

Putting a Price
on
ENERGY

International
Pricing Mechanisms
for Oil and Gas



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International Pricing Mechanisms for Oil and Gas

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Energy Charter Secretariat

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Energy Charter Secretariat

The 1991 Energy Charter Declaration:

Title I Objectives:

*"Within the framework of **State sovereignty and sovereign rights over energy resources** and in a spirit of political and economic co-operation, (the signatories) undertake to promote the development of an efficient energy market throughout Europe and a better functioning global market, in both cases based on the principle of non-discrimination and **on market-oriented price formation**, taking due account of environmental concerns."*



Article 18 of the Energy Charter Treaty: SOVEREIGNTY OVER ENERGY RESOURCES

- The Contracting Parties recognize state sovereignty and sovereign rights over energy resources.
- Treaty shall in no way prejudice the rules in Contracting Parties governing the system of property ownership of energy resources.
- Each state continues to hold in particular the rights to decide:
 - the geographical areas within its Area to be made available for exploration and development of its energy resources,
 - the optimalization of their recovery and the rate at which they may be depleted or otherwise exploited,
 - to specify and enjoy any taxes, royalties or other financial payments payable by virtue of such exploration and exploitation,
 - to regulate the environmental and safety aspects of such exploration, development and reclamation within its Area,
 - to participate in such exploration and exploitation, inter alia, through direct participation by the government or through state enterprises.



Structure: International Pricing mechanisms for oil and gas

- 1. Some theoretical and historical aspects**
- 2. Development of long term contracts:**
 - Groningen concept and price formula
 - Development of gas pricing in Eastern part of Continental Europe
- 3. Regional differences in cross-border pricing of gas and impact of LNG**
- 4. Conclusions**



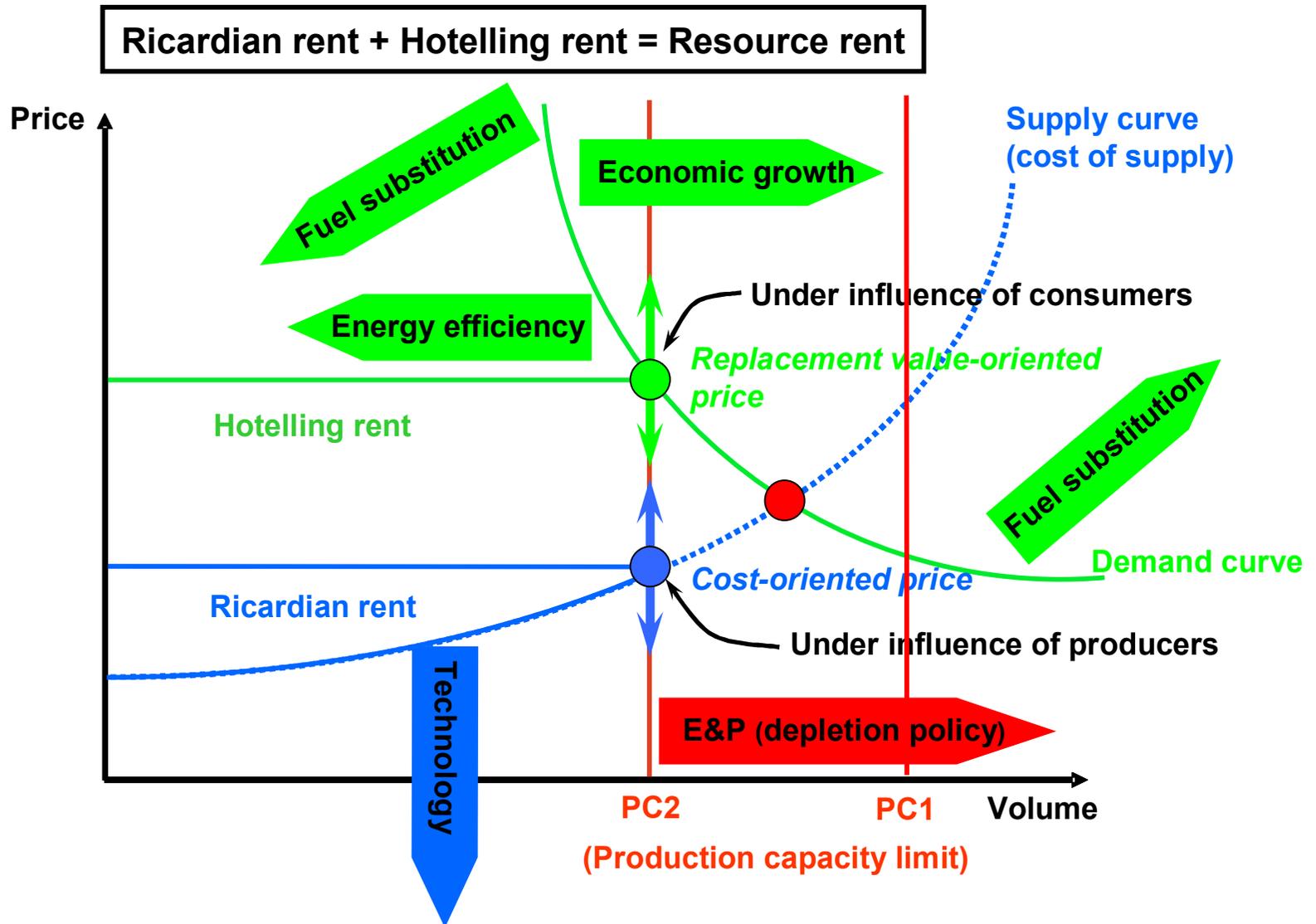
Non-standard Theoretical Aspects

Resource (and energy) economics are different from economics of manufacturing ,e.g.:

- Risk and High Specificity of Oil and Gas Investment: Transaction Cost Theory
- The Character of a Natural Resource: Ricardian Rent
- Finiteness of Resources: Hotelling's Theorem
- Producing Companies and Resource Owners: Principal-Agent Theory
- Inelastic Demand Combined with Supply Restrictions: Cournot-Nash-Formula
- Market Imperfections/Externalities: Pigou Taxes and Coase Theorem



Pricing of Non-Renewable Energy Resources: RICARDIAN VS. HOTELLING RENT

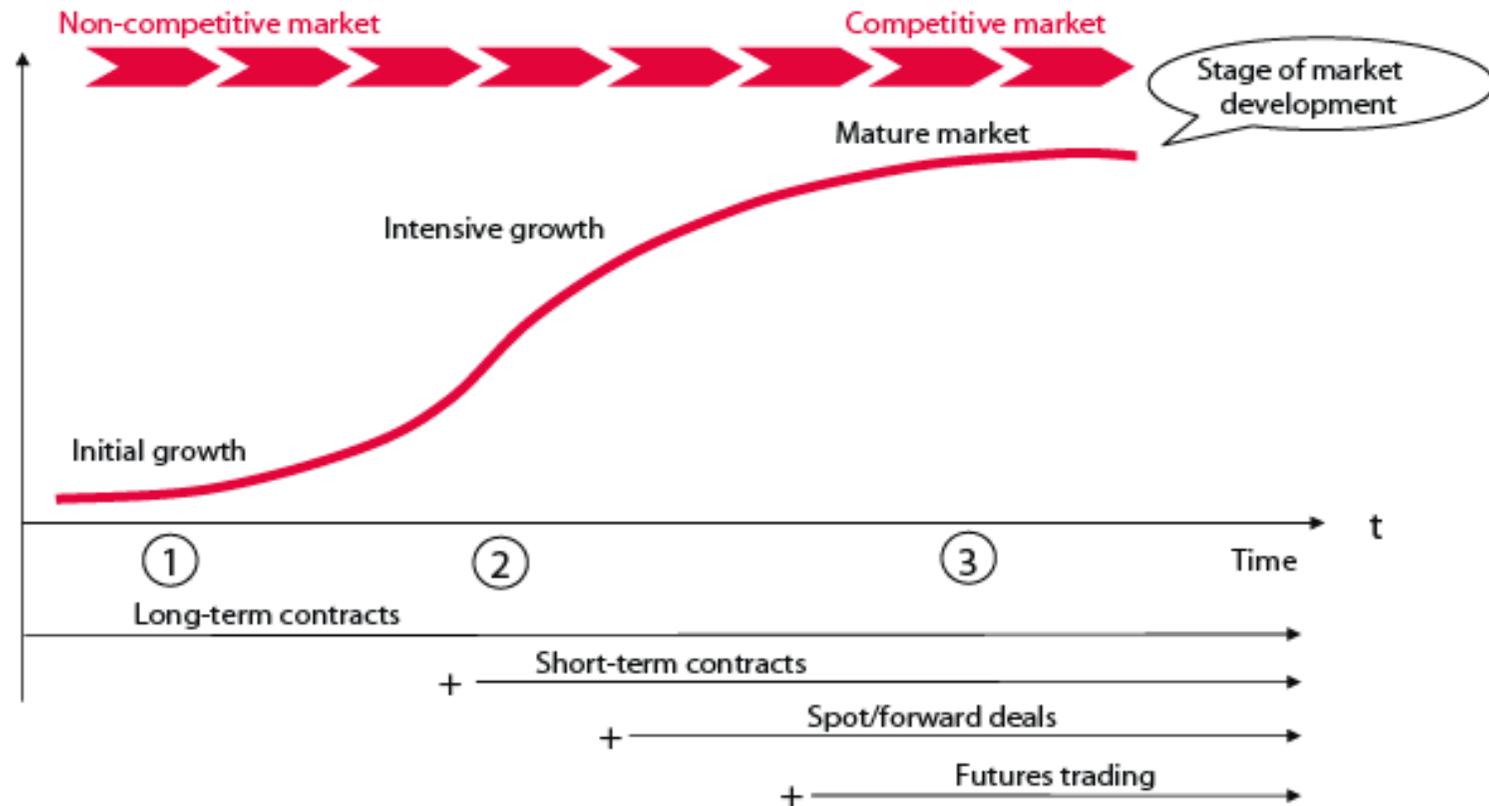


Gas Export Pricing & Prices

- Resource price and resource rent for non-renewable energy:
 - **Ricardian rent**: internal demand is *below* domestic production capacity limitations
 - **Hotelling rent**: internal demand is *above* domestic production capacity limitations
- Pricing principles:
 - **Cost-plus (net forward)** => pricing at internal domestic market of producer *or* subsidized export pricing (Hotelling rent is shared with your own nation *or* with foreign nation)
 - **Replacement value** (costs of alternative energies) => in case when domestic production capacities are below internal demand for gas => to receive maximum marketable price/resource rent
 - **Net-back replacement value** = Replacement value netted back upstream to the delivery point => Dutch (Groningen) model of long-term export contract (since 1962)
 - **Net-back value from EU market** = Value of main EU gas imports less transportation differential to other customers (mainly FSU countries) so that netback at the wellhead is equal



Gas markets development



- ① Pricing mechanism's development stages:
- ① - cost-plus
 - ② - escalation formulas (based on alternative fuels prices)
 - ③ - based on futures prices (commodities markets)



Regional Specificity: Will Gas follow Oil to Become a Global Commodity?

Will Gas Follow Oil to Become a (Global) Commodity?						
North America and United Kingdom				Continental Europe and Japan / Korea		
➤ development based on own resources, no initial dependence on imports				➤ high import dependence from the start		
➤ supply based on small to medium sized gas fields				➤ supply based on imports from giant / super giant fields		
➤ standardised rent taking development decision by private players				➤ rent maximisation of exporting countries development decision by exporting country		
➤ demand elasticity from gas to power generation				➤ limited demand elasticity		
➤ gas-gas competition but price path for gas still tracks oil prices				➤ oil prices as reference in price formula		
			Linkages			
market restructuring as of 1980s			⇔ model for reform	market restructuring as of late 1990s		
North America		UK	LNG trade	Continental EU		Japan/Korea
Hubs created by industry, churn 100, many players, high LNG absorption potential.	⇔	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.



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Origin of concept

- Groningen – one of the first Super Giant gas fields, first large gas exports worldwide
- Before Groningen – cost-plus approach for gas associated with oil fields (in NL and beyond)
- Producer received a fraction of final consumer price
- Goal of Dutch government: to achieve the highest revenue from Groningen for the Dutch Government
- Nota de Pous (11 June 1962)

The Groningen Concept

Developed by Nota de Pous (Note to Parliament in **1962**)
For exports:

Pricing:

- Replacement value principle (no cost-related approach)
- Net-back value, netted back from replacement value
- Regular price review, if no joint solution=> arbitration
- Price risk and reward for seller, marketing risk for buyer
- Protection against arbitrage by buyer

Volumes and risks:

- Long term supply vs. off take obligation based on minimum pay: dedication of certain volumes of reserves vs. commitment to market defined volumes
- Secure supply at marketable prices against reliable sales volumes at maximum highest marketable price



Basis of Concept – Exports

- Pricing based on net back value based on replacement value of competing fuels
- Allows building of infrastructure for and in export market
- Allows to sell gas in competition with other fuels
- Regular price review, disputes settled by arbitration
- Different netbacks to Dutch border:
 - Different replacement value in different countries
 - Compensation for transport if not delivered free border



A Typical Net Back Gas Price Formula

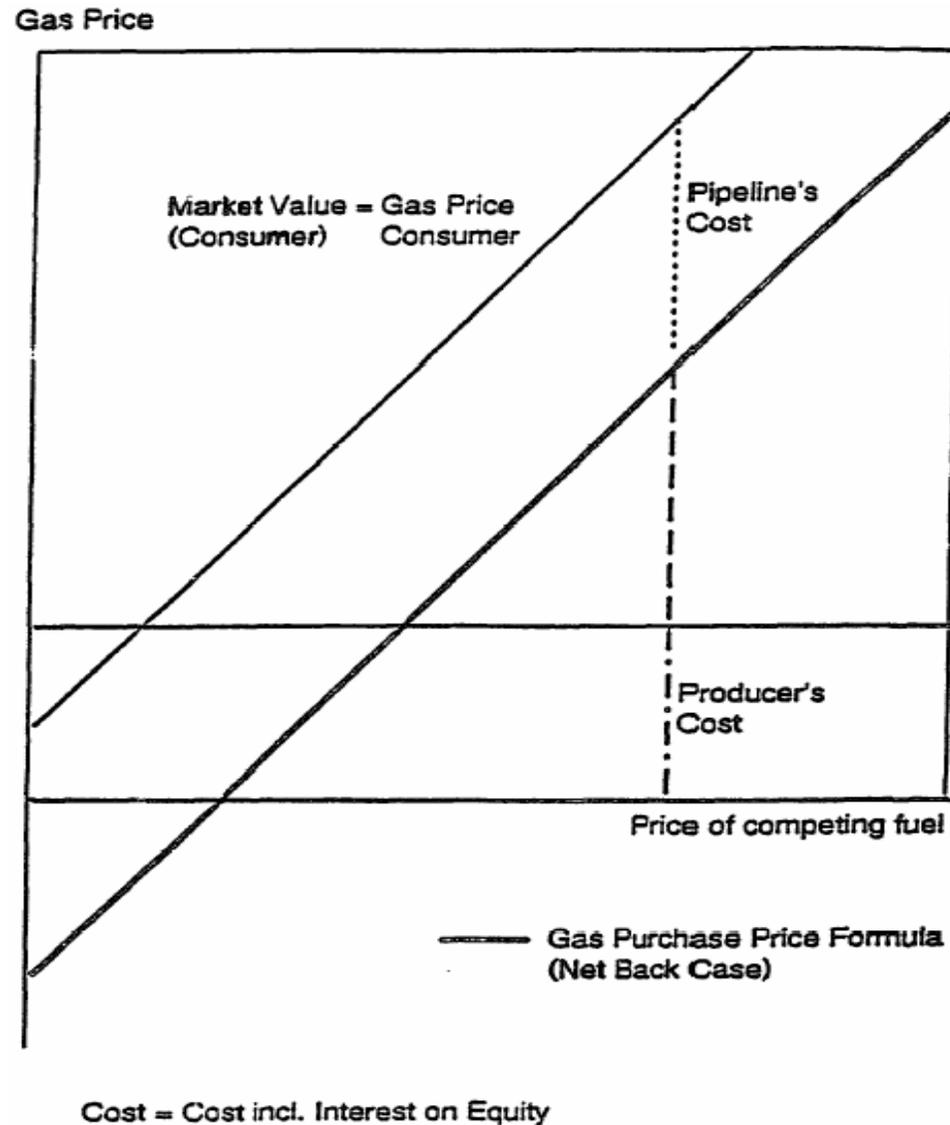
$$P_m = P_o + 0.60 \times 0.80 \times 0.0078 \times (LFO_m - LFO_o) + 0.40 \times 0.90 \times 0.0076 \times (HFO_m - HFO_o)$$

The gas price P_m during the Month m is a function of

- the starting gas price P_o
- and the price development of competing fuels Light Fuel Oil (LFO) and Heavy Fuel Oil (HFO)



Sharing of the Market Value: Netback Case



An Example of a Price Re-opener

- If the circumstances beyond the control of the Parties change significantly compared to the underlying assumptions in the prevailing price provisions, each Party is entitled to an adjustment of the price provisions reflecting such changes. The price provisions shall in any case allow the gas to be economically marketed based on sound operation.
- Either Party shall be entitled to request a review of the price provisions for the first time with effect of xx/yy/zzzz and thereafter every three years.
- Each Party shall provide the necessary information to substantiate its claim.
- Following a request for a price review the Parties shall meet to examine whether an adjustment of the price provisions is justified. Failing an agreement within 120 days either Party may refer the matter to arbitration in line with the provisions on arbitration of the Contract.
- As long as no agreement has been reached or no arbitration has award been rendered all rights and obligations under the agreement –including the price provisions - shall remain applicable unchanged. Unless otherwise agreed or decided by the arbitral award, differences to the newly established price (by agreement or by arbitration) shall be retroactively compensated inclusive of interest on the difference calculated at an interest rate reflecting the conditions on the international financing market.



Review of A Typical Net Back Gas Price Formula (1)

$$P_m = P_o + 0.60 \times 0.80 \times 0.0078 \times (LFO_m - LFO_o) + 0.40 \times 0.90 \times 0.0076 \times (HFO_m - HFO_o)$$

Typical subjects of a price review:

- Shares of competing fuels / new competing fuels / gas to gas competition / switching possibilities
- Adjustment of P_o to reflect changed shares
- Adjustment of rent sharing / marketing incentive implicit in P_o
- Ceilings and bottoms
- More technical elements: Reference fuels, time lags



Pricing After Groningen

Pricing developed by new contracts and by price reviews based on Groningen concept:

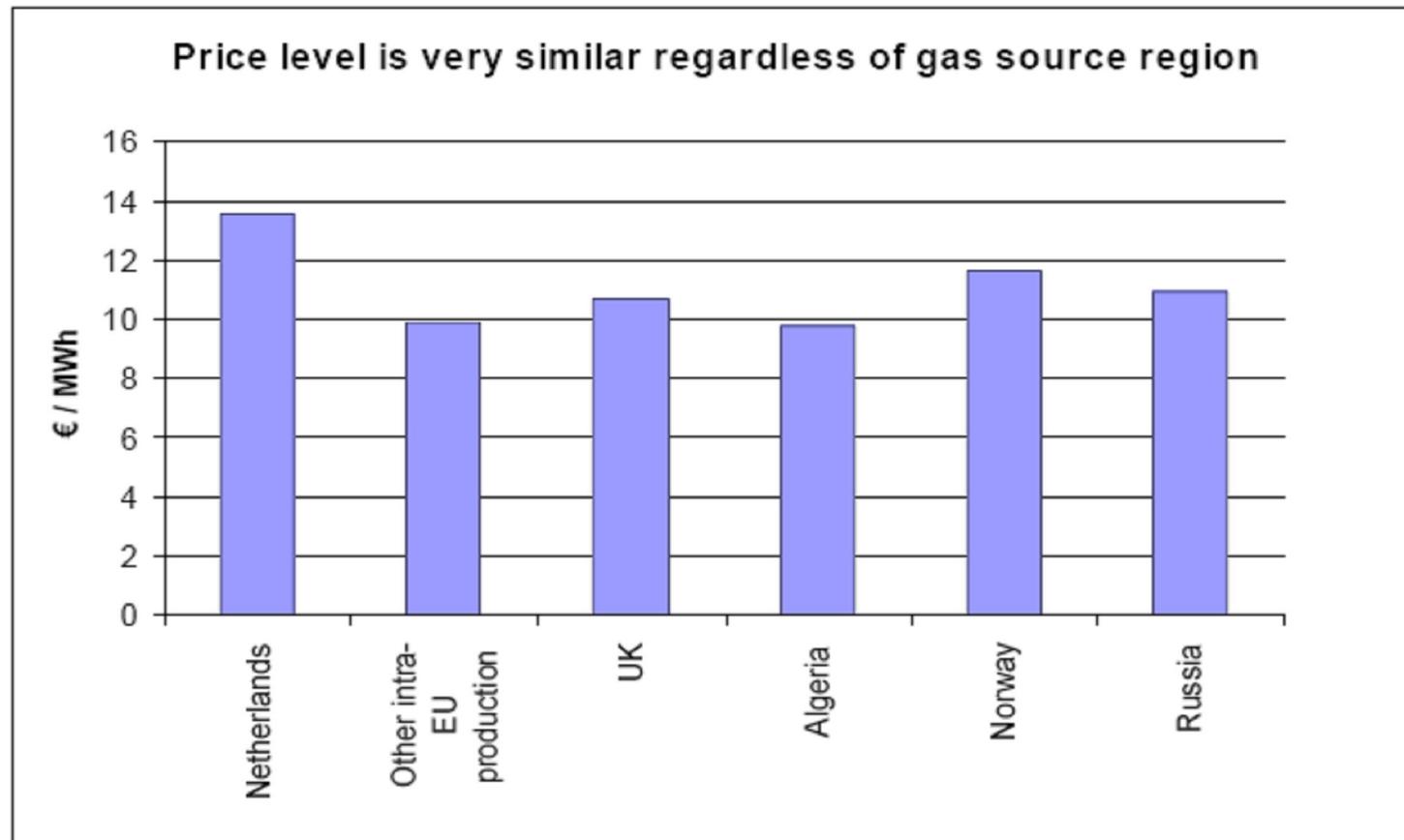
- NL as “trendsetter”, later also Troll
- Heavy fuel oil share decreased, the share of light fuel oil increased (now about 60-65%)
- Algerian exports partly pegged to crude oil (Algerian crude oil parity campaign early 80s)
- More recent: a small share of coal or electricity indicators, gas-to-gas price indicators.

● Arbitration was seldom invoked

=> comparable price levels and similar pegging



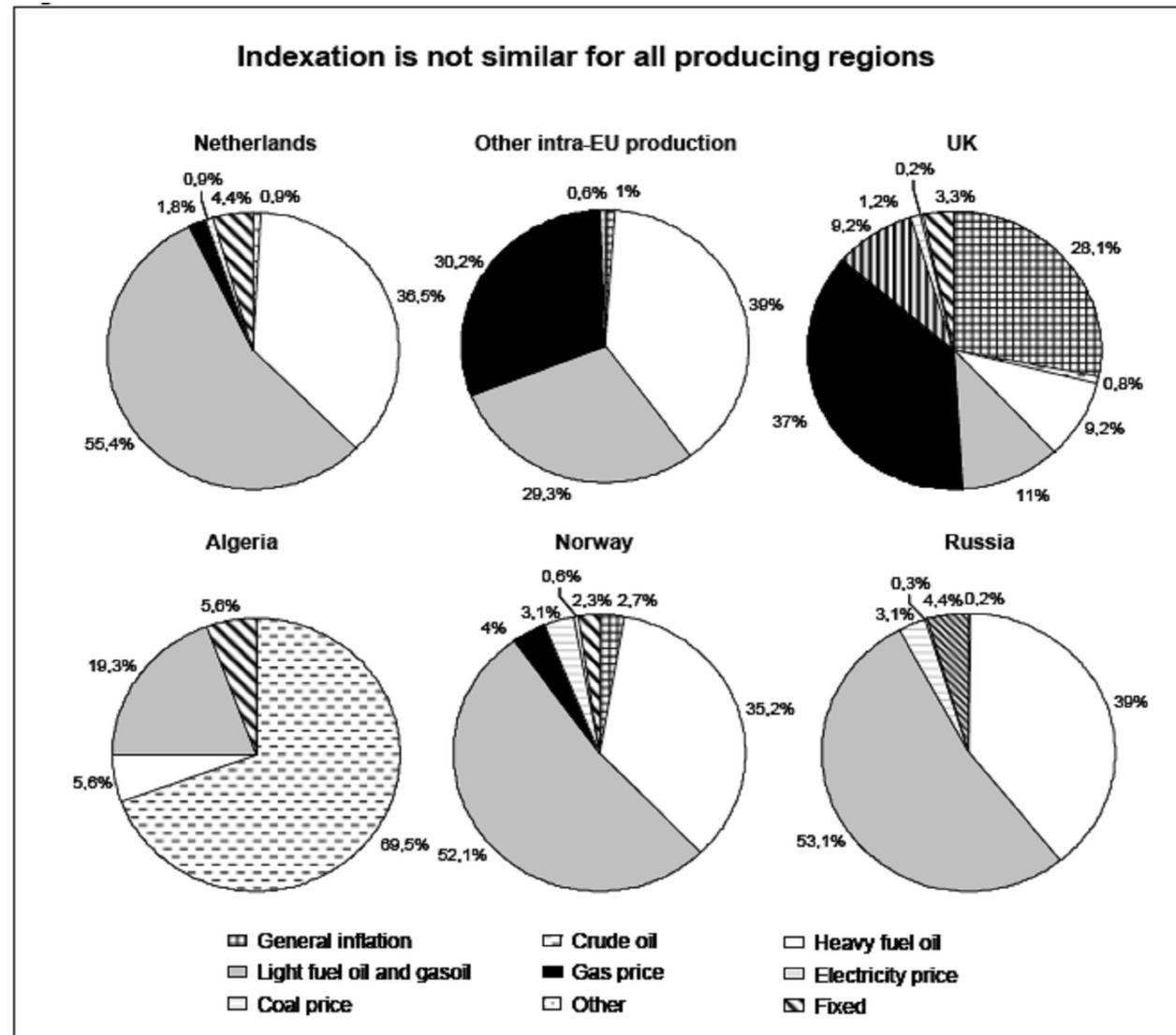
LTC: Price Levels



Source: Energy Sector Inquiry 2005/2006



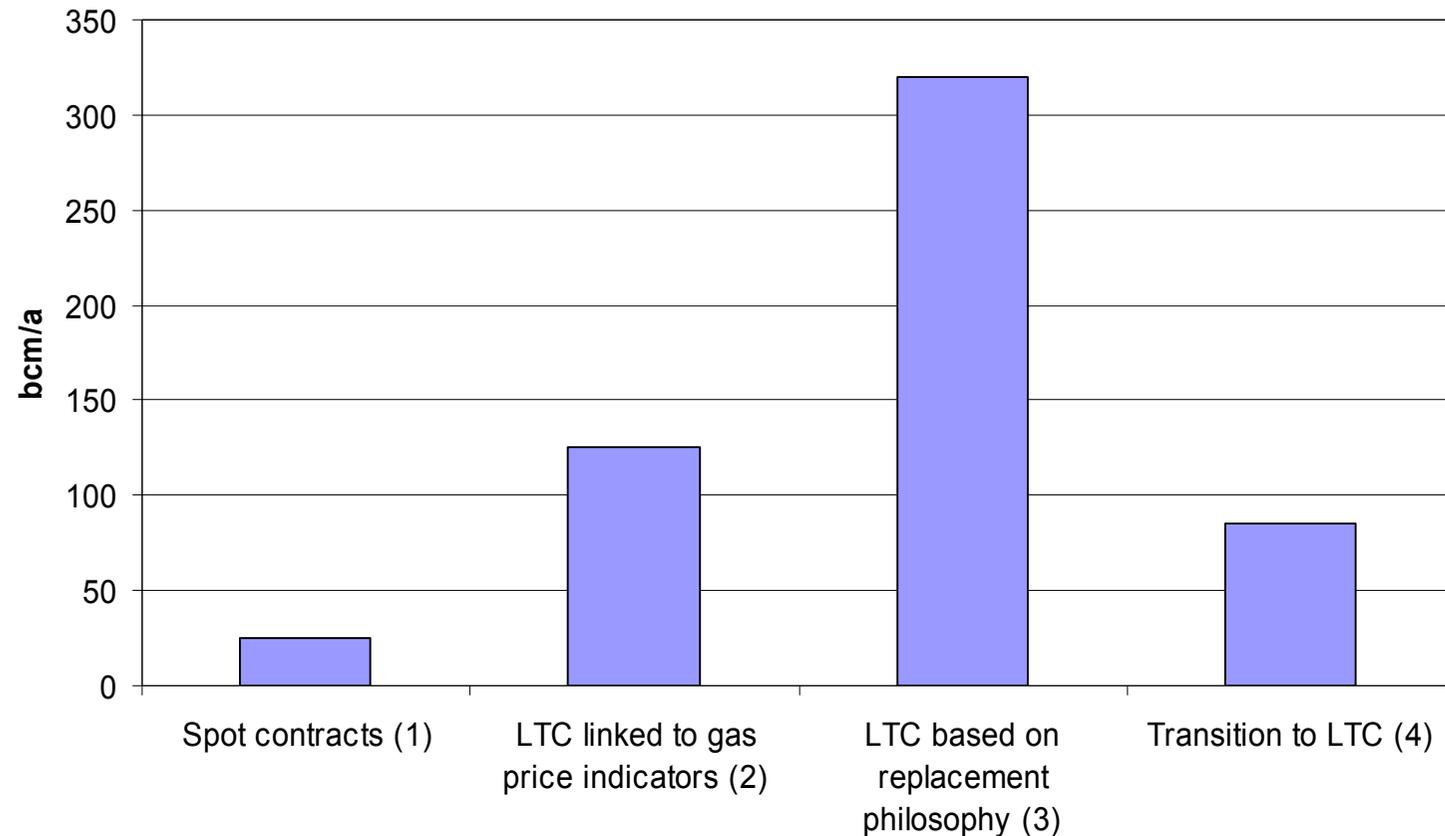
LTC: Indexation by Producer



Source: Energy Sector Inquiry 2005/2006



Estimated International Gas Trade (2005): Different Pricing Mechanisms for Main Regions



Source: BP (2006) (1) LNG to USA, UK and other spot LNG; arbitrage on the UK-Belgium Interconnector
(2) Pipeline Canada-USA, pipelines to UK (BBL, Langeled) and new Dutch exports
(3) All imports by Continental Europe (incl. accession countries) less spot LNG under (1)
(4) Trade with FSU now in transition from quasi-barter deals to LTCs, 2004 figures





Performance of LTCs so far

- In place since 40 years for pipeline and LNG, duration LTCs in place today: up to three decades
- Predominant share of World gas trade
- Review clause provided flexibility for LTCs to adopt to changes in the market:
 - from fixed price to pegging to heavy fuel oil, to more gas oil, inclusion of coal, power and gas to gas competition
 - Coped with oil price increases in 1973/74, 1979/80 as well as oil price slump in 1985, fall of the Berlin Wall in 1989, major technological developments
- Adopted to a liquid market place like UK (Gasunie – Centrica / Statoil – Centrica)

Ormen Lange: A Project without LTC

- Ormen Lange – the first offshore gas export project (field + pipeline) w/out LTC:
 - Feasibility study – initially with LTC (internal motivation of investors)
 - No LTC due to political and commercial considerations
- Aimed at UK Market:
 - NBP price (more volatile) vs. LTC price (more stable), but
 - For UK: Price at NBP prevails anyhow
 - UK: Most liberal & liquid market, but totally different from Continental Europe
- Marketing
 - Each company of consortia responsible for marketing its own share of gas produced
- Low breakeven price of the project (BEPP)
 - Result of technological & managerial improvements
 - Big gap between NBP & breakeven price diminishes risks & secures from/compensates for lack of LTC



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Soviet/Russian Gas to Europe - Contractual Structure Based on Groningen *LTGEC* Concept

Soviet / Russian gas export contracts to:

- the EU (historically),
- former COMECON (since USSR dissolution), and
- FSU (since recently)

are based on Groningen (Dutch) concept of long-term gas export contract (*LTGEC*)

Groningen concept = LTC + replacement value + regular price rebate + minimum pay obligations+ net back + destination clauses. More than 250 BCM/y of gas imports to continental Europe based on this concept

Groningen concept originated in 1962 vs. USSR gas export to EU started in 1968 (OMV to Austria at Baumgarten). Groningen concept-based Russian gas export contractual structure proved its validity & reliability through Cold War and post-Soviet transformation periods



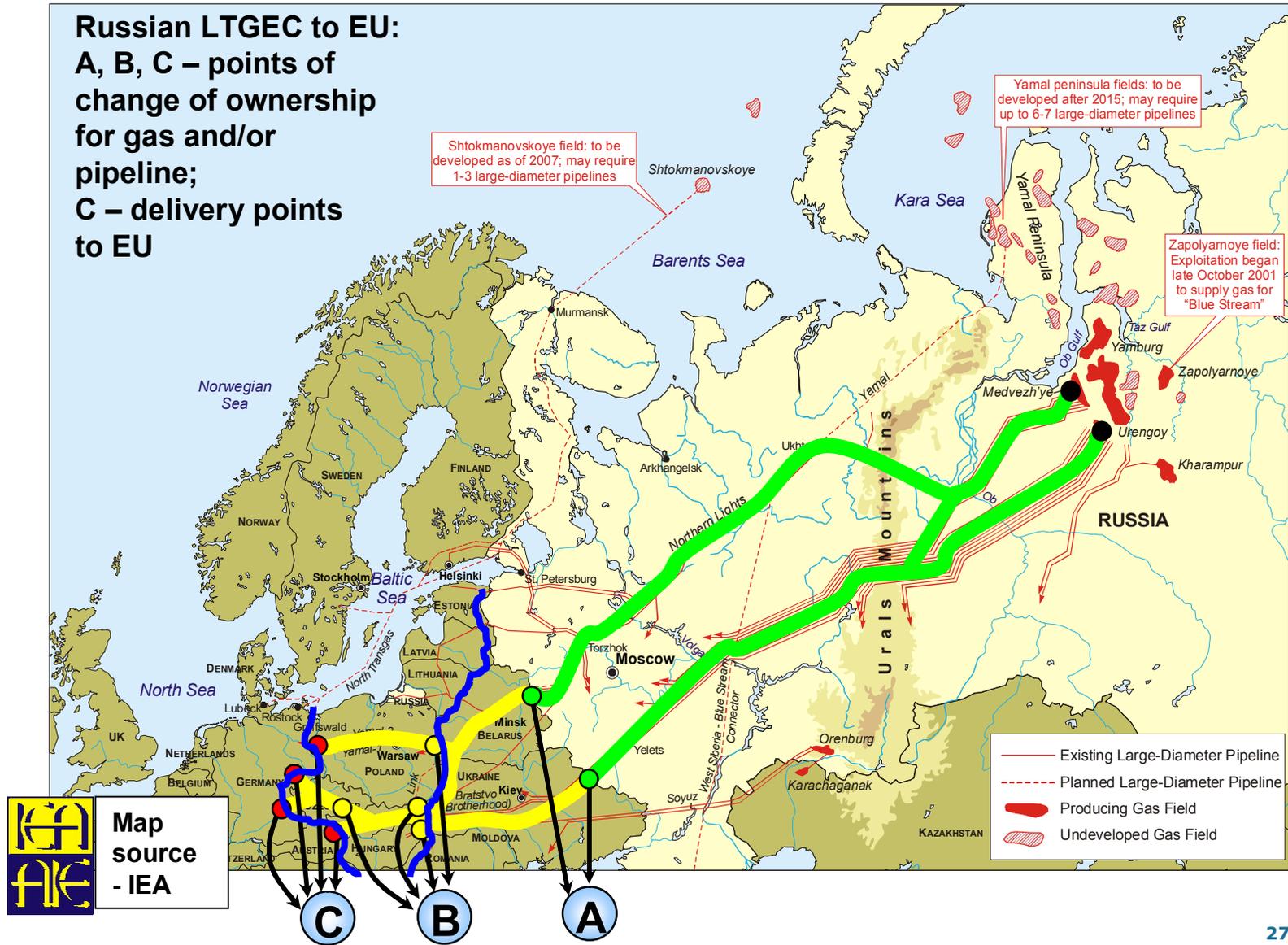
Soviet/Russian Gas to Europe: Contractual Structure

- Long-term gas export contracts (LTGEC)
- On-border EU (-15) sales (delivery points partly upstream to end-markets)
- Pricing: netted-back from replacement value at the end-market (e.g. less cost of transportation from end-market to delivery point)
- Protection against arbitrage (destination clauses)
- Multiple transit (increasingly important: compared to other exporters & after USSR/COMECON dissolutions)

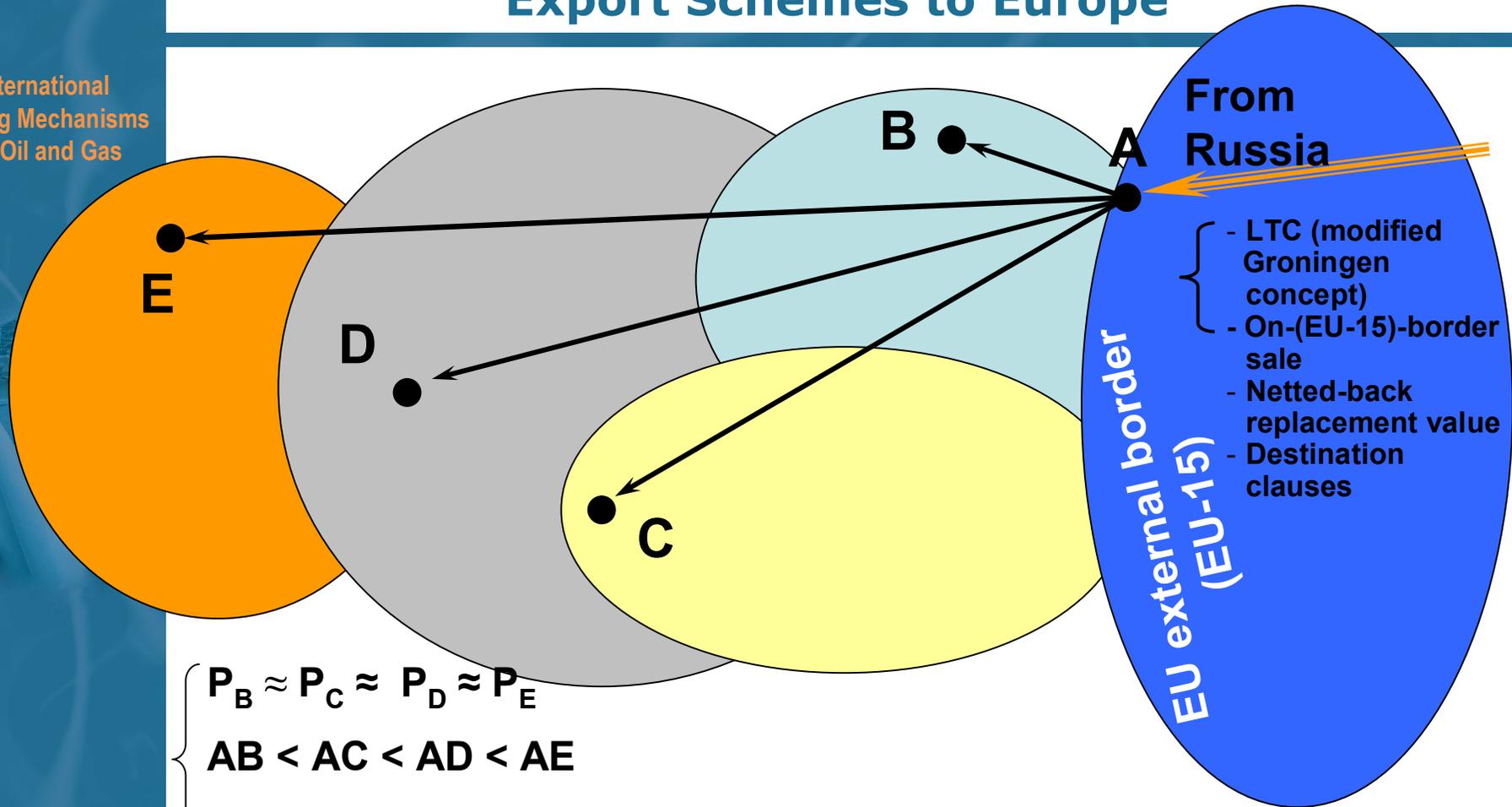


Russian Gas Export to Europe: on-border Sales and Transit Legs

Russian LTGEC to EU:
A, B, C – points of change of ownership for gas and/or pipeline;
C – delivery points to EU



Destination Clauses: Economically Motivated Integral Part of Historically Existing Russian Export Schemes to Europe



$$\begin{cases}
 P_B \approx P_C \approx P_D \approx P_E \\
 AB < AC < AD < AE \\
 P_{A \triangleright B} < P_{A \triangleright C} < P_{A \triangleright D} < P_{A \triangleright E}
 \end{cases}$$

“Destination clauses” allowed gas supplier to sell gas to different buyers at different prices and other contractual terms at one and the same delivery point to protect its competitiveness at the end market (to prevent arbitrage by buyers).



Soviet/Russian Gas Supplies to COMECON/CIS: *Prior to* Dissolution of the USSR

- Political (friendship) pricing => :
 - subsidized (notional) export prices
 - transfer of Hotelling rent from producer-state to consumer-state through cost-plus (net forward) pricing
 - portion of resource rent is left to importer in exchange on his political concessions to exporter
 - sharing USSR resources (which today are mostly Russian resources) within USSR and with COMECON countries
 - Legal background: state sovereignty on natural resources (UNGA 1962 Res.1803; ECT Art.18)
- Barter & quasi-barter deals
- Transportation system - but not designed as transit system within USSR/COMECON
- No transit within USSR
- Export & transit supplies are not contractually separated within COMECON



Soviet/Russian Gas Supplies to COMECON/CIS: *After* Dissolution of the USSR

- Long & painful transition to :
 - Contractual separation of transit & export supplies
 - Formation of domestic transport vs. transit legislation
 - From barter to cash payments
 - From politically-subsidized - to market-based pricing & prices:
 - Transit tariffs methodologies
 - Market-oriented export pricing & prices

Energy
Charter role:

draft Transit Protocol + gas/transit-related activities: e.g. Transit tariffs study (Jan'06), Pricing study (March'07), etc.

Gas problems in post-Soviet area = result & long-term economic consequences of dissolution of USSR/COMECON political system = objective long-term economic problems of transition period



Ukraine/Belarus: Export and Transit of Russian Gas *Prior to* 4 January/30 December 2006

- Export & transit are not contractually separated
- Quasi-barter deals
- Notional export prices & transit tariffs – to balance gas supplies to Ukraine/Belarus
- Export pricing:
 - “cost-plus (net-forward)” – on the basis of the marginal costs (supply curve) for Russia
- Who receive the resource rent (Ricardian & Hotelling rents):
 - Ricardian rent – producer / exporting state (Russia),
 - (at least part of) Hotelling rent – consumer / importing state (Ukraine/Belarus) => ECT Art.18



Ukraine: Export and Transit of Gas from Russia *After* 4 January 2006

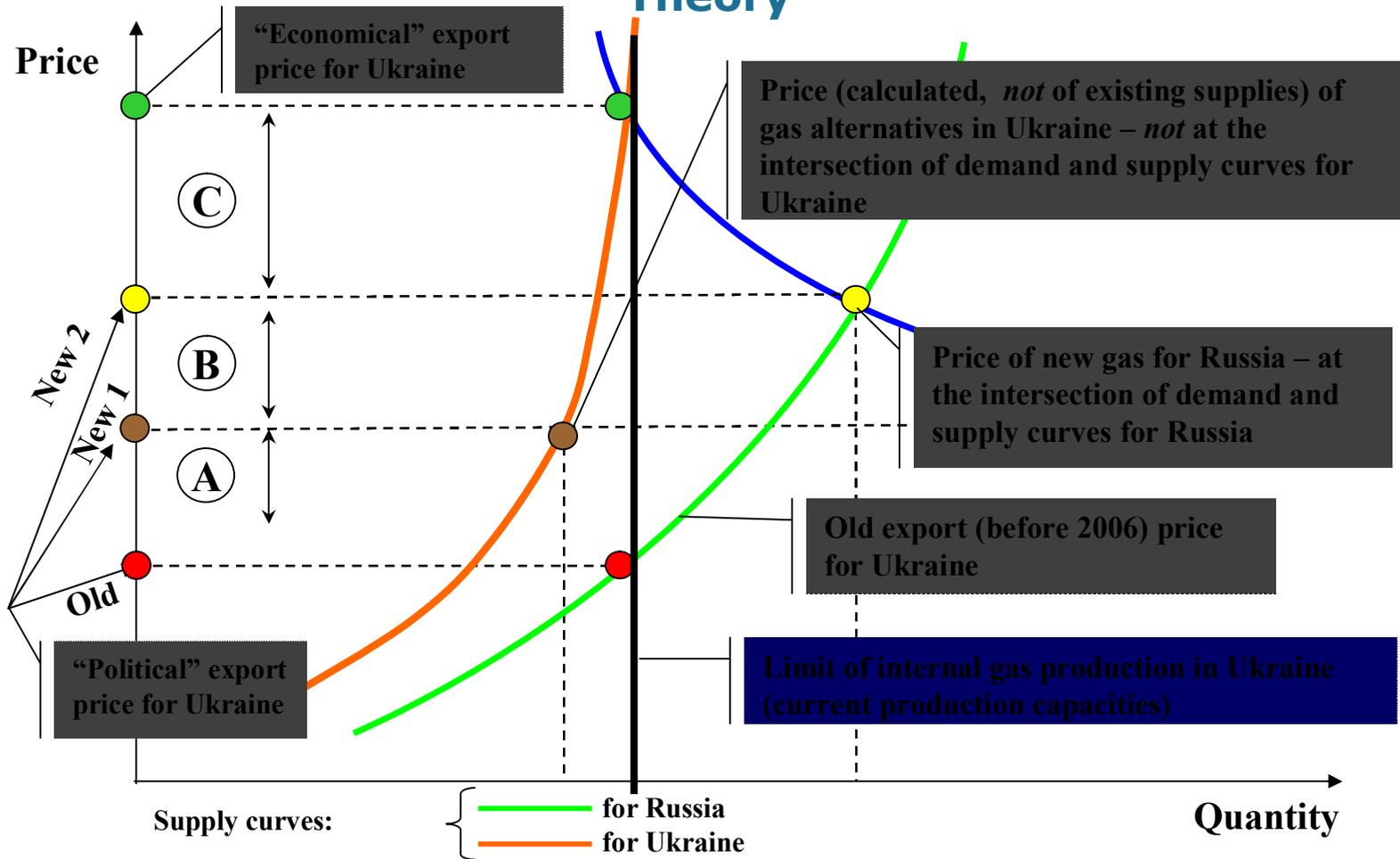
- Transit and export are contractually separated
- Cash payments
- Export price => average based on cocktail from two sources: Russia and Central Asia (CA)
- Export pricing:
 - for Russian gas - by net-back calculation => based on *demand-curve* => replacement value within EU netted-back (less transportation costs) to Russia-Ukraine border
 - for Central Asian gas - by cost-plus (net forward) calculation => based on *supply curve* => negotiated price at external border of exporting CA country (above its cost-plus level ?) plus transportation costs to Russia-Ukraine border
- Who receive the resource rent (Ricardian & Hotelling rents):
 - on Russian gas – both rents go to producing/exporting-state (Russia)
 - on Central Asian gas – *Ricardian* rent goes to CA producing / exporting states; *Hotelling* rent shared between Ukraine & CA producers/exporters => ECT Art.18



Putting a Price on ENERGY

International Pricing Mechanisms for Oil and Gas

Pricing Options in Russia-Ukraine Gas Trade & Economic Theory



- **“Political” export price for Ukraine :**
- **Old** = current internal Russian price plus cost of transportation to Russia-Ukraine border (*Russian export subsidy to Ukraine = A+B+C*)
- **[New 1]** = if equated to production costs («cost-plus» in Ukraine) of replacing energies, based purely on the possibility of their production within the internal market of Ukraine (e.g. A.Illarionov) (*Russian export subsidy to Ukraine = B+C*)
- **[New 2]** = if equated to internal Russian price (production costs/“cost-plus” in Russia) of new Russian gas (*Russian export subsidy to Ukraine = C*)
- **“Economic” export price for Ukraine** = gas replacement value at the internal EU market (calculated on long-term contracts gas pricing formulas) netted-back to Russia-Ukraine border



Belarus: Export and Transit of Russian Gas *After* 30 December 2006

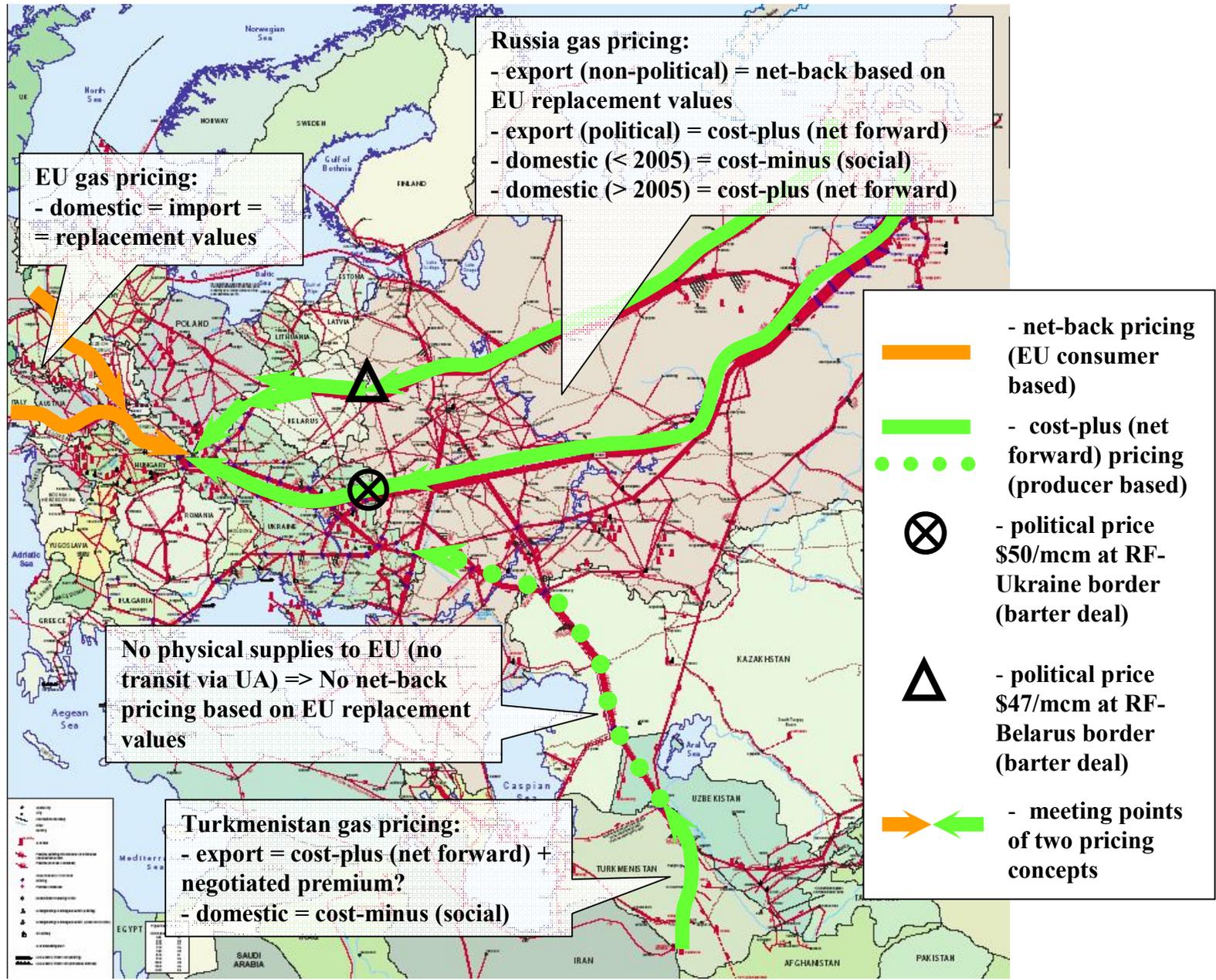
- Transit and export are contractually separated
- Cash payments
- Export pricing: by net-back calculation => based on demand-curve => replacement value within EU netted-back (less transportation costs) to Russia-Belarus border (market price)
- Export price => calculated as increasing %% of market price (from its current discounted level), to reach market price level in 2011, in line with Russia domestic gas price increase for industrial users
- Who receive the resource rent (Ricardian & Hotelling rents):
 - *Ricardian* rent – goes to producer/exporting-state (Russia)
 - *Hotelling* rent - until 2011 shared between producer/exporter (Russia) & importer (Belarus); since 2011 – goes to producer/exporter (Russia) => ECT Art.18



Putting a Price on ENERGY

International Pricing Mechanisms for Oil and Gas

Russian Gas Export: "Political" and "Non-Political" Pricing Zones (Ukraine, pre-Jan.4, 2006, & Belarus, pre-Dec.30, 2006, cases)



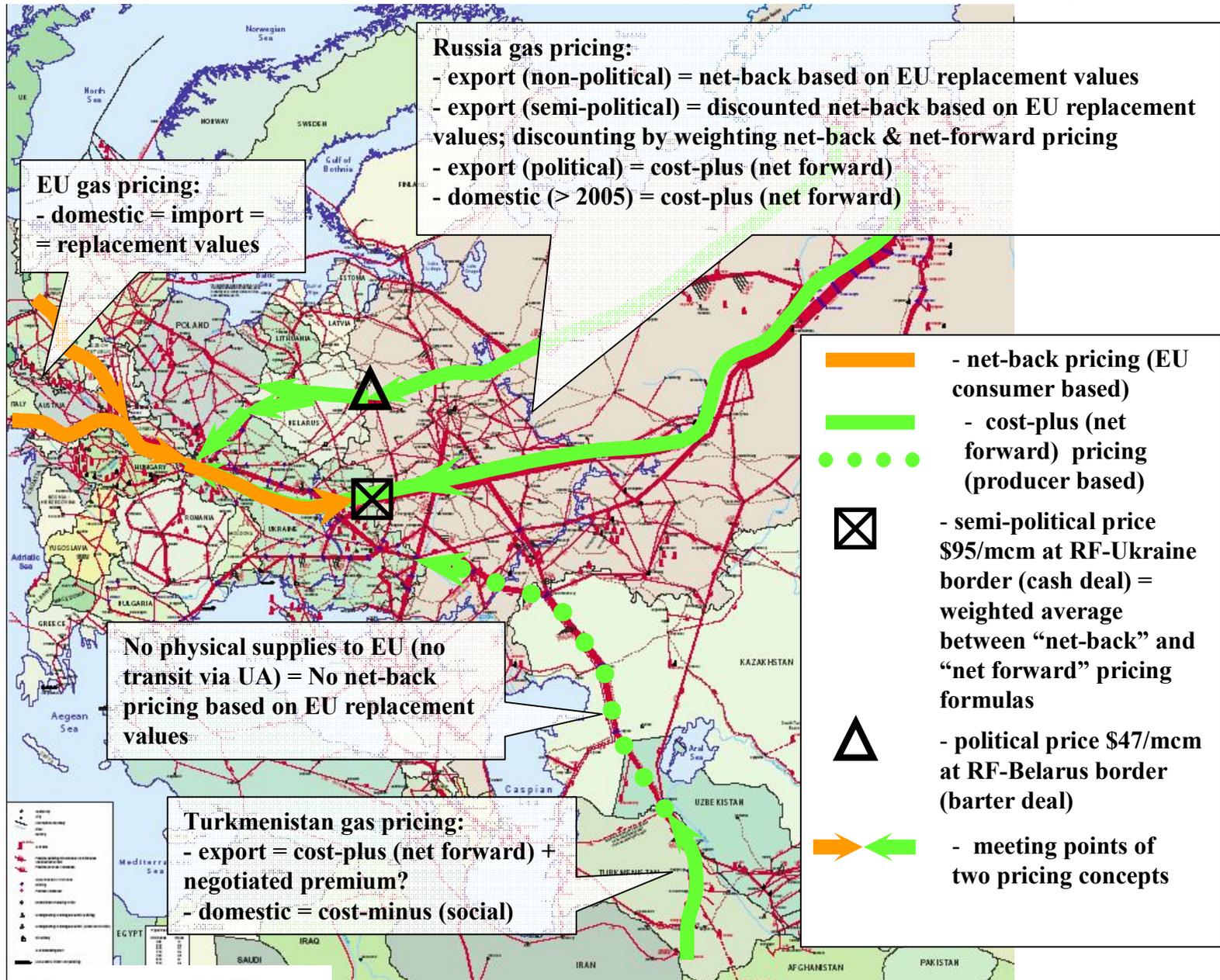
Map source: CGES

Putting a Price on ENERGY

International Pricing Mechanisms for Oil and Gas

Russian Gas Export to Ukraine:

“Political” and “Non-Political” Pricing Zones post-January 4, 2006



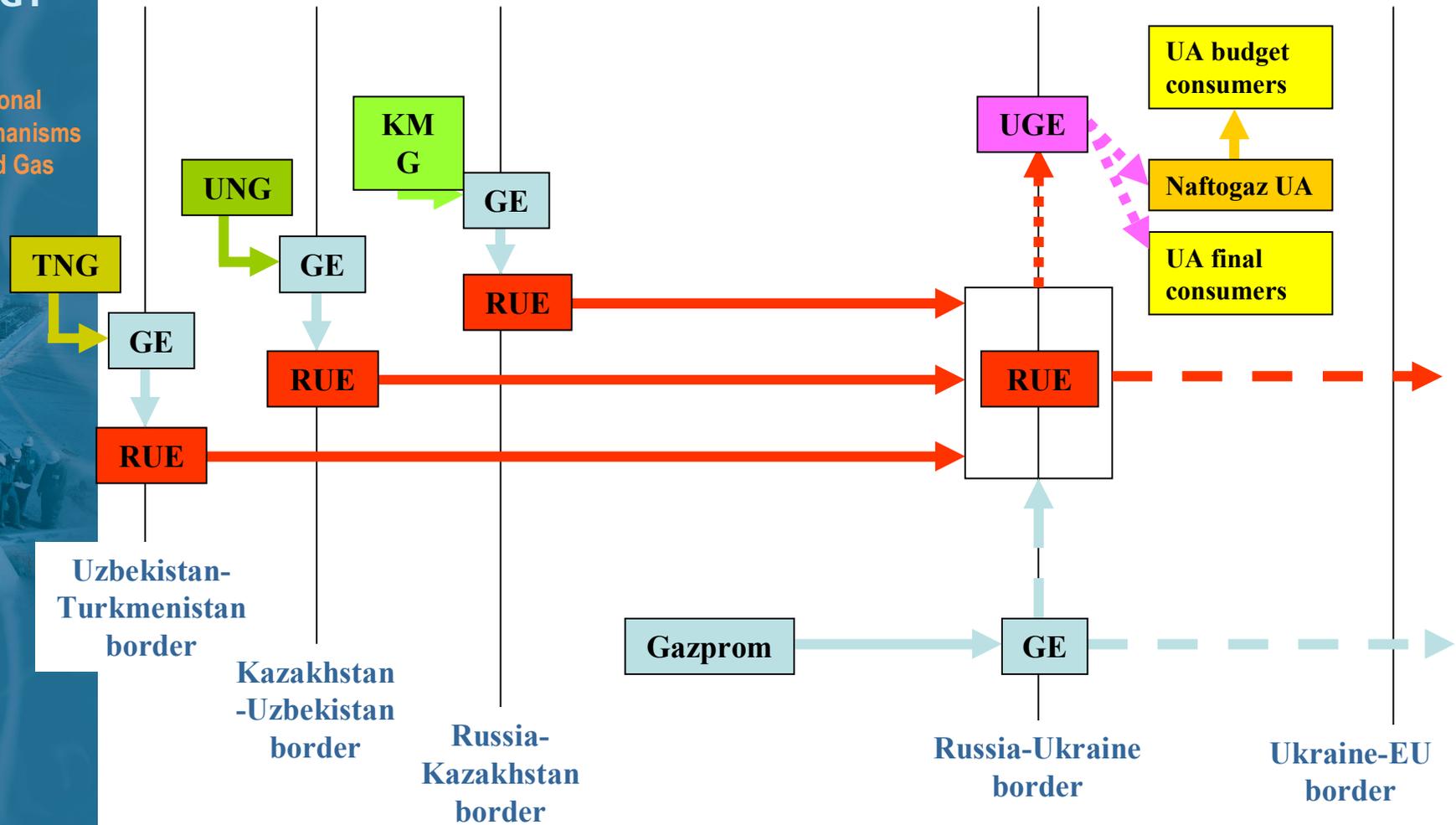
Map source: CGES



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International Pricing Mechanisms for Oil and Gas

Organisation of Russia-Ukraine Gas Trade After 4 January 2006: the Role of Intermediaries



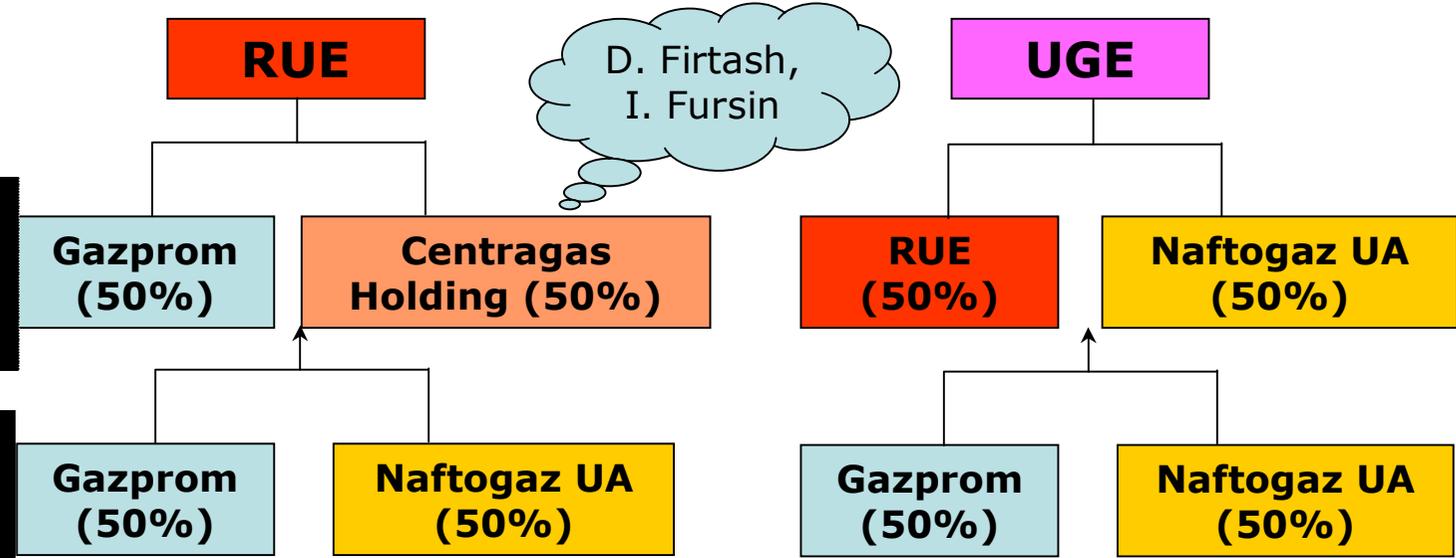
-  Cost-plus (net forward) pricing
-  Net-back replacement value pricing
-  Weighted average price based on two formulas' calculations



February 2008: How/Which/Whether Intermediaries in Russia-Ukraine Gas Trade Were Abolished

Pre-February 2008:

Post-February 2008:



RUE =
 (a) gas supply to UA of Russian and Central Asian gas received from GE & Gasprom based on mixing the gas & pricing principles in order to provide soft transition for UA to EU-based pricing (inevitable future result of UA intention to enter the EU)
 [+ (b) limited export]

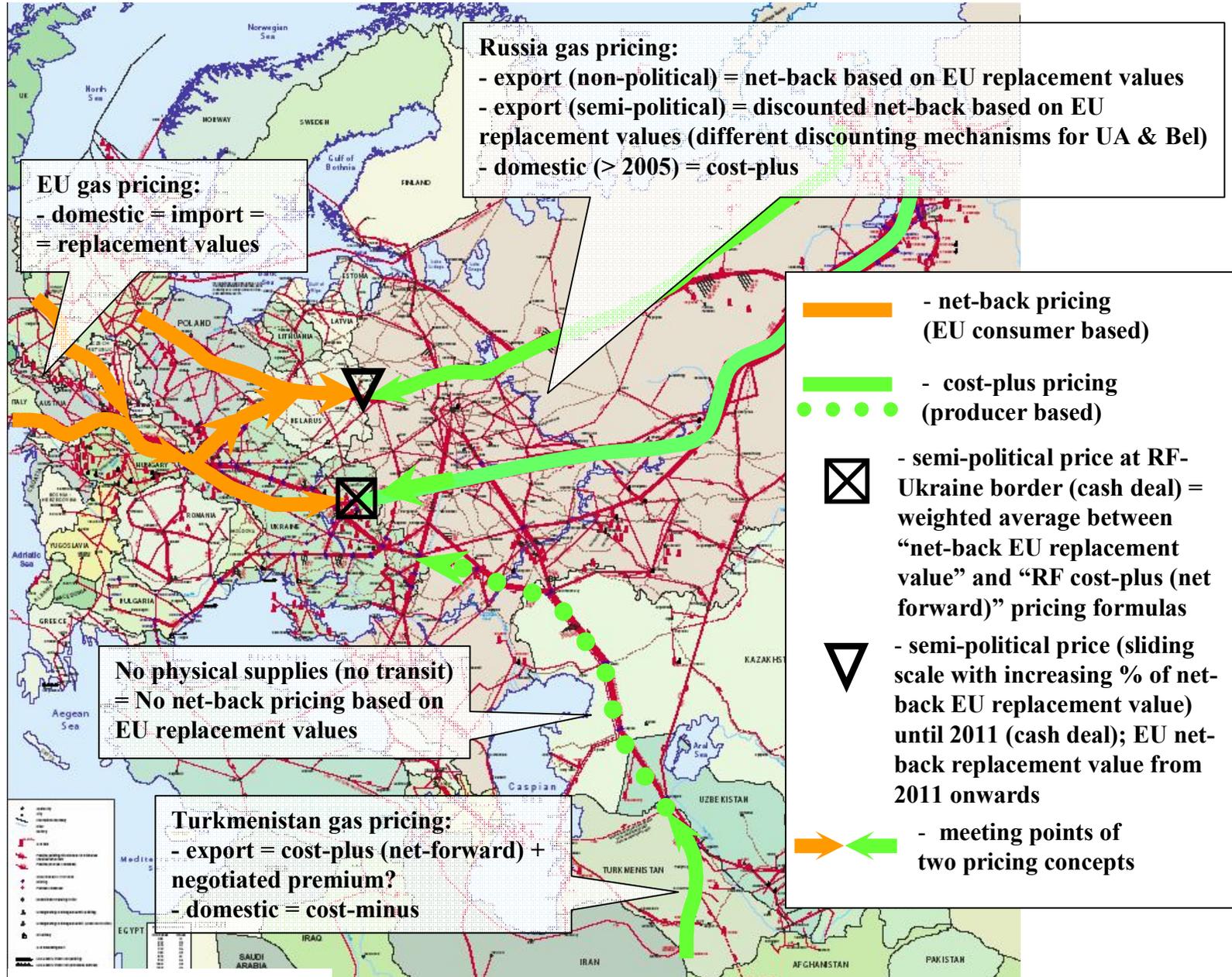
UGE =
 marketing of gas received from RUE within the domestic UA market (UGE = institutional form of "destination clause"; prevents UA from re-export of cheaper imported gas)



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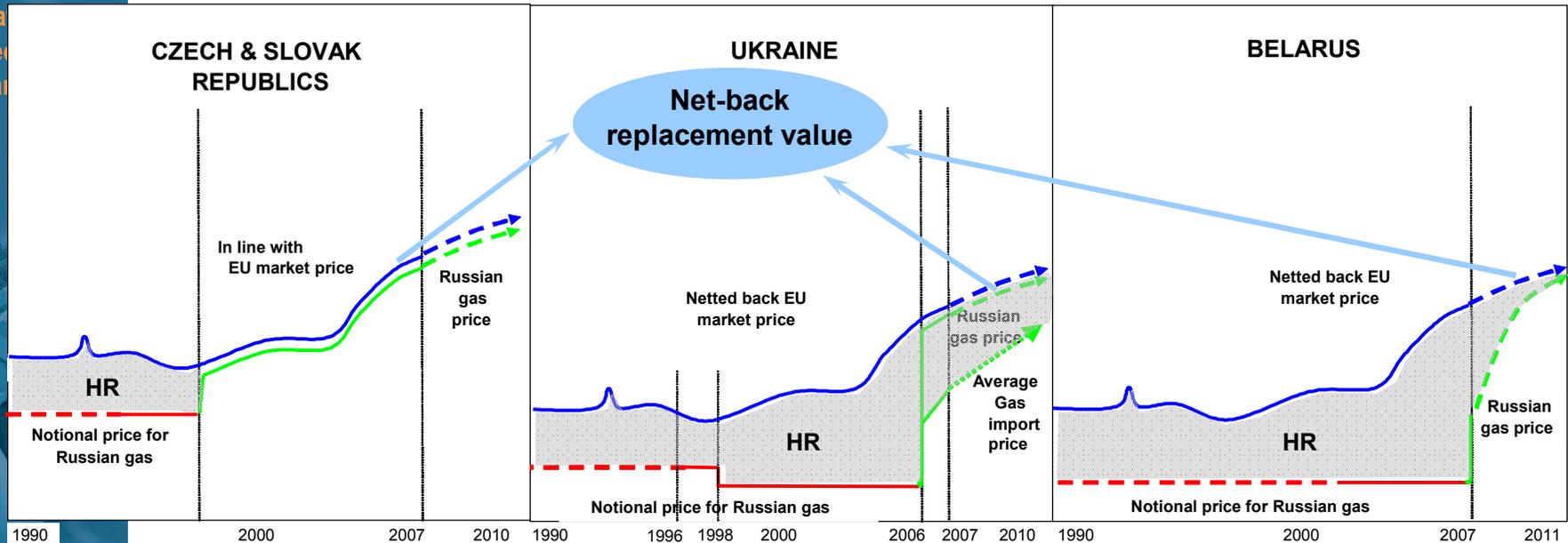


Map source: CGES



Russian Gas Prices to the EU and Countries along the Pipe

Internal Pricing Mechanism for Oil and Gas



- Remarks:**
- 1- The figures are entirely for illustration purposes and, therefore, may not fully reflect the actual price levels and movements
 - 2- The illustration for "Netted back EU market prices" are based on the IEA's World Energy Outlook, 2006
 - 3- Estimates for future gas price movements beyond 2007 are entirely illustrative.
 - 4- Recent actual price figures for Ukraine and Belarus, based on information from public sources, are as follows:
 For Ukraine - Russian gas price: 230 \$/mcm (2006) ; Average gas price (for a mixture of Russian / Central Asian gas): 95 and 135 \$/mcm (2006 and 2007, respectively)
 For Belarus - Russian gas price: 100 \$/mcm (2007) It will reach market price level by 2011 in agreed upon steps (67, 80, 90 and 100% from 2008 to 2011)
 - 5- Notional prices for Russian gas were used to determine volumes of gas as compensation for transit services.
 For Ukraine: 80 \$/mcm until 1998; 50 \$/mcm from 1998 to 2006
 For Belarus: 47 \$/mcm most recently until 2007

 Hotelling Rent



Russia & Former COMECON/USSR: Different Sensitivity of Transition to Market-based Gas Prices

	Czech & Slovak Republics	Ukraine	Belarus
Internal motivation vs. external political obligations to move to market pricing / prices	(No?) / Yes (accession to EU)	No / No	No / No
Price gap (market vs. political price): value (USD/mcm) & trend prior to transition	10- (1998); diminishing	15 (1998), 160 (2005); growing	25 (1998), 170+ (2006); growing
Relative economic value / political sensitivity	Low	High	Highest (Union state)



Conclusions

- Russian gas exports are based on Groningen (Dutch) LTGEC concept & proved its validity over 30-40 years
- Market gas export prices/pricing in continental Europe: gas replacement value at importer market netted back to delivery point + regular price rebate in LTGEC; regular practice since early 1960's
- Export prices/pricing to former COMECON & FSU states: step-by-step transformed from cost-plus-based political to market-based pricing/prices
- To soften transition to market export prices, for some countries (e.g. Ukraine, Belarus) different transition mechanisms introduced – in line with industrial gas price increase at Russia's domestic market
- Russian gas pricing to *all* destinations is being rearranged to universal market approach: replacement value in EU country netted-back to export point (Gazprom stated aim: equal financial results from operations at all its export markets)
 - Practical consequences for non-EU oriented exports?



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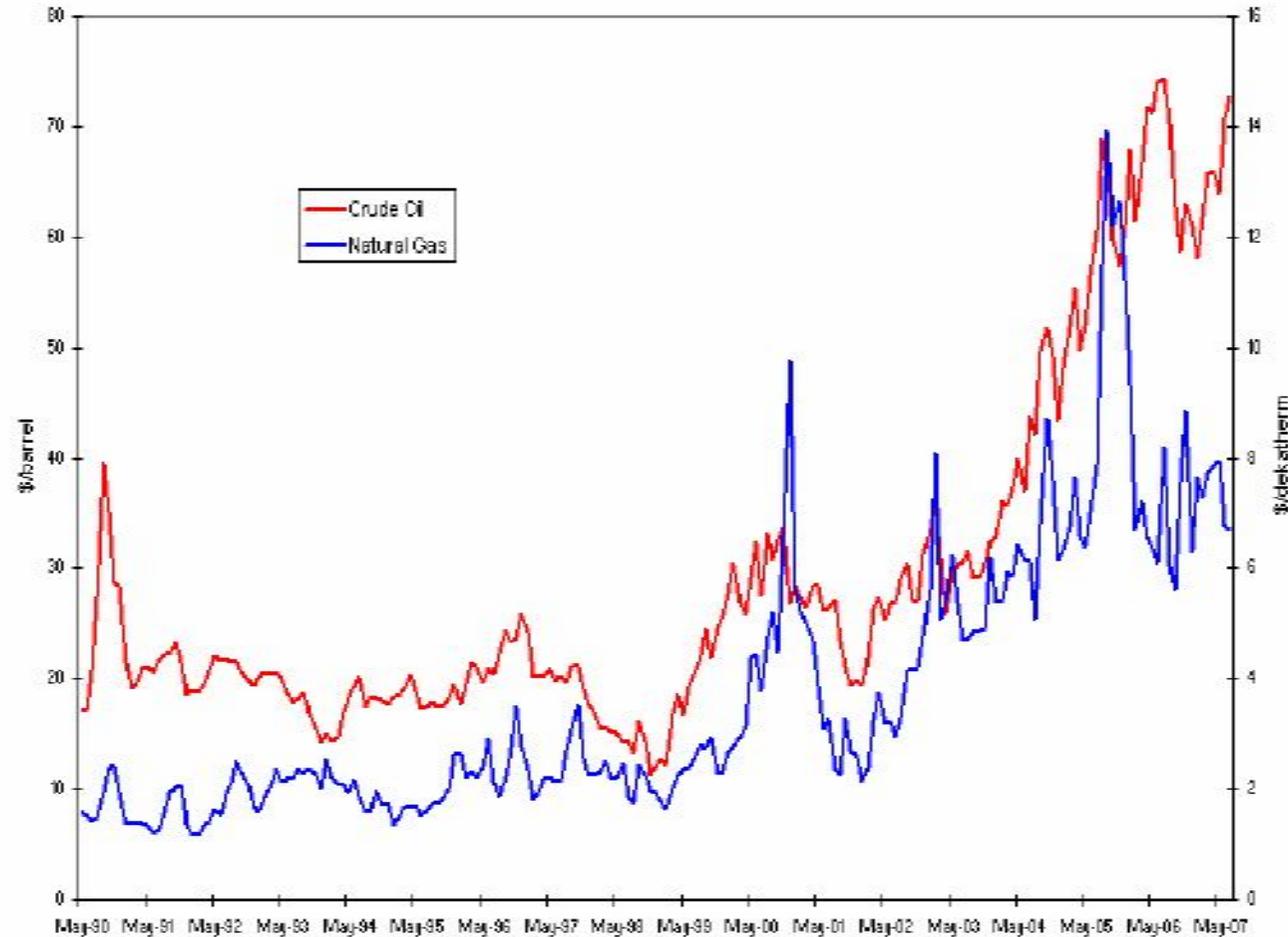
Gas Prices in North America

- During gas bubble prices were low, oil was ineffective competitor
- Emergence of “gas-to-gas” competition
- Perception that oil pricing was no longer relevant
- BUT ‘gas-shock’ of the winter of 2000/2001 => buyers bid up gas prices
- Dual-fired power generation users forced to switch to residual fuel oil =>
- Indirect linkage between gas prices and oil prices was re-established
- Recently surpluses returned => new decoupling of oil and gas pricing



The Pattern of Gas Prices Compared to Oil prices

NYMEX Natural Gas & Crude Oil Prices



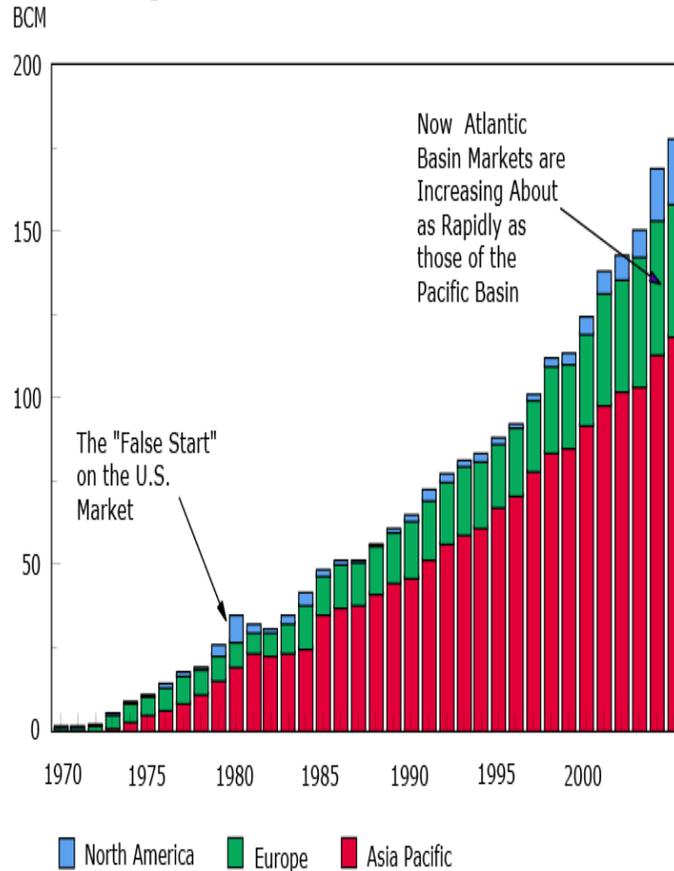
UK Gas Market

- Gas industry's transition from government monopoly to market competition complete
- New transition from a net exporter to a net importer
- New – recent gas imports:
 - mixture of traditional LTCs
 - arbitrage gas flows between UK and Continent
 - LNG supply subject to arbitrage with US
- Interconnector => channel for price signals to travel between UK and Continent
- Seasonal flows with peak deliveries to UK in winter

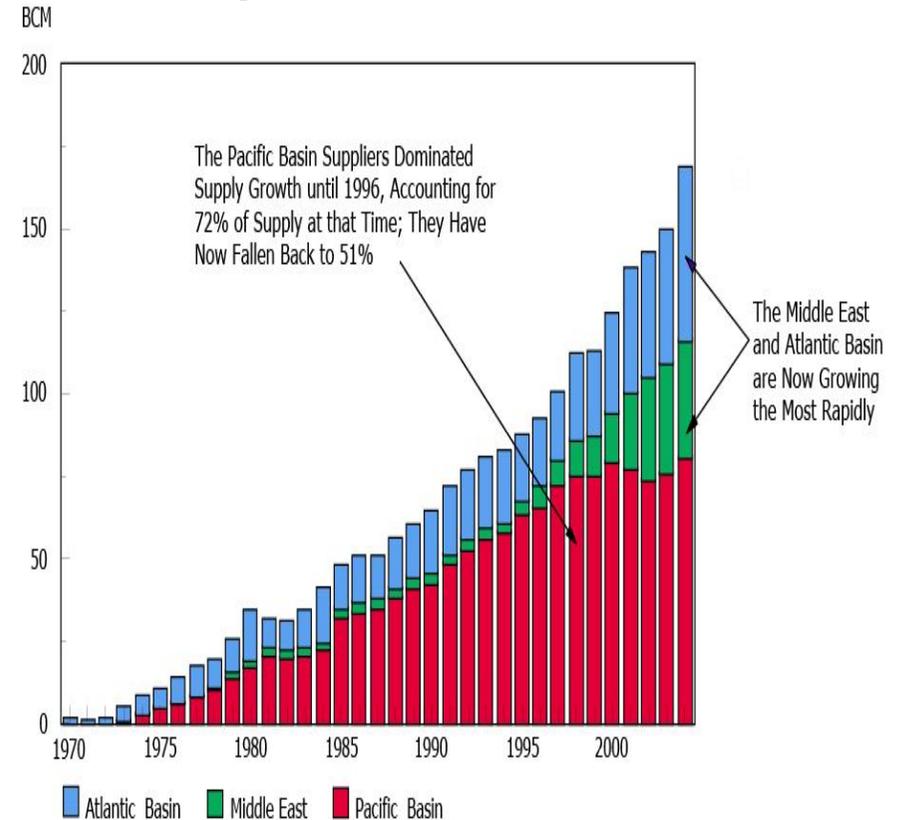


Growth of LNG Imports

By market



By source





Long-term Contracts in LNG Trade

- Sale and Purchase Agreement (SPA)
- Long term contracts – traditional pattern - 20 years or longer
- Risk sharing – buyers take volume risk (take-or-pay), sellers – price risk (price escalation clause)
- Flexibility through swapping cargoes
- Early indexation clauses used oil

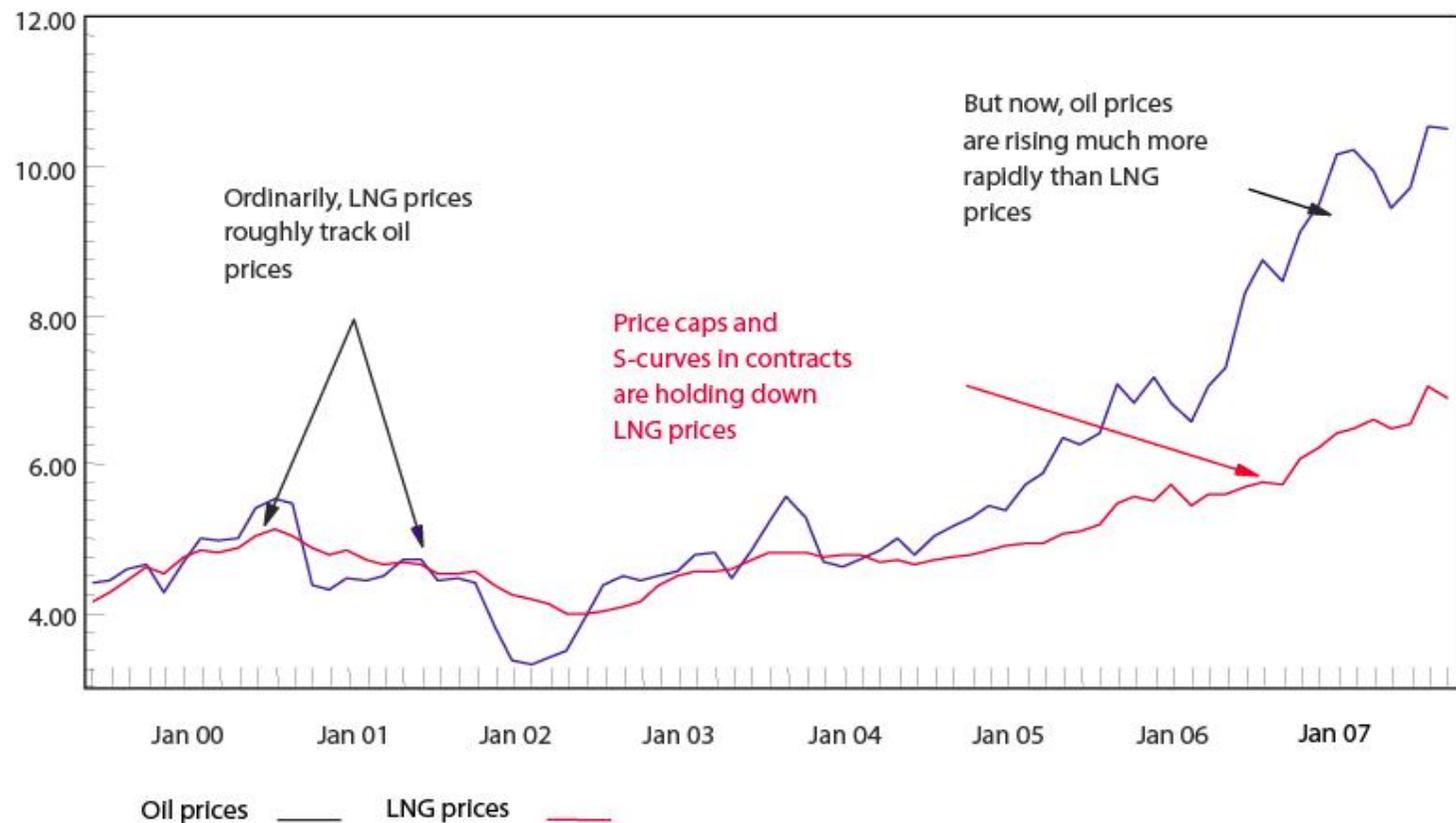
Development of Pricing - Pacific Basin

- First Japan's project from Alaska focused on electric utility market
- Interest in replacing oil in power generation => LNG major goal
- Concern over sulphur pollution => premium pay for LNG
- Crude oil was early reference
- Since 1987 – almost all contracts use Japanese Customs Clearing price for crude oil ("Japanese Crude Cocktail")
- South Korea and Taiwan adopted JCC approach
- To avoid oil price volatility buyers insisted on price re-opener triggered at certain price level
- Sellers interested in floor price



JCC Compared with LNG Import Prices

Price In \$/MMBtu



New Trends in LNG Activities

- Traditionally high take-or-pay threshold
- Buyers insist on more “take” flexibility =>
- Emergence of new LNG suppliers outside Asia Pacific plus reemergence of US market
- Flexibility in new contracts:
 - disappearing of floor price
 - shorter term
 - smaller off-take
 - destination flexibility (FOB instead of CIF)
 - buyers negotiating equity position upstream
- Important flexibility through self-contracting
- While LTC remain, they become more flexible (now more to the benefit of sellers)



Northeast Asia and Continental Europe

- Traditional contracting patterns remain important
- Prices linked to oil
- Northeast Asia – crude oil as reference
- Cont. Europe – mixes of fuel oil, gas oil, crude oil / review clause after 3 years
- Cont. Europe – generally traditional contracting (except where gas is used in power generation (e.g. Spain))
- Continent will be affected by competition with UK's gas-to-gas pricing via Interconnector



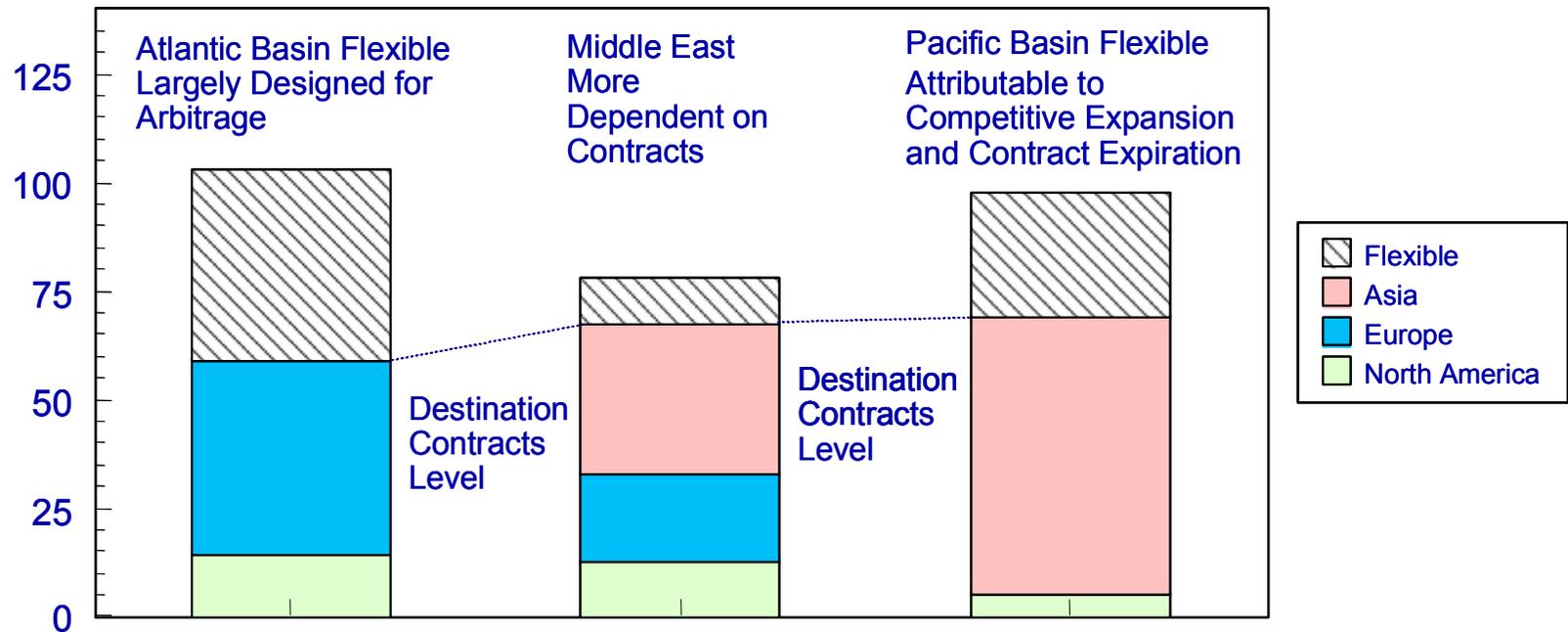
North America and UK

- Restructuring influenced the market in US and UK
- Short-term contracts dominate in US
- LTCs still dominate in UK
- LTCs refer to gas market indicators (Henry Hub or NBP)
- Oil linkage doesn't work for power generation customers
- => self-contracting, integrating downstream to sell directly to smaller resellers and end users
- Reliance on self-contracting and LTC with gas indicators likely to remain the basis for LNG trade in North America and UK



Estimated [1] Contractual Status of Firm and Probable LNG Capacity in Place by 2010 Million Tons of LNG

Million Tons



[1] Jensen Estimates Assuming Current Schedules

ATLANTIC BASIN

MIDDLE EAST

PACIFIC BASIN

Jensen



Structure: International Pricing mechanisms for oil and gas

1. Some theoretical and historical aspects
2. Development of long term contracts:
 - Groningen concept and price formula
 - Development of gas pricing in Eastern part of the Continental Europe
3. Regional differences in cross-border pricing of gas and impact of LNG
4. Conclusions



Main Results

Oil:

Liquid markets are **not** necessarily competitive markets

Gas is unlikely to follow oil soon:

Lower energy density means higher specific costs for transport and storage
=> Hindrance to a global market and to liquid market places

Major factors for gas pricing mechanisms:

- Resource rent optimisation by resource owning country
- Import dependence => **Limited regulatory reach**
- High specificity of pipelines, tying partner for a long time together

Long Term (Import) Contracts:

- concept for **international** gas trade developed by the Netherlands in 1962
 - Predominant part of international gas trade
 - Increasingly replaces annual compensation deals in FSU countries
- LTCs able to adopt to changes, e.g. reduction in fuel oil pegging
- LTCs a reality of international trade which can only be changed by consensus

LNG:

- Bulk still under long term contracts (for financing)
- Now flexibility for opportunity driven changes
- Serves as price transmitter (of high prices so far), **but** no market place



Putting a Price
on
ENERGY

International
Pricing Mechanisms
for Oil and Gas

The Report can be down loaded at:
www.encharter.org



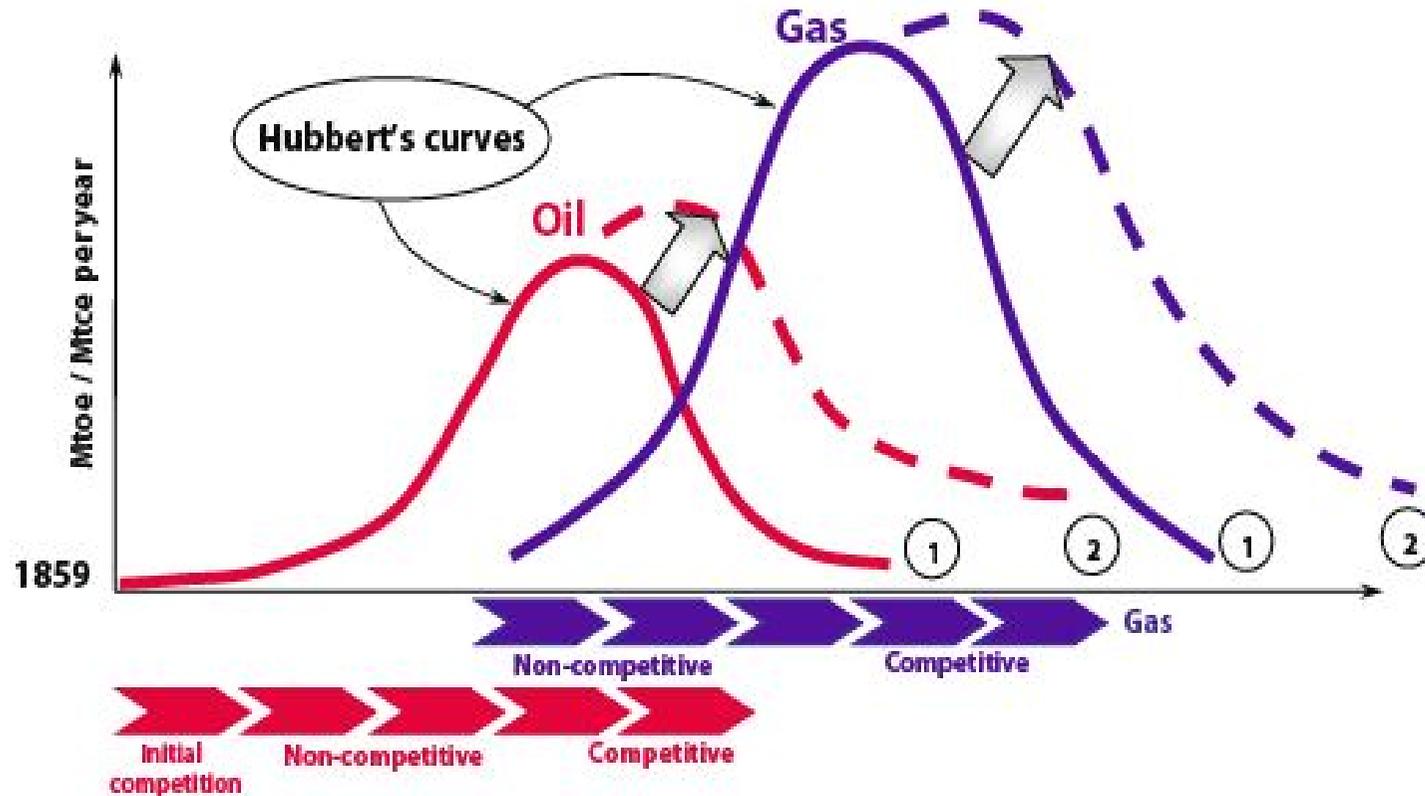
Putting a Price
on
ENERGY

International
Pricing Mechanisms
for Oil and Gas



Reserve Slides

Hydrocarbons markets: from non-competitive to competitive structures



Shift of "Hubbert's curve" in the foreseeable future due to economic and technical factors

- ① Conventional oil and gas resources as of today
- ② Unconventional oil and gas resources as of today which will become conventional ones in the future

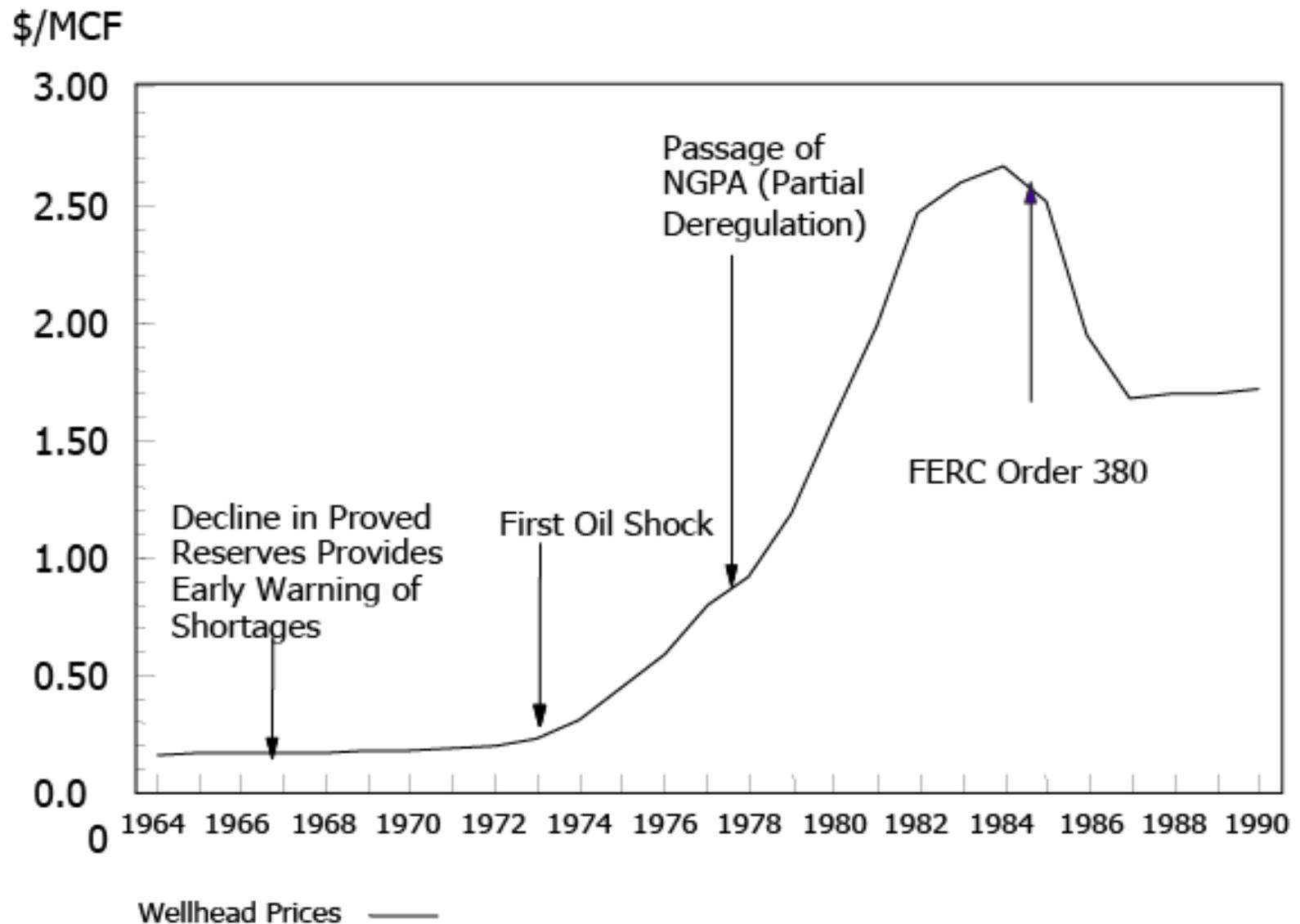


US Reform Policy

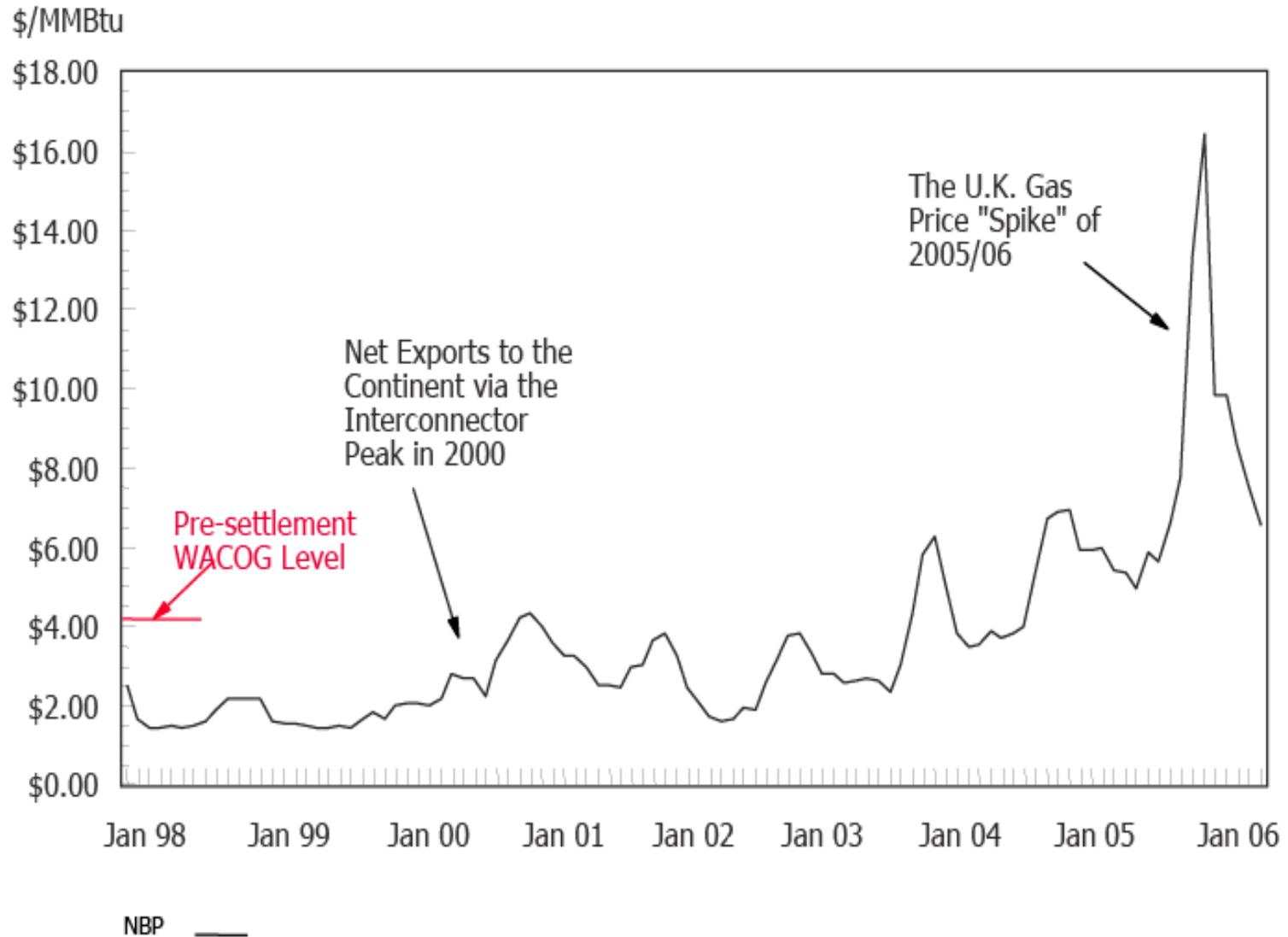
- Low price market – through 1954 (large reserves, lack of transportation)
- Regulation-induced shortages led to curtailments in 70s
- Natural Gas Policy Act of 1978 – partial deregulation =>
 - solving excessive demand problem
 - sharply higher gas prices
 - price control intrastate
- Cross-subsidies between price-controlled old supply and the newer contracts
- Average wellhead prices rose



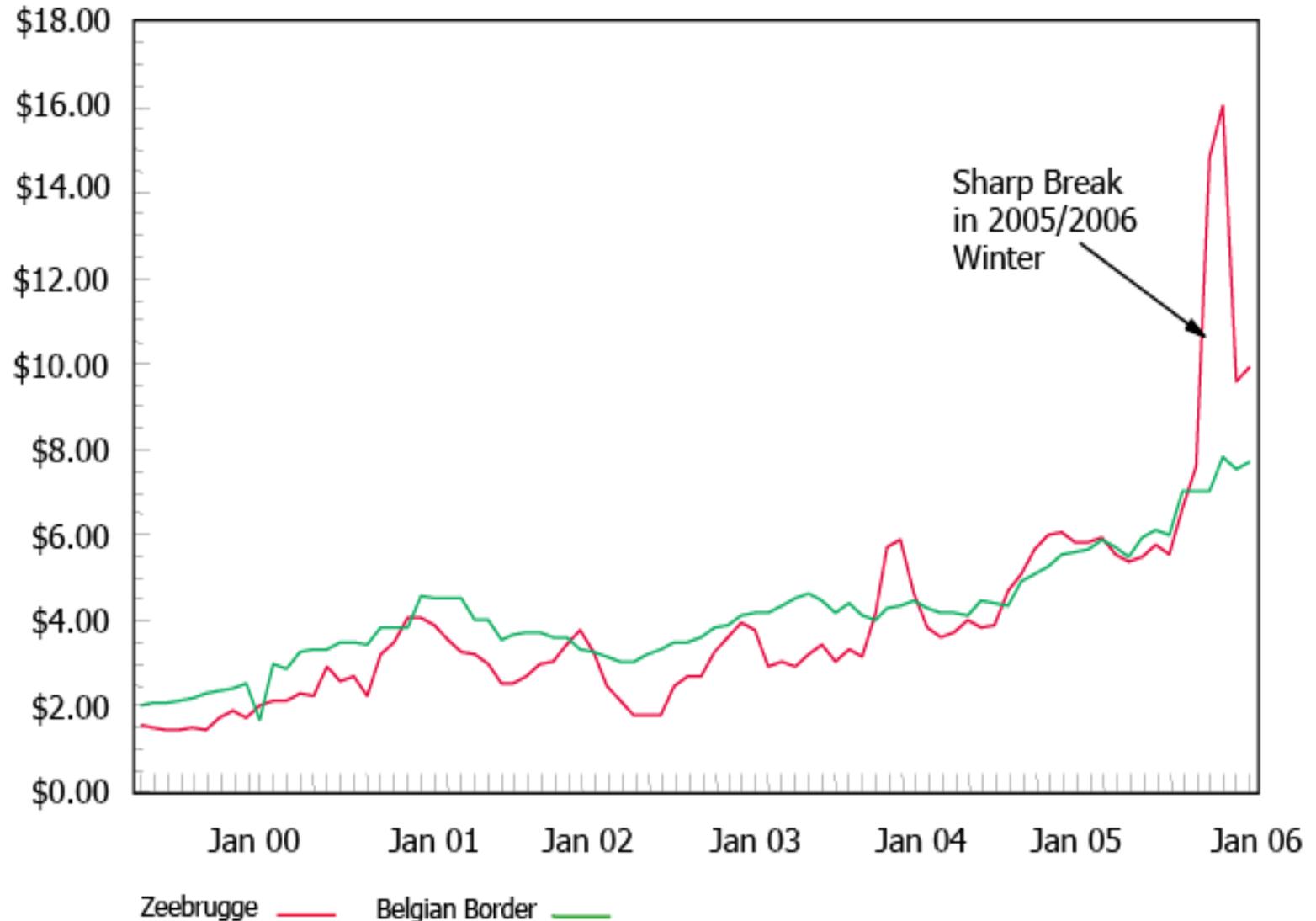
Wellhead Price before and after the Natural Gas Policy Act of 1978



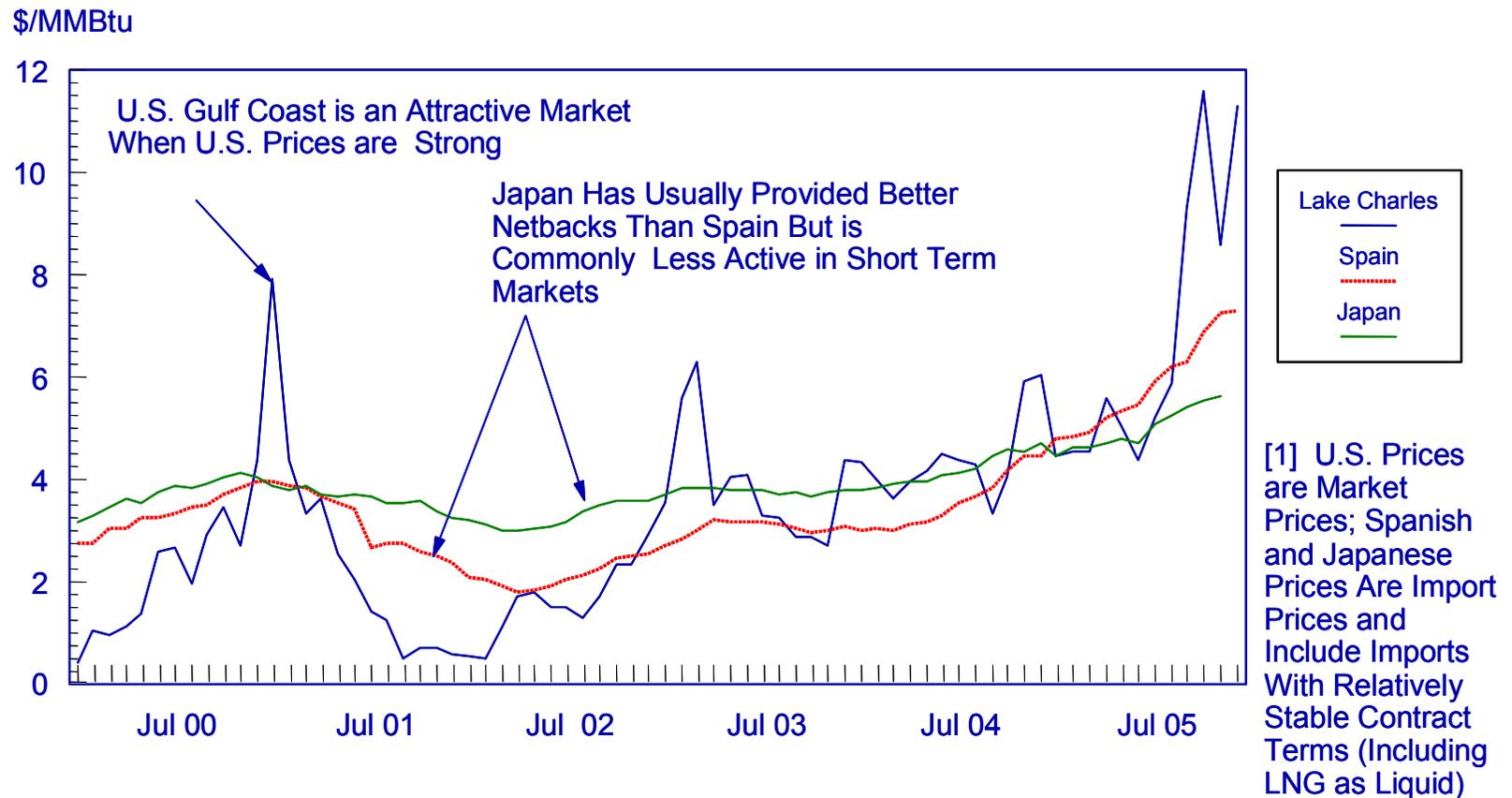
UK National Balancing Point Prices



Comparison of Zeebrugge and Belgian Border Prices



Illustrative Netbacks [1] from the US Gulf Coast, Spain and Japan to the Middle East Showing Arbitrage Patterns



Specifics of Dutch exports

● Short haul gas:

- ▶ High flexibility in line with market needs
- ▶ Low annual minimum pay (about 3000 hrs)
- ▶ Max capacity not available all year long
- ▶ Export investment covered by capacity charge

● Volumes:

commitment of certain volumes of reserves and delivery capacity vs. commitment to market minimum volumes (minimum pay)



Groningen: Concept of Long Term Contracts

First large gas export ever

Pricing:

- Replacement value (also domestically), regular price review
- For exports: net back to delivery point based on replacement value, arbitration in case of disputes

Ensures marketability of the gas

Volumes:

- Obligation for reliable supplies
 - Min pay volumes (take-or-pay)
- Ensures defined volumes, incentive not to oversupply the market

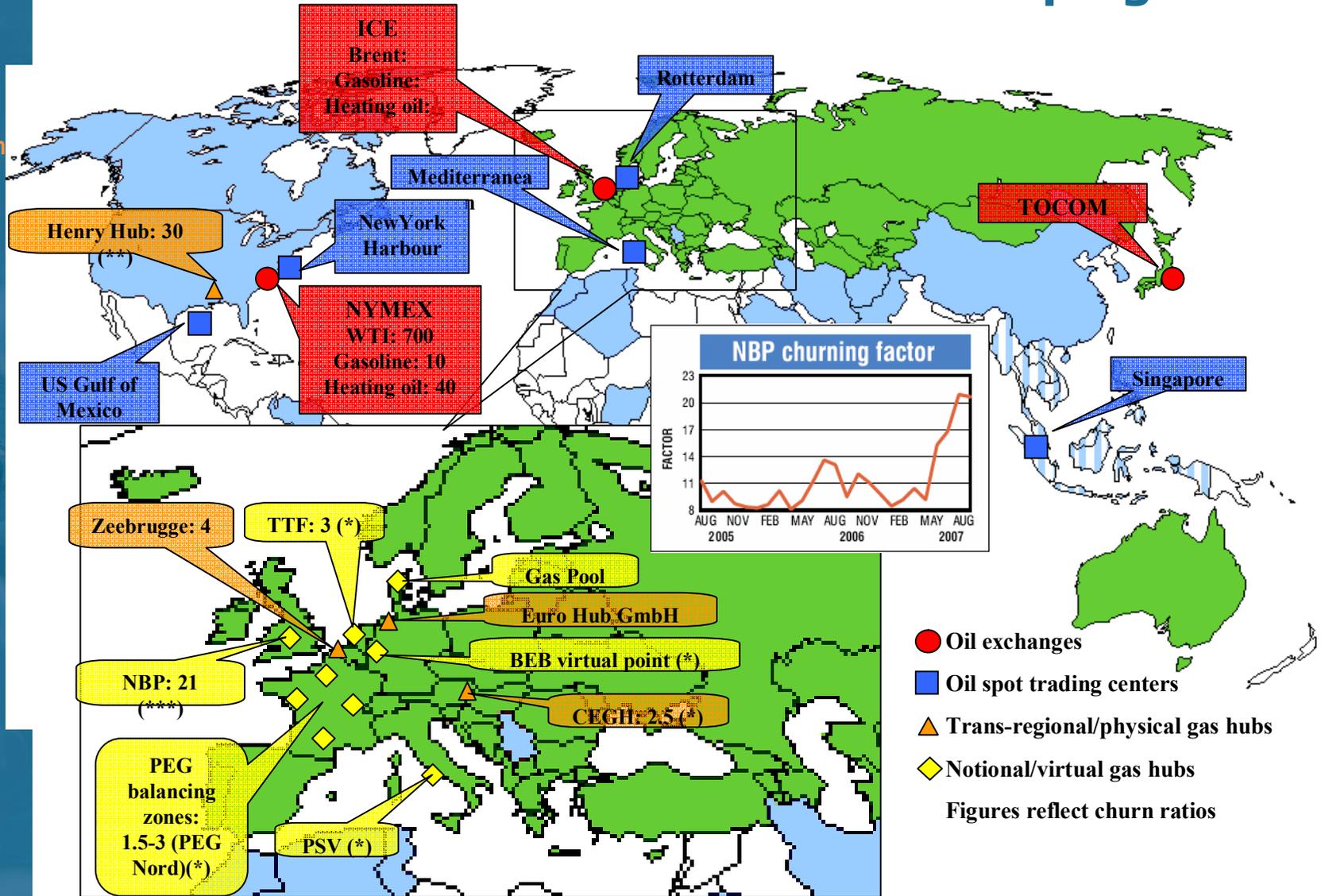




After Groningen

- Dutch experience encouraged exploration for gas and other gas supplies
- Replacement pricing concept => basis for investment and expansion of continental European gas network
- Increased gas exports from the Soviet Union, Norway, Algeria – more than 250 bcm/year imported based on Groningen concept

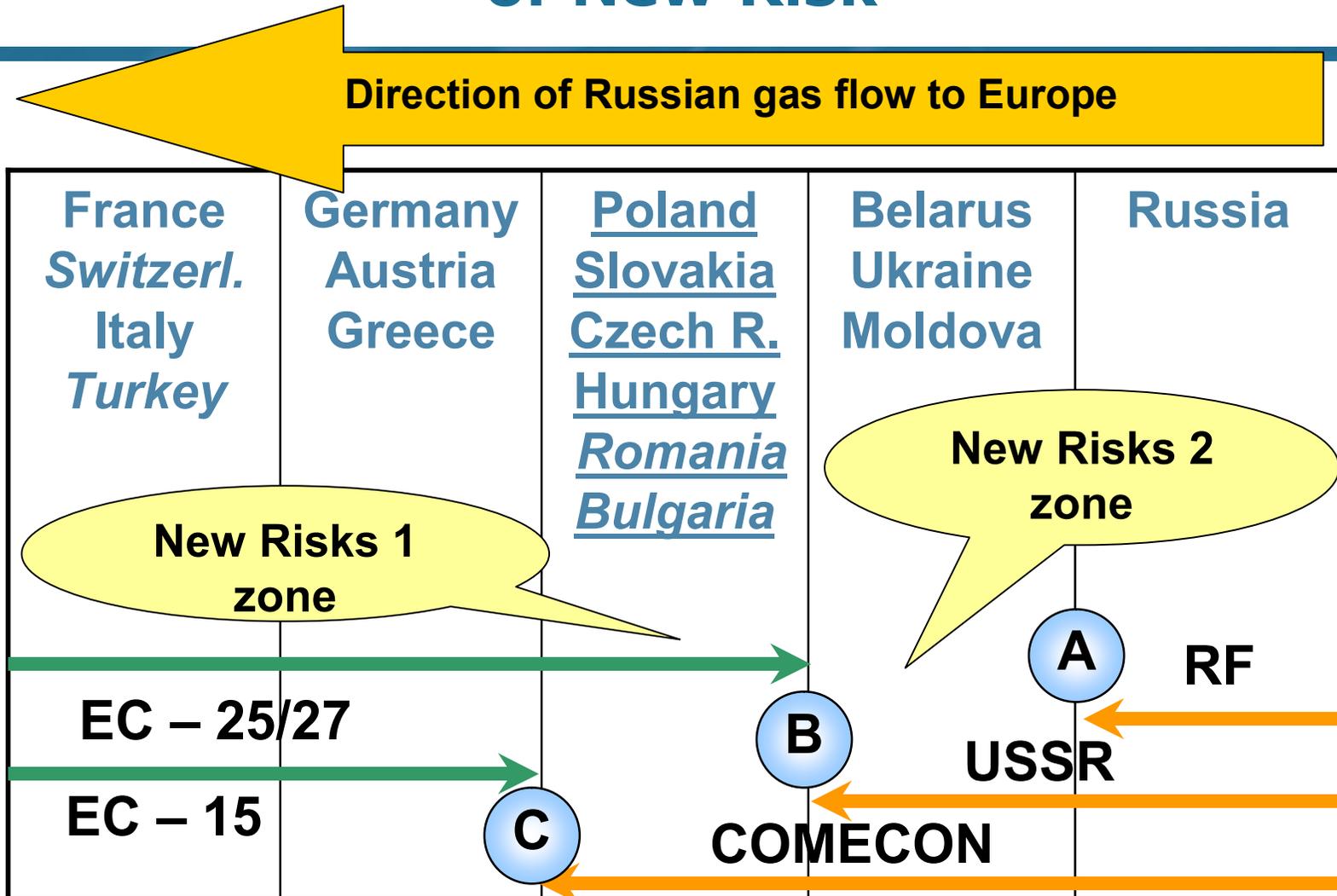
Comparative liquidity of marketplaces: worldwide oil vs. Continental Europe gas



(*) BEB hub = Bunde (Germany) at German/Dutch border, CEGH = Central European gas hub (Baumgarten, Austria), NBP = Notional Balancing Point (UK hub), PEGs = French hubs (GdF), PSV = Punto di Scambio Virtuale (Italian hub), TTF = Title Transfer Facility (Dutch hub);
 (**) 2004 – 2006 average; (***) 8-14 during the 2004 – 2006 period



Russian Gas Supplies to Europe: Zones of New Risk



Italic – non-EU countries; New EU accession states: underlined – since 01.05.2004, *underlined + italic* – since 1.01.2007; A, B, C – points of change of ownership for Russian gas and/or pipeline on its way to Europe



2004-2006 FLAME Polls on Gas-to-oil Price Pegging

Q 2004-05: When will European LTC gas prices “break loose” from oil prices and be ruled by spot/futures quotations?			Q 2006: To what extent will spot pricing in gas markets replace oil price pegging formulas?	
By yearend 2005	1	-	Very considerably	4
By yearend 2008	-	5	Considerably	28
By yearend 2010	24	17	To some extent	44
By yearend 2015	36	23	Slightly	23
After 2015	15	30	Nil	1
Never	24	25		



Where will it go?

Two possible directions

Present situation:

tight supplies, competition between consumers,
price peaks transferred by arbitrage

Future situation:

Case 1: More import dependence of North-America, UK
=> liquidity of the market places (churn) decreases
=> supply governed by LTC and vertical integration

Case 2: Attractive, deep and liquid market places
(US,UK) => more resources developed for export,
liquidity provided by LNG
=> increasing supply competition
=> LTC with replacement pricing leading to
=> LTC (also on the Continent) pegged to gas-to-
gas competition => more spot deliveries



Alternative / Complementary Concepts

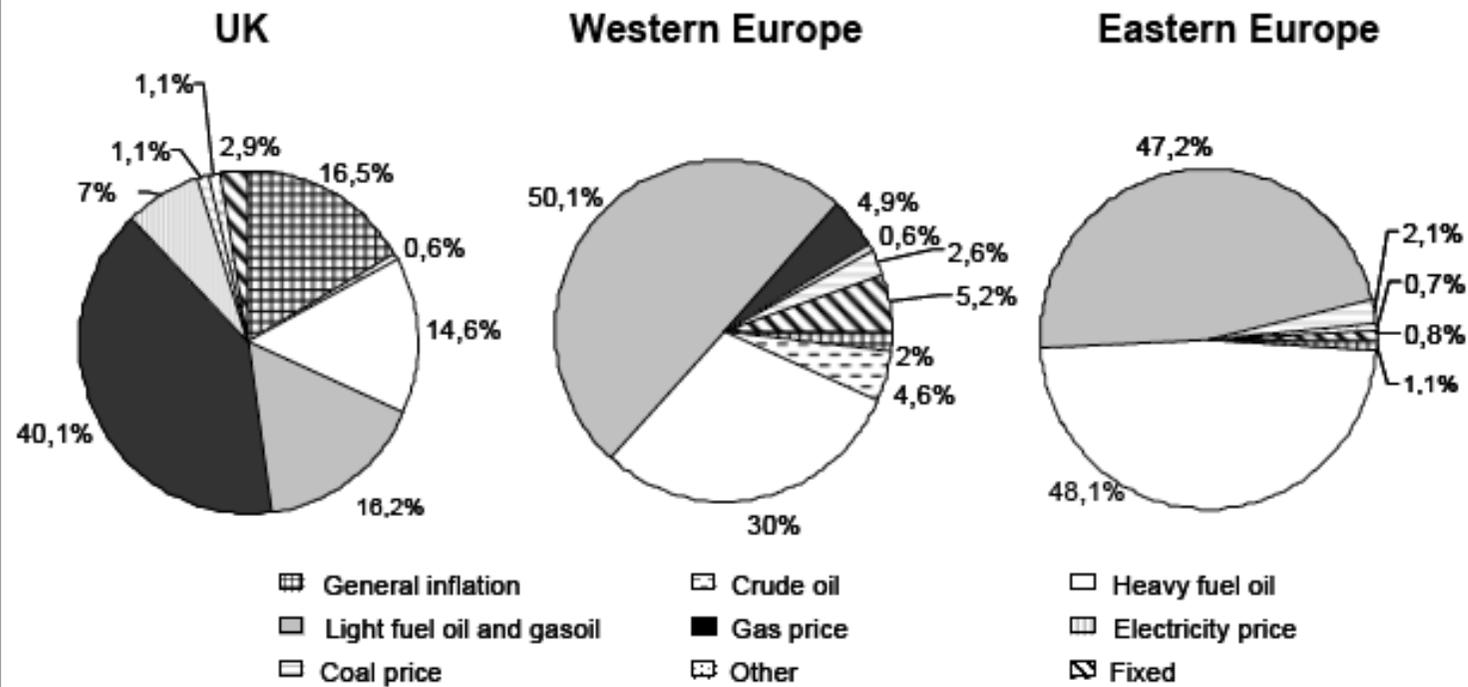
- **So far: LNG to US, UK and arbitrage on Interconnector**
- Expanding models of national gas market places to international trade:
 - Demand side flexibility by deep and liquid US market
 - Supply flexibility by LNG?
- **BUT:**
- Liquid markets not necessarily competitive
- Tight gas / LNG supply: more regasification than liquefaction terminals under way
- LNG: vertical integration / self contracting / arbitrage

So far: gas prices follow trend of oil prices



LTC: Indexation by EU Region

UK price indexation is very different to that in continental Europe



Source: Energy Sector Inquiry 2005/2006

