Формирование системы ценообразования на газ в Северо-Восточной Азии: влияние Европы и США

А.А.Конопляник,

д.э.н., профессор кафедры «Международный нефтегазовый бизнес» РГУ нефти и газа им.Губкина, Москва

Международная конференция
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Formation of gas pricing system in North-East Asia: European & US influence

Dr. A.A.Konoplyanik,
Professor Chair “International Oil Gas Business”,
Russian State Gubkin Oil & Gas University, Moscow

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3 key energy pricing mechanisms worldwide (terminology)

- **Cost plus (net-forward):** linked to producer production & transportation costs (+ROR)
- **Replacement value based (+ net-back):** linked to prices of competing fuels at end-user (if net-back: less transportation costs from delivery point to end-user)
- **Commodities (spot/exchange-based):** based on demand-supply equilibrium at physical (spot) and/or paper (exchange-based) energy market

NEA: gas flows & pricing models (1)

- **NEA = Japan, Korea, China** => all three different:
  - **Japan & Korea**: LNG imports only (pipeline to Korea?), no domestic gas
  - **China:** LNG + pipeline imports, domestic NG + future shale gas
- **Domestic gas (China):**
  - **Today – NG: (i)** regulated domestic gas price lower than imported LNG & (discounted) Central Asian gas; **(ii)** pricing reform in 2 provinces – towards original Groningen LTGEC formula (RFO/LPG = 60/40, k = 0.9)
  - **Today – shale gas:** negotiating tool for pressing-down Russian contractual import gas price/pricing formula

NEA: gas flows & pricing models (2)

- **Import LNG:**
  - **Today** (Qatar, Malaysia, Australia, Russia, etc.): Japan as Asia's LNG price maker => LTGEC indexed to JCC (S-curves)
  - **Tomorrow** (+ from US/2015+): HH-indexed LTGEC & spot? Will US become a new Asia's LNG price maker?
- **Import Pipeline gas:**
  - **Today (Central Asia):** discounted pricing: LTGEC + cost-plus (?) pricing *linked* w tied-loans (lower CA prices for cheaper Chinese loans)? => continuation of long-term China external energy policy "oil/gas for CAPEX/tied-loans and/or for infrastructure"
  - **Tomorrow (+ Russia?):** LTGEC + (different views): oil-indexation (Russia) vs coal-indexation or HH-indexed LNG (China?) – if replacement value-based pricing

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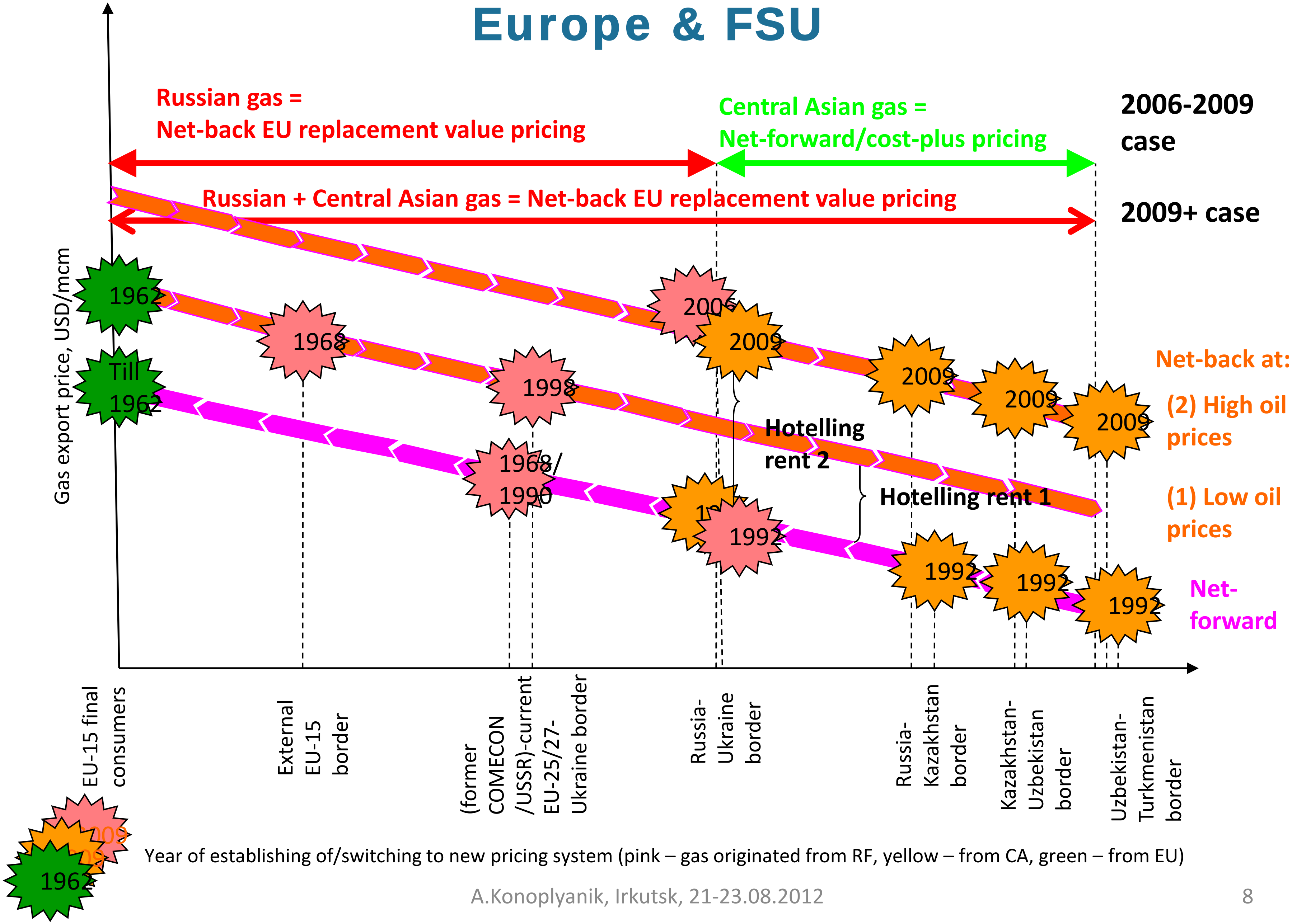
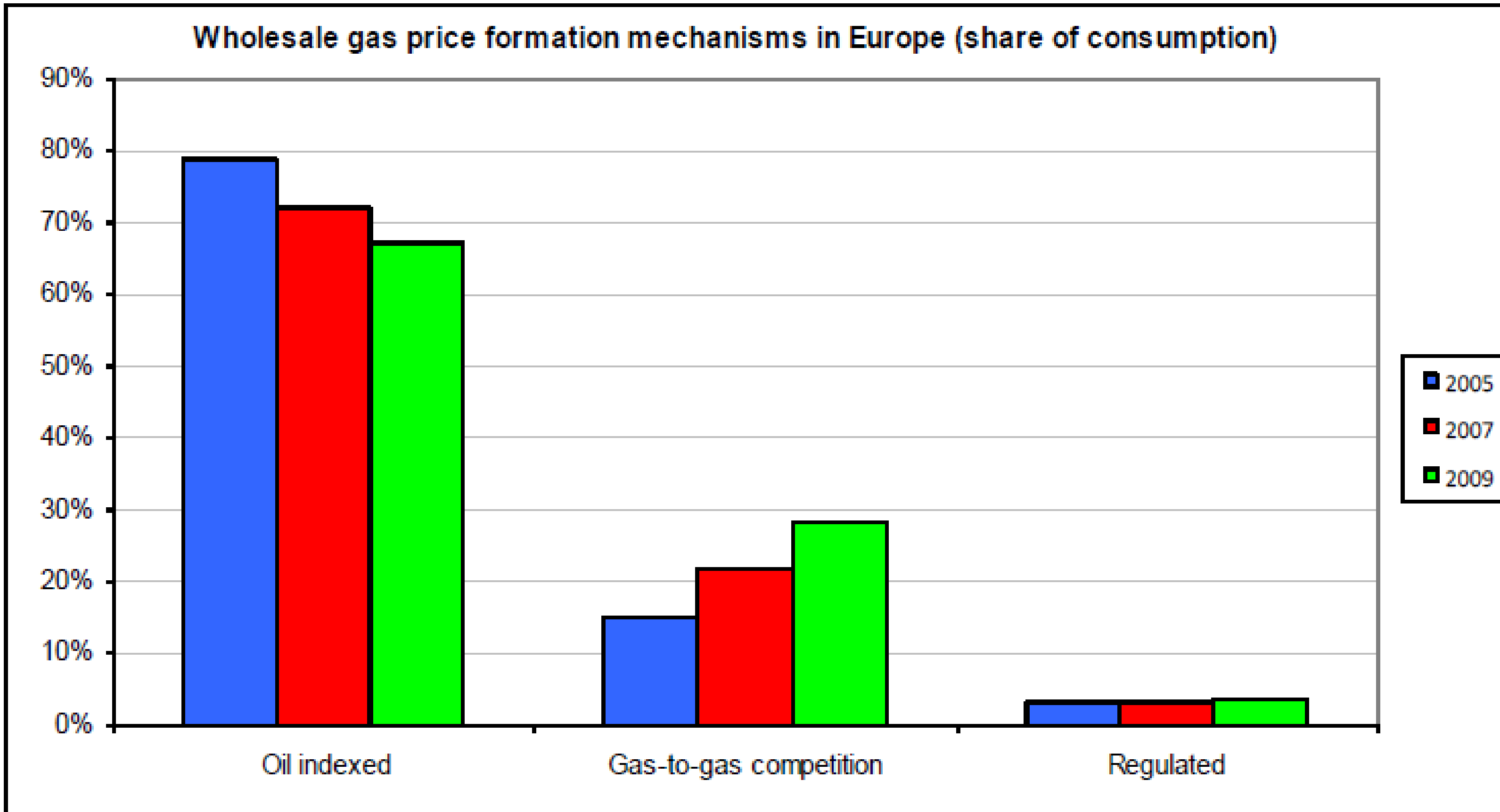
Evolution of gas export pricing in Continental Europe & FSU



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

Gas price formation



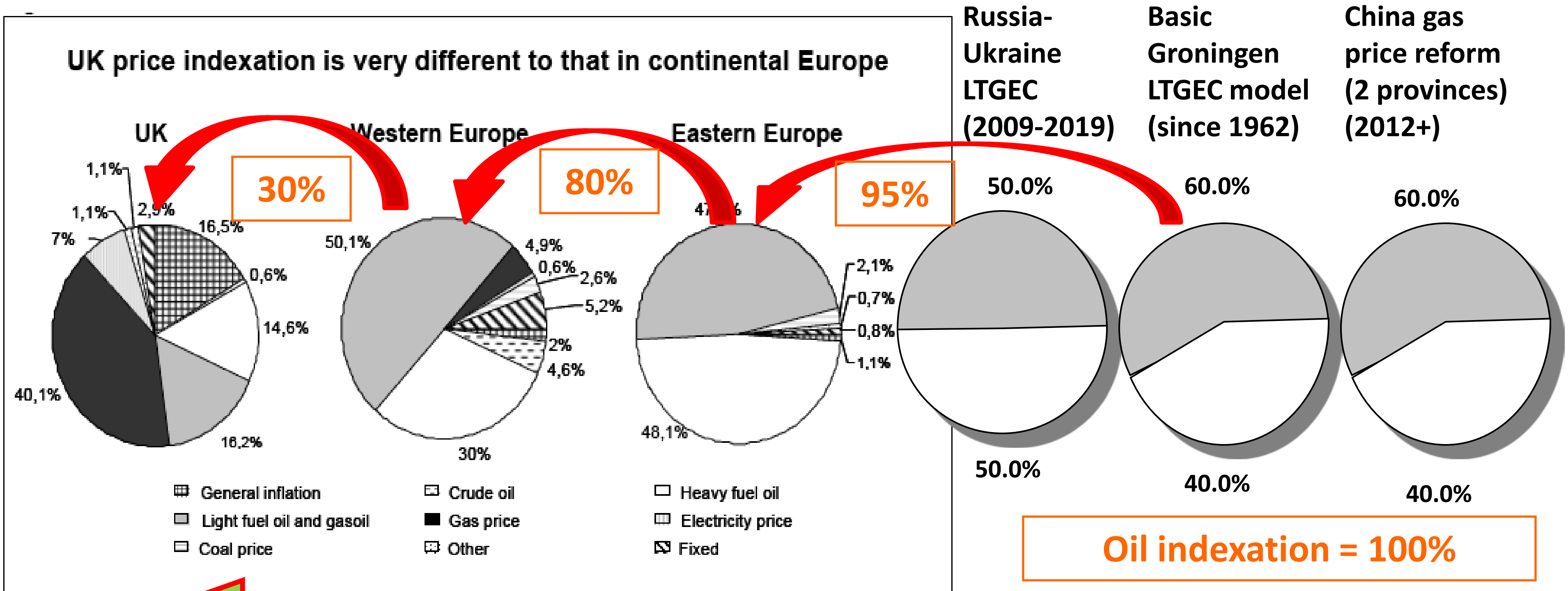
Source: 2009 International Gas Union Survey.

Source: Walter Boltz. Presentation on "Gas Pricing" at the 11th round of informal Russia-EU expert consultations on the Third EU Energy package issues/4th meeting Work Stream on Internal Markets, Russia-EU Gas Advisory Council, Moscow, Gazprom / Gazprom export, 26-27.06.2012

Oil indexation: arguments “in favour” and “against”

“In favour”	“Against”
1. Worked out in practice for 50 years => convenient for users 2. Narrows corridor of price fluctuations, increases price predictability, minimizes investment risks 3. Convenient tool for financial institutions => hedging => provides debt financing 4. Transparent and understandable pricing mechanism (at least for professionals) 5. Professional, homogenous, stable and narrow circle of market participants 6. Proposed alternative (spot/futures) is not better: low liquidity (EU), high possibility for manipulations	1. Conservation without changes does not correspond to evolution of “replacement value-based” mechanism within LTGEC (based on inter-fuel competition) 2. Liquid fuel ceased to be a replacement fuel for gas in industry, electricity generation, but just a reserve (back-up) fuel 3. Withhold gas price below oil parity (price of oil in energy equivalent) 4. Links gas price to highly liquid, but manipulated and unpredictable futures oil (oil derivatives) market 5. Confidentiality, thus closed and non-transparent for the public 6. Currently: higher contractual prices compared to spot transactions

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



Source: Energy S... 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 =>

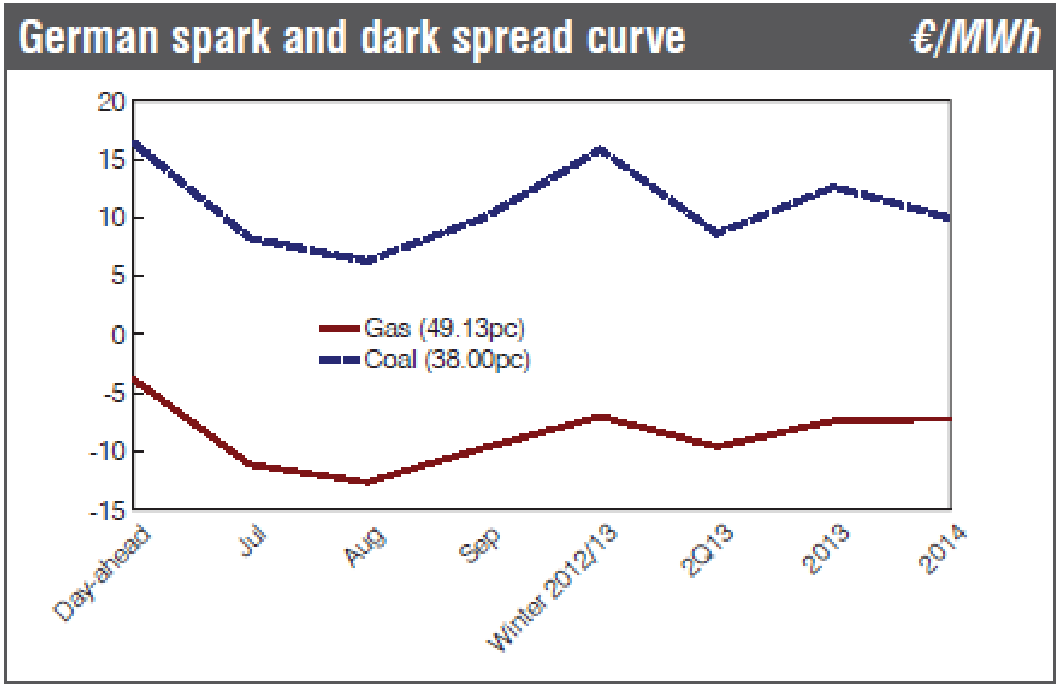
away from oil parity?

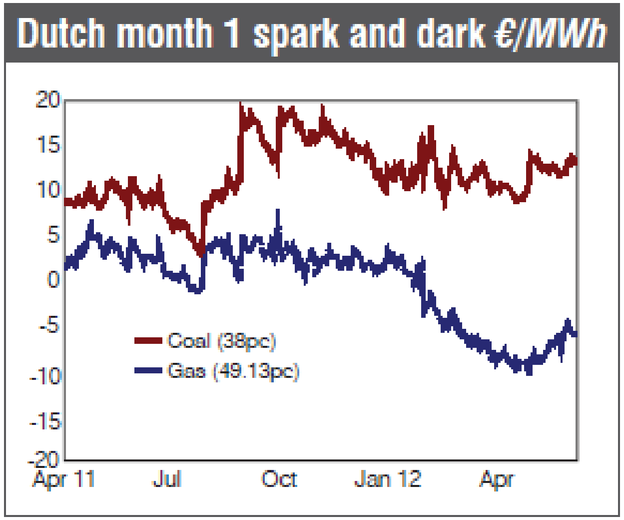
China gas pricing reform – same approach (to basic Groningen formula)?

Gas to Power in Europe

E-CONTROL

Oil indexed gas pricing strongly supports the renaissance of coal in Europe





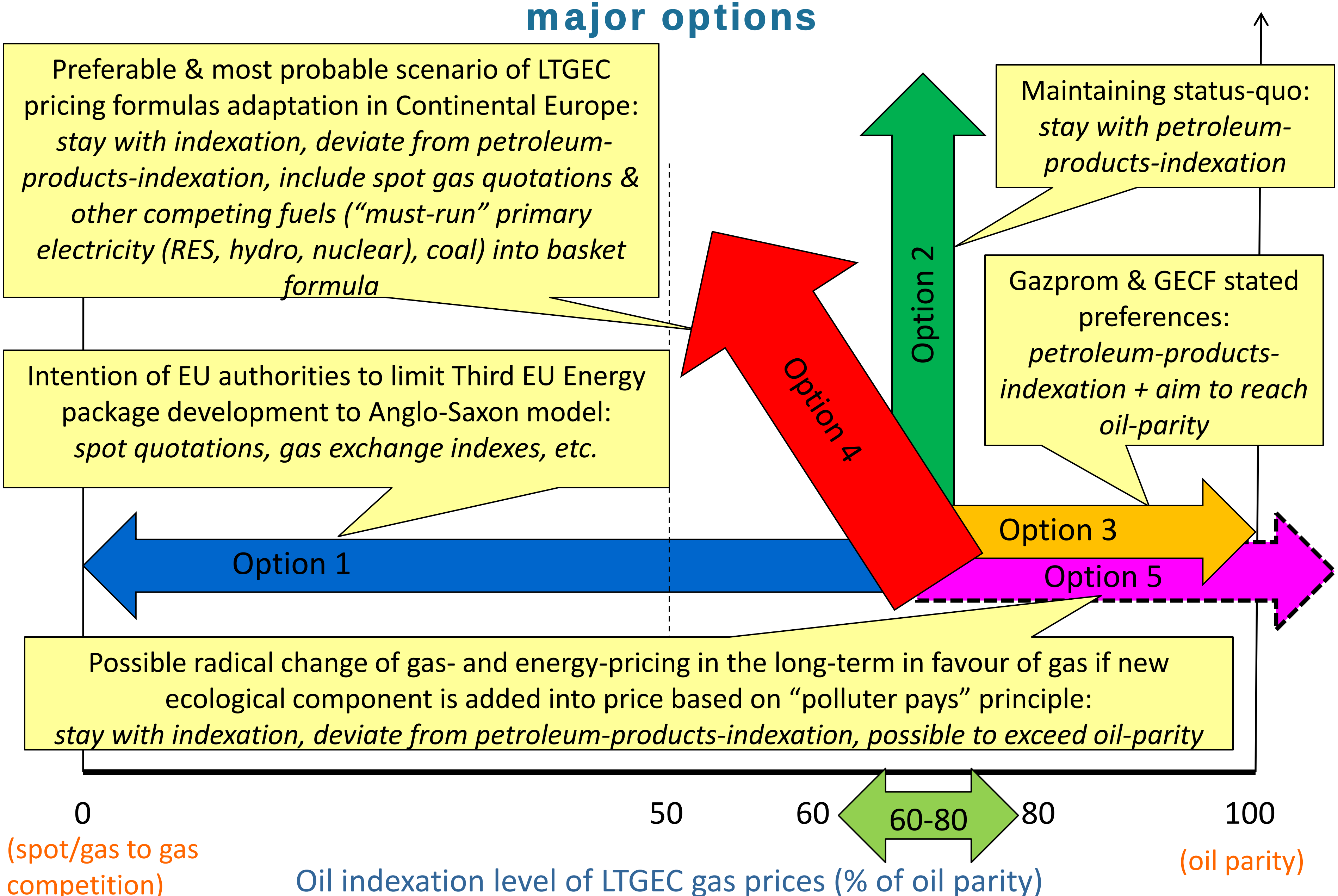
Source: Walter Boltz. Presentation on "Gas Pricing" at the 11th round of informal Russia-EU expert consultations on the Third EU Energy package issues/4th meeting Work Stream on Internal Markets, Russia-EU Gas Advisory Council, Moscow, Gazprom / Gazprom export, 26-27.06.2012

Source of the two figures: Argus Media, Power in Europe, 13 June 2012

Gas price indexation: new prospects in EU electricity generation

- **Competing/replacement fuels** (basis for gas indexation):
  - **Contractually:** through whole period – RFO/LFO (Continental Europe)
  - **In practice:** historically – RFO (1960/70-ies), today – coal & RES
- **Gas vs Coal:** *new* CCGT vs *old* coal power stations:
  - **New CCGT:** to recoup new CAPEX + high fuel costs (if gas linked to RFO/LFO) => spark spread (E-G) ***negative*** in EU
  - **Old coal stations:** CAPEX already recouped + low fuel costs (lower than gas price) => dark spread (E-C) ***positive*** in EU
  - **+ ecology: net spreads** (incl. current low spot CO2 price: from 30 to less 10 USD/tCO2 in 2008-2012) changed in favour of coal: until mid-2010 NDS minus NSS was negative and diminishing, since mid-2010 it became positive and is growing => low CO2 price discriminates gas vs coal
- **Gas vs RES:** *new* CCGT vs *new* RES (wind & solar):
  - **New RES:** "must-run" generation => subsidized CAPEX + zero fuel costs (even after RES subsidies are banned after CAPEX are made)
  - **New CCGT:** as "back-up" capacities for RES only (high gas LTGEC prices prevent to use gas as base-fuel) => low load factor + non-subsidized CAPEX + high fuel costs => long pay-back periods diminish ROR below acceptable levels

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



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Traditional Asian vs US Cheniere Sabine Pass LNG pricing model

- Traditional LTGEC Asian model (Japan as import LNG price-maker):
  - TOP & JCC-based price indexation (currently **16 USD/mmBtu**)
- Cheniere Sabine Pass model (2016+):
  - Off-taking: Departure from TOP - Cheniere's customers can take less LNG than specified in the contract (20-year-long with BG)
  - Pricing: Gas will be sold at a price indexed to Henry Hub (HH: May '12 = less **2 USD/mmBtu** (historical minimum), Aug'12 = **3 USD/mmBtu**)
  - After liquefaction, transport and other costs, LNG could be imported into Asia for **11-13 USD/mmBtu (?)** ("Gulf Coast to Japan ends up at 11-12 USD/mmbtu in 2016" – Wood Mackenzie)
  - Selling & buying gas at the same basis (HH-indexed) => from "cost plus" (producers) to "HH-plus" (purchasers) pricing mechanism

US Cheniere Sabine Pass LNG pricing model & Asian prices

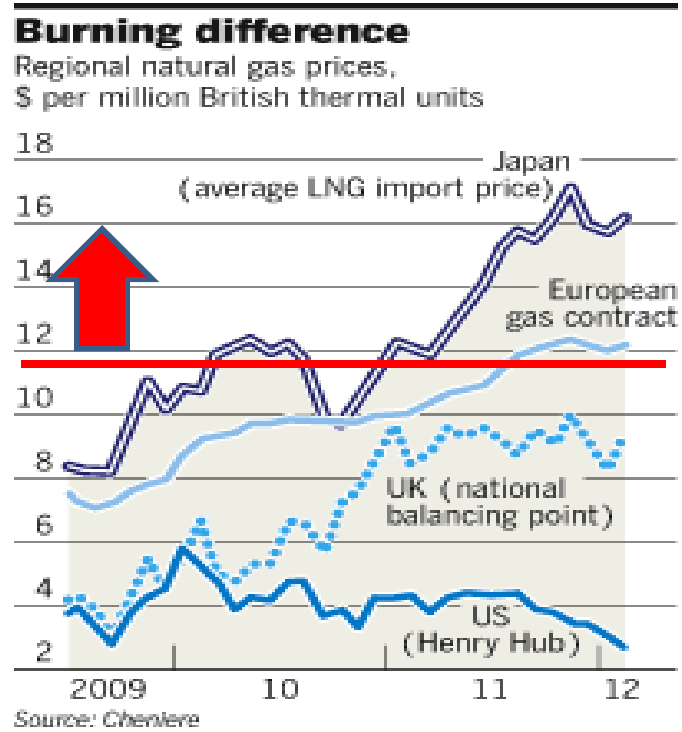
NEA/Japan LNG import price → 11.5-13.3 | 17.2 (June' 12)

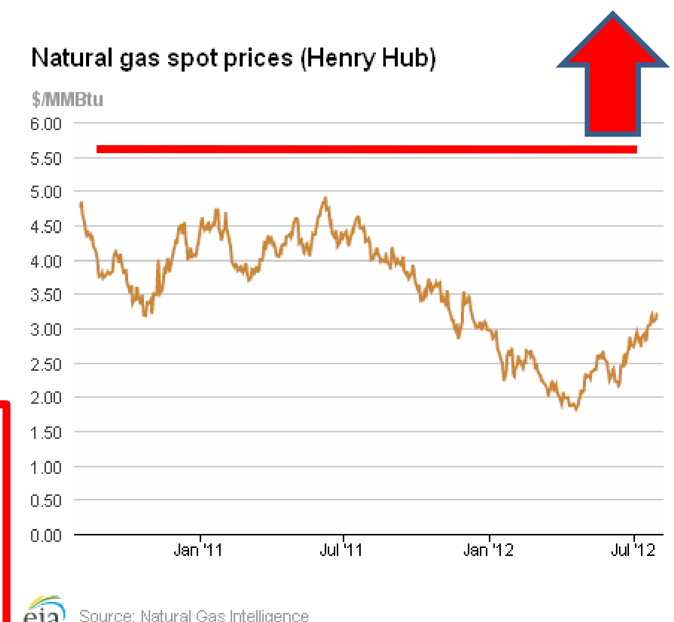
Transportation & liquefaction costs (7-8 USD/mmbtu) → 7-8 | 7-8

Flexible fuel charge, 115% of Henry Hub gas price at delivery month → HH = 2 | HH = 5.5-7.1

Fixed capacity charge, 2.25-3.00 USD/mmbtu (indexed by inflation?) → 2.25-3.0 | 2.25-3.0

Min HH price case | Breakeven HH "should be" price at current Japan LNG price





US LNG effect on NEA pricing

- NEA: From Japan to US as LNG price-makers?
- NEA: From JCC-based to HH-based indexation?
- NEA: HH-based indexation for LNG only or as a benchmark for overall NEA gas pricing?
- With US LNG export (2015+) & Panama Channel upgrade (2014+) - a whole new arbitrage opportunity for buyers: from mostly separate arbitrage operations in Atlantic & in Asia-Pacific – to global arbitrage => to global gas market based on US shale gas-based LNG?
- Even with HH-based indexation LNG supplies to NEA are more attractive than to the EU? => Arbitrage LNG deals EU-NEA? => *more market space in EU for Russian pipeline gas?*

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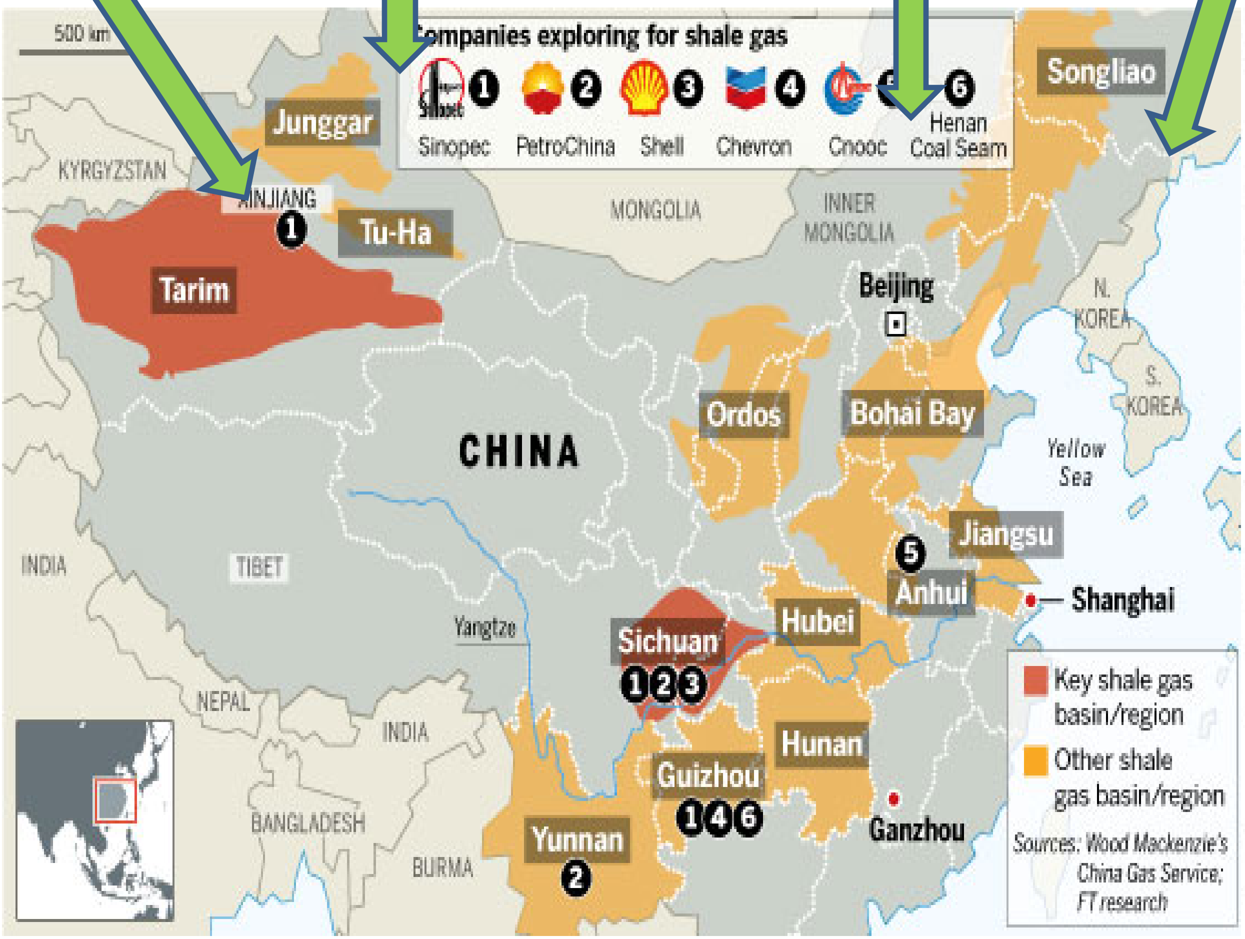
Shale gas in China - & some import gas pipelines

Turkmenistan-Uzbekistan-Kazakhstan-China gas pipeline (exists, to be expanded)

Russia-China "Altai" gas pipeline (proposed)

Russia-China gas pipelines from Kovykta, Yakutiya, Sakhalin (proposed)



- China has **25tn cubic metres** of potentially recoverable shale gas resources - enough to supply the country's gas needs for nearly 200 years at current levels
- Beijing's goal is to produce **6.5bn cubic metres** of shale gas annually by 2015 and **60bn cubic metres** annually by 2020, a huge leap from no commercial production today (Or even 100 BCM) by 2020
- Shale gas fits into China's energy strategy as it could reduce dependence on imported gas as well as helping cut carbon emissions
- Premier Wen Jiabao vowed recently that China must 'tackle key problems more quickly' in shale gas development, a tacit acknowledgement of the challenges the sector is facing

Source of the map: L.Hook. China tries to copy US success in shale. "Financial Times", 25.04.2012

China shale gas – bright prospects but physical difficulties

- China accounts for a fifth of global shale resources and has the world's largest technically recoverable shale gas resources (US EIA)
- China shale gas vs other gas sources (2011 => 2020):
  - Domestic NG production: 102 => 163 (2017)
  - Import: 31 => 160-185+ (capacities):
    - pipeline: 40(a)->65(p) (Central Asia) + 12 (Mianma/a) + 70 (?) (Russia/planned) = 122-147 BCM
    - LNG (min): 12.4 (acting) + 26.4 (under constr./2012) = 38.8 BCM
  - Shale gas: 0 => 60-100 BCM => But: take it cautiously…
- China shale gas problems:
  - Many early exploratory projects are in the quake-prone Sichuan basin,
  - Availability of water, where China faces growing shortages,
  - China lacks the extensive pipeline infrastructure needed to bring gas to market, etc.

China-Russia debate on gas pricing - & shale gas in China

- A disagreement on price has been delaying Russia and China signing a big gas supply deal.
- Reasons for the delay:
  - Gazprom's policy for equal netback price for all supply destinations (incl. exports to the West and to the East) =>
  - This makes it difficult to prove that based on replacement value pricing principle of LTGEC gas price for China should provide same *(higher)* netback as for the EU
  - Why so? **China *factual*** replacement fuel = local coal w low ecologic constraints – or imported LNG; **EU *"contractual"*** replacement fuels in Russian LTGEC for EU = LFO & FRO; **EU *factual*** today's replacement fuels for gas in EU = coal & RES
- => China's growing awareness of its own shale gas resources, which could reduce its need for imports => **shale gas as a negotiating tool to lower import Russian gas price**

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What conclusions for NEA gas pricing?

- Lower prospects of oil/PP-indexation? China: PP-indexation - just a starting point in domestic gas reform?
- Indexation with multiple ingredients? China: From oil-indexation to coal-indexation not to RES-indexation?
- Economic vs ecologic concerns: ecologic issues are less important currently in China => CO2 price as insignificant factor on gas pricing?
- NEA spot pricing not probable – too early? (China: non-mature gas market)
- All importers would be in favour of HH-based indexation in LTGIC? (+ downgrade of liquefaction & transportation costs)
- From Japan (JCC) to US (HH) as LNG price-maker?
- Russia will not act as NEA pipeline gas price maker?

Thank you for your attention

www.konoplyanik.ru

andrey@konoplyanik.ru