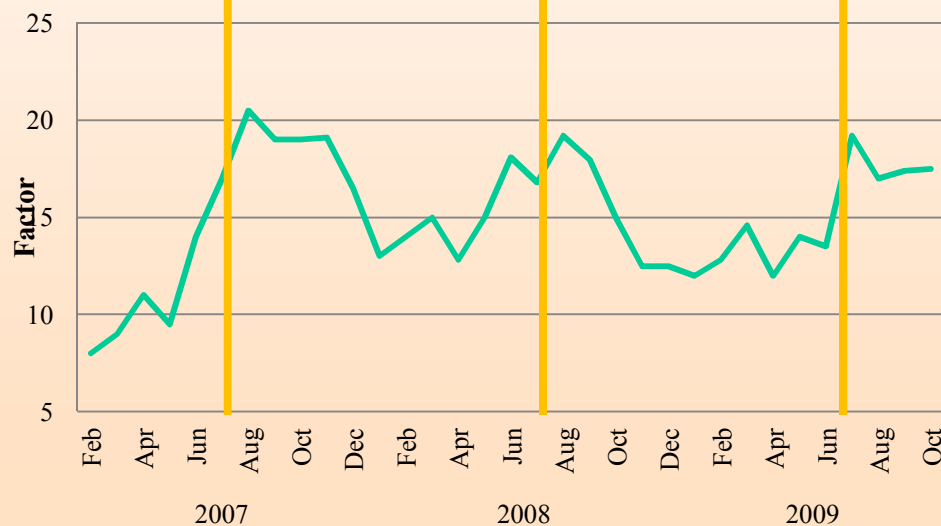
Source: "Gas Matters" for corresponding years, WTI/ICE – M.Kanai estimate (ECS)

Churn ratio: the best available, but controversial liquidity measurement

NBP Total Throughput, Trades and Delivered Trades



NBP Churning Factor



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: the higher is trade turn-over, the higher is liquidity level of this market-place – the higher is churn ratio to be
- churn: whether it could be an easy-to-manipulate, but not necessarily a true measurement ?