The shift to the new paradigm of international energy development and its influence on the regulatory issues of the EU gas market

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Past & modern paradigm of international energy development: three classics (according to A. Konoplyanik)

Marion King Hubbert
Harold Hotelling
Jean-Marie Chevalier
World Energy: The Change of Paradigm?

### Past/current: “peak supply”?

<table>
<thead>
<tr>
<th>Supply</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Hubbert peak (curve)</td>
<td>- Economic growth</td>
</tr>
<tr>
<td>- Hotelling rent (theorem)</td>
<td>(industrial-type)</td>
</tr>
<tr>
<td>- Chevalier turning point</td>
<td>- Population growth</td>
</tr>
</tbody>
</table>

Future energy resources more costly & limited (depletion rent) => low-cost win more rent, high-cost delayed

### From Current to Future: “peak demand”?

<table>
<thead>
<tr>
<th>Supply</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Technological progress, incl. US shale revolution =&gt;</td>
<td>- Four steps in departure from oil</td>
</tr>
<tr>
<td>=&gt; Hotelling anti-theorem</td>
<td>- Energy efficiency (delinking E&amp;E, post-industrial-type)</td>
</tr>
<tr>
<td></td>
<td>- COP-21 (upper limit/emissions)</td>
</tr>
</tbody>
</table>

Future energy supply less costly & plentiful (partly not in demand?) => competition among suppliers increases => low-cost win, high-cost cut-off
Current Paradigm of International Energy Development

• Possible, though in a rather distant future (at least post 2 global invest cycles), if any at all, supply side limitations due to dominant non-renewable character of energy resource base =>
  • “Hubbert’s curve” (1949) => bell-type production curve for non-renewable resource extraction => “peak oil” theory,
  • “Hotelling rule” (1931) => the future value of fossil fuel in-situ increases by the value of the current interest rate within the time-frame,
• BUT: both theories:
  • did not consider possible demand-side limitations (f.i. due to environmental considerations), => First (alarmist) report to the “Club of Rome” (1972) => respond of Sh. A.Z.Yamani “Stone age came to an end not because end of stones…”
  • works for increasing future cost & value of in-situ non-renewable energy resource within time-frame, at least during post-”Chevalier’s breaking point” period (since early 1970-ies)
Marion King Hubbert (1903-1989) and his curve

Источник: https://en.wikipedia.org/wiki/M._King_Hubbert
Author’s economic interpretation of Hubbert’s curves

The mankind will not reach Hubbert’s peaks in oil & gas at least within **TWO INVESTMENT CYCLES** (1\textsuperscript{st} invest cycle = today’s commercial technologies which shall pay back full CAPEX in their RD&D & commercial utilization before they will be substituted by new technologies of the new invest cycle which today stays at RD&D stage and thus predetermines this 2\textsuperscript{nd} invest cycle)

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Peak of “Hubbert’s curve” is at least two investment cycles away

Deep horizons, deep offshore, Arctic, **shale gas**, CBM, CSM, CMM, biogas, gas hydrates, etc. …

Deep horizons, deep offshore, Arctic, heavy oil, **shale oil**, tar sands, GTL, CTL, XTL, …


(* ) later reproduced in “Putting a Price on Energy…” (ECS, 2007, p.53), where this particular basic picture is taken from

Legend: CBM = coalbed methane (from unmined rock), CSM = coalseam methane (from active coal mines), CMM = coalmine methane (from abandoned coal mines), GTL = gas-to-liquids, CTL = coal-to-liquids, XTL = biomass to liquids
Harold Hotelling (1895-1973) and his economic rule regarding natural resource rent


Source (basic graph): Neha Khanna, On the economics of non-renewable resources. – in: Economics Interactions With Other Disciplines (http://www.eolss.net/ebooks/Sample%20Chapters/C13/E6-29-03-01.pdf)

Pricing of Non-Renewable Energy Resources: Ricardian vs. Hotelling Rents

Ricardian rent + Hotelling rent = Resource rent

- **Fuel substitution**
- **Energy efficiency**
- **Economic growth**

- **Supply curve** (cost of supply)
- **Demand curve**

**PC1** (Production capacity limit)

Source: A.Konoplyanik. The EU, Russia & Central Asia: new pricing mechanisms within FSU & prospects for alternative gas supplies to the EU // Lecture at the Center for Energy, Petroleum & Mineral Law & Policy (CEPMLP), University of Dundee, Dundee, Scotland, UK, October 14, 2009
Corridor of cut-off (affordable) prices for producer & consumer (simplified)

- **Maximum affordable price for consumer**: The lowest among available alternative options in end-use.
- **Spot/futures price**: The current short-term price.
- **Minimum affordable price for producer**: The price of self-financing up to delivery point.
- **NBRV price**: The upper investment price (upper long-term limit).
- **Cost-plus price**: The lower investment price (lower long-term limit).
Corridor of cut-off (affordable) prices for producer & consumer (detailed)

Ricardian + Hotelling rents

Upper price is more flexible than lower price => demand for indexation

Price “Net-back replacement value” (upper investment price = upper long-term price limit)

Spot / futures prices (current trade price)

Cost-plus price (lower investment price = lower long-term price limit)

Maximum affordable price for consumer

Minimum affordable price for producer

USD/bbl, USD/MMBTU

CAPEX+OPEX

Investment period + pay-back period

Rest of long-term contract duration

OPEX

Ricardian rent

A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
Mechanism of defining replacement fuel and upper investment price within under- and oversupply expectations

Expectation of “peak supply”
- Demand for energy resource ABOVE its supply =>
- Under-supply of given energy resource =>
- Replacement value (upper investment price) – in competition BETWEEN different energy resources (with suppliers of different energies)
- Indexation «given energy resource vs OTHER energy resource” (RFO vs coal; gas vs crude oil/petroleum products)

Expectation of “peak demand”
- Demand for energy resource BELOW its supply =>
- Over-supply of given energy resource =>
- Replacement value (upper investment price) - in competition WITHIN supplies of given energy resource (between suppliers of given energy resource)
- Indexation “given energy resource vs same energy resource FROM ANOTHER supplier” (gas vs gas)
Resources vs Reserves: geology, technology, economics, politics

(A)

(1) Geology
(geological resources)

(2) Technology
(technically recoverable resources)

(3) Economics
(proved recoverable reserves)

(4) Politics
(reserves, access to which is permitted / open by host state)

(B)

Volume

(1)

(2)

(3)

(4)

$\Delta$
Добывающая промышленность: трансформация «ресурсов» в «запасы» (для чего необходимо снижать издержки)
Two types of technological advance (STP)

1. Revolutionary advance (technological breakthroughs)
   - Brand new innovations
   - Fertilizer effect
   - Multiplier effect
   - Role of state (RD&D financing)
   - e.g. US shale gas revolution

2. Evolutionary advance (improvements of existing technologies)
   - Economy of scale effect
   - Learning curve effect
   - Role of state (commercialization)

1 + 2 => Multiple domino effects

"Learning curves": evolutionary & revolutionary STP

A: evolutionary НТП («кривые обучения» / learning curves)
B: revolutionary НТП

Технологии морской добычи:

В-1: эстакады (коммуникации с берега)
В-2: искусственные острова
В-3: стационарные платформы (свайные, гравитационные)
В-4: полуторные платформы на натяжных тросах
В-5: полупогружные платформы и суда с системами динамического позиционирования
В-6: плавучие заводы СПГ
В-7: бесплатформенная морская добыча (подводное заканчивание скважин)
В-8: тектонические блоки

(без учета временного лага внедрения технологии)
STP: “Learning curves” & the role of State

A: evolutionary technological progress (learning curves)
B: revolutionary technological progress (technological breakthroughs)
C: State financing of RD&D + economic stimuli for commercialization of innovations
D: investment stimuli to increase competitiveness of investment projects (from direct tax effects => to direct + indirect + multiplier effects as criteria for state effect)

Shorter duration of investment cycle (money turnover) + cost diminishment (shorter CAPEX pay-back period)

e.g. US State long-term fundamental RD&D funding, incl. in shale, since 1977 “Energy Independence” Programme

e.g. EU RES development (state subsidies non-dependent WTO rules)

A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
J.M. Chevalier about turning point of the trends

• “In the fundament of our analysis we laid out the central hypothesis that in 1970-1971 the earlier trend of diminishing marginal production costs in petroleum industry has changed to their growth, at least in exploration of new fields and oil production. …it is too early to prove this theory through the quantitative analysis. In the given research we have tried to provide its general assessment only.” (1972)

(Ж.-М. Шевалье, Нефтяной Кризис. – М.. Мысль, 1975, c.196)
Jean-Mari Chevalier and his “Petroleum crisis”

Jean-Marie Chevalier. Le nouvel enjeu pétrolier, Paris, 1973
Ж.-М. Шевалье, Нефтяной Кризис. – М.. Мысль, 1975
Выровненная динамика издержек добычи углеводородов в мировой нефтегазовой промышленности в период смены тенденций во второй половине XX в. (количественная оценка/проверка центральной гипотезы Ж.-М.Шевалье)

Источник: Ю.Куренков, А.Конопляник. Динамика издержек производства, цен и рентабельности в мировой нефтяной промышленности. - "Мировая экономика и международные отношения", 1985, № 2, с. 59-73
Impact of revolutionary and evolutionary STP on changing exploration and production (E&P) costs for conventional hydrocarbons in the period of growing marginal costs (after ‘Chevalier’s breaking point’, late 1960-ies/early 1970-ies)

1. **Evolutionary STP** slows down the growth of marginal E&P costs thus neutralising/diminishing negative effects of the natural forces’ factor.

2. **Revolutionary STP** overcomes (overweighs) negative effects of the natural forces’ factor which leads to a (temporary) reduction of marginal and average E&P costs.

Conventional vs. unconventional energies & cost-plus vs. NBRV pricing

- Revolution STP diminishes costs
- Cost-plus unconventional HC (prior to revolutionary STP)
- NBRV conventional HC (+/-)
- Cost-plus conventional HC-1 (after revolutionary STP) = former unconventional HC
- Cost-plus conventional HC-2 (after evolutionary STP) = former unconventional HC
- Evolutionary STP slows down cost increase post 1970-71 (Chevalier)
- Worsening of natural conditions (post 1970-71)
- Evolutionary STP which transfers unconventional energies into conventional ones
- Evolutionary STP (nutrition effect + learning curve effect)

USD/bbl

USD/bbl
Oil & Gas: No limitations from resource base (greetings from Yamani)

Annual world oil production: 90 mln b/d

Source: BP, IHS Energy.

1 Unconventional oil and gas includes shale oil, oil shale, tight oil, oil sands, shale gas, tight gas and coalbed methane.

Source: BP, IHS Energy.

PRR = 1.7 TBOE = 3.8%

Источник:
В соответствии с оценками BP, мировые технически извлекаемые ресурсы нефти превышают прогнозные объемы накопленного спроса за период 2015-2035 гг. в 3.7 раз и за период 2015-2050 гг. – в 2 раза; доказанные извлекаемые запасы – в 2.4 и 1.3 раза соответственно.

Technology advances will change the relative cost competitiveness of resource types.

Technology improvements to 2050 will enable us to recover more resources than we can today.

Technology innovation will enable us to access resources more cost effectively and they will have a major impact on unconventional resources that today are high cost and complex to recover.

Источник:
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A.Konopyanik, CEPMLP seminar, Dundee, 12-13.02.2018
First top-10 states with highest technically recoverable shale gas resources (acc. to EIA DOE)

Conventional gas reserves vs shale gas resources

China, Argentina, Mexico, South Africa, Canada, Australia, etc. => New players at the world gas map? When & at what cost?

Based on: “Financial Times” shale gas series, 22-25 April 2012
"Volume of shale gas resources, potentially, is sufficient to radically change gas market. If you can extract them..." (Financial Times)

USA, Argentina, Mexico, South Africa, Australia, Canada & Libya: shale gas **resources** in each of them potentially exceeds gas **reserves** of the fourth largest natural gas producer – Saudi Arabia

Role of US state financing in stimulating “US shale gas revolution” (based on MIT study)

- Revolutionary advances (state spending)
- Investment stimuli (state concessions)
- Evolutionary advances (learning curves) (industry spending)
- Resulting effect

Source of the basic Figure: Figure 8.1 “CBM RD&D Spending & Supporting Policy Mechanisms” from The Future of Natural Gas. An Interdisciplinary MIT Study, 2011, p.163; Figure adapted by this author
EU shale gas: where overestimated expectations came from…(*)

(*) it should be noted that US DOE EIA has been publishing estimates of “technically recoverable shale gas resources”, but not its “reserves” estimates, as mentioned by the authors of the cited article, since “reserves” presents only a portion of a broader “resource” category (see Box 1)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Shale</th>
<th>Traditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed costs (CAPEX) to total costs</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Variable costs (OPEX) to total costs</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Economic life-cycle, years</td>
<td>Short (2-3)</td>
<td>Long (10-15+)</td>
</tr>
<tr>
<td>Time lag between FID &amp; 1st oil</td>
<td>Short (weeks)</td>
<td>Long (years)</td>
</tr>
<tr>
<td>Responsiveness to oil price fluctuations</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Type of rent extracted</td>
<td>Technological rent</td>
<td>Natural resource rent (economy of scale)</td>
</tr>
<tr>
<td>Daily production/well decline</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>How this type of investment cycle influence on price volatility</td>
<td>Soften / “shock absorber” (*) (quick invest effect)</td>
<td>Intensify (delayed invest effect)</td>
</tr>
<tr>
<td>Key producers &amp; their financial characteristics</td>
<td>Small &amp; medium independents/not robust enough (lack of cash to finance from cash flow, fully dependent of debt financing)</td>
<td>Majors/robust (enough cash to finance from cash flow)</td>
</tr>
<tr>
<td>Financing (project finance is …)</td>
<td>Conveyer/standardized (each project deal is typical), easy going</td>
<td>Art (each project deal is unique), sophisticated</td>
</tr>
</tbody>
</table>

US oil output had been declining since early July, yet still was 260 kbd higher y-o-y in end-September.

Shale production is directly proportional to spending but the ratio varies per play

For US shale, it is not only about production economics but also about leverage, as increase in US output has been associated with increase in total debt of US shale producers.

Despite negative free cash flows, financing has not yet proven to be disruptive force as US shale producers have been able to secure finance.

Energy companies have been borrowing to fuel growth...

US high-yield capital expenditure as a % of ebitda

Energy capital expenditure as a % of ebitda

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A. Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
What is COP-21 & what it’s future role?

• COP-21 – the Paris agreement within UN Framework Convention on Climate Change, was prepared within climate conference in Paris,

• regulates the measures on diminishing CO2 emissions post-2020,

• adopted by consensus on 12 December 2015,

• signed on 22 April 2016, came in force 4 November 2016

• 179 signatory states, account for 95% of emissions

• From my view: **Major factor of uncertainty in international oil & gas, possibly new paradigm of the international energy development**
COP-21 & New Limits to Growth

• **IEA (2012):** to limit global warming by 2°C without large-scale implementation of carbon capture & storage (CCS) = not be able to consume (*) **MORE THAN ONE THIRD** of global proven recoverable reserves (PRR) of hydrocarbons (HC) up to 2050

• **OR:** cumulative future CO2 emissions from current PRR HC volumes are **THREE TIMES HIGHER** than the upper limits of such emissions which are agreed upon in Paris bearing in mind sustainable global development.

• **IEA:** 2/3 of such potential emissions will come from coal, 22% from oil and products, and 15% from gas.

(*) through technological chains from production to end-use of each fossil fuel (coal, petroleum products, gas) in each energy/non-energy use of energy resources
COP-21 & New Paradigm of Energy Development

- **COP-21** might radically change paradigm of future energy development !!!
- **FUTURE**: possible limitations on the demand side of global energy induced by the climatic-based restrictions on emissions (COP-21) - ???:
  - not all today’s CPRR might be demanded by global economy
  - decreasing (NOT increasing) value of oil in place due to its staying potentially unclaimed (an opposite to Hotelling rule)
  - stimuli for quicker extraction and utilization of the current PRR HC
  - this will accelerate expectations of the “cheap oil” era (“cheap” means not because of decreasing production costs but because of diminishing price that the society will be ready to pay for it)
  - future possible oversupply artificially created by climate change agenda ???
US shale oil & COP-21 influence on global oil supply curve (order of the figures): consequences for Russia

Current proven recoverable reserves (CPRR) of oil, billion barrels

CPRR production costs (oil), USD/bbl

1/3 CPRR

2/3 CPRR

Saudi Arabia (conventional oil): current and marginal (natural forces’ factor)

Russia (conventional oil): current

USA (shale oil): current

USA (shale oil): marginal (STP’ factor)

1/3 CPRR of HC = max CO₂ emissions in accordance with COP-21 (IEA)

There may be demand limitation (upper demand limit) for 2/3 CPRR of HC due to exhaustion of CO₂ maximum permissible quotes in accordance with COP-21

Shift of production costs from present to future production:
- USA
- Russia

Shift of production costs from present to future production:
- USA
- Russia

Russia (conventional oil): marginal (natural forces’ factor)
And in the end... Whether the whole concept of man’s irreversible impact on climate change is well justified?

Specialists in solar activity are well aware of the climate change 178Y cycle!

As known, the Earth runs not around the Sun, but around mass center of Solar System (MCSS) which stays away of center of the Sun (CS) & constantly moves. In the period measured by decades deviation of MCSS from CS is comparable with diameter of the Sun => flow of Solar energy to the Earth fluctuates. These fluctuations (±24 W/sq.m) BY THE ORDER (10 times) HIGHER than increment of this flow (2.4 W/sq.m), which International Expert’s Group on Climate Change called as “result of anthropogenically defined increase in GHG emissions”

“RAS Presidium view, presented at request of RF President, on TOTAL ABSENCE OF SCIENTIFIC SUBSTANTIATION OF GLOBAL WARMING DOCTRINE is strongly justified even at the level of elementary appraisals”

Sources: Крученицкий Г.М. Климатическая доктрина РФ и защита национальных интересов России. НЕУСТРАИМЫЕ ПРОТИВОРЕЧИЯ (в печати); он же. Презентация на Круглом столе «Риски реализации Парижского климатического соглашения для экономики и национальной безопасности России». Аналитический центр при правительстве РФ, 19.07.2016; Крученицкий Г.М., Матвиенко Г.Г. Физические причины долговременной изменчивости глобальной температуры. "Оптика атмосферы и океана" (в печати).
Political economy of energy: factors of production, inter-factors’ competition, & Scientific & Technological Progress (STP) in energy – & current competitive niche for Russia

Factors of production

Labour
Capital
Soil
Non-energy materials
Energy materials (post-1973)

Natural forces
Revolutionary
Evolutionary

STP

[25x511]Adam Smith

Carbon/CO2(?) (post-COP-21)

Zones of competitive advantages of different groups of countries:
- Labour: developing (price), developed (quality)
- Capital (financial markets & innovations, technologies): developed (Anglo-Saxon),
- Energy (non-renewables, hydrocarbons): OPEC, USA, Russia => the only current competitive niche for Russia (?)

Options for increasing energy efficiency (decrease of energy costs in GDP/GNP) = its substitution by:
1. Other energies => inter-fuel &/or intra-fuel competition (STP)
2. Labour => export of energy-intensive industries to developing states
3. Capital => increase of energy efficiency (STP)
4. Non-energy materials (in non-energy use of energies) => (STP)

(1) Energy price
(2) Energy intensity

(3) Carbon intensity as new limit to energy development (factor of competitiveness) => new driver for/ component of “new” STP => capital, innovations

Peak demand

Peak supply
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Energy paradigm => international law priorities => areas for international governance / cooperation: PAST -> TODAY

• International energy economy based on:
  – Mostly non-renewable energies (NRE)
  – Mostly centralized commercial (industrial-type) cross-border energy value chains
  – Physical energy markets (till mid-1980s), physical & paper – afterwards
    • energy as commodity (commoditisation of energy markets)

• Sovereignty over natural resources
  – UN GA Res. 1803, Dec’1962; ECT Art.18, 1994/98 – role of national state
  – Fight for internationalization of supply (national supply vs international demand)

• Natural resource-rent generation & collection:
  – Geology risks
  – Monetization of nonrenewable resource rent
    • Cost plus (self financing) = minimum LT price
    • NBRV + indexation (maximization of marketable resource rent) = maximum LT price
  – Fight for resource rent: “resource nationalism” vs “optimization of natural resource rent collection”

• Primary attention: Access to resources (primary energy) => political risks (incl. nationalization, expropriation) & instruments of its mitigation:
  – Investor-host Gov’t agreements (concessions, PSAs, risk-service, etc.)
  – International law instruments: DTTs, BITs, MITs

• Secondary attention: Access to capital, technologies, innovation within mostly non-competitive & non-transparent energy & other markets
Energy paradigm => international law priorities => areas for international governance / cooperation: TODAY -> FUTURE?

• International energy economy based on:
  – NRE & RES (climate change, import dependence, SoS)
  – Centralized (industrial-type) cross-border (NRE) & decentralized (rural + post-industrial - RES) energy value chains
  – Physical & paper energy markets
    • Energy as financial asset (financialisation of energy markets)
• Nat.resource rent + technological rent generation & collection
• Access to capital, technologies, innovations in the more-and-more competitive & transparent energy & other markets
• Fight against energy poverty (access to end-use energy)
• Environmental considerations (pollutant pays) => “climate change” as new “production factor”
• Transition risks => financial stability/risk mitigation:
  – Re-pricing of fossil fuels due to technological change demanded by world decision to limit fossil fuels emission (COP-21) =>
  – “Unburnable carbon” => huge drop of energy assets values => how to exclude financial risk & shock
    • Financial Stability Board (FSB), the international body set up by the G20 in 2009 to monitor risks to the financial system
    • NB: G-20 accounts for 85% of the global emissions
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• Competition of existing and new gas supplies to Europe within the new paradigm of international energy development
  – Russian pipeline gas vs US LNG in Europe
    • US LNG story
    • Russian new gas pipelines story
      – In the North
      – In the South
  – EU Quo Vadis project – from liberalization to protectionism?
Development of international energy markets and of mechanisms of investment-trade protection & stimulation

**Energy markets**

- Local
- Internationalisation
- Regional
- Globalisation
- World markets of individual energy resources
- Global common energy market

**Mechanisms of investment protection / stimulation, incl. enforcement mechanisms**

- National legislation
  - Enclaves of stability & investment stimuli in unstable / non-stimulating legal-economic environment
  - Increase of general level of investment attractiveness of domestic legislation

- International law instruments
  - Energy efficiency
  - Investments
  - Dispute settlement
  - Transit

- Bilateral
- Multilateral

**Concessions (traditional, modernised), PSA, risk-service contracts, etc.**
- e.g. RF: Concessions, Free Economic Zones, PSA
- e.g. EU: derogation from mandatory TPA (2nd Gas Directive: Art.21-22; 3rd Gas Directive: Art. 35,36)

**ECT (52)**
- EU Acquis (28+8)
- WTO (159)

**ECT (54) = 1431 BITs**

**01.06.2010:**
- 2756 BITs
- 2927 DTTs

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A. Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
Эволюция рынков нефти и газа: соотношение стадий развития, контрактных структур и механизмов ценообразования на восходящей ветви «кривой Хабберта»

Нарастающая диверсификация инфраструктуры и доступность альтернативных возможностей для энергоснабжения, как для производителя (газа) (альтернативные пути доставки и рынки, как географические, так и новые отрасли), так и для потребителя (газа) (альтернативные поставщики данного энергоресурса (конкуренция газ-газ) и его заменителей (конкуренция газ-не газ))

Нарастание конкуренции = нарастание множественного / многовекторного набора возможностей для субъектов предпринимательской деятельности в энергетике на всех стадиях трансграничных цепочек энергоснабжения (газа)
Эволюция рынков нефти и газа: соотношение стадий развития, контрактных структур и механизмов ценообразования на восходящей ветви «кривой Хаббера» (2)

Рынок физической энергии

Долгосрочные контракты + ценообр. кост-плюс => нижняя инвест.цена (рынок физической энергии)

Фьючерсные контракты + фьючерсное ценообр. (биржа) => торговая цена (рынок бумажной энергии)

Долго/средне/кратко-срочные контракты + ценообр. от стоимости замещения => верхняя инвест.цена (рынок физической энергии)

Спотовые контракты + спотовое ценообр. (внебирж.рынок) => торговая цена (рынок бумажной энергии)

A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
Evolution of contracting schemes with energy market developments (oil, natural gas, LNG)

(A) Initial stages of market developments (under-supplied/under-contracted markets)

Producer/seller

LTC; first ‘cost-plus’ then NBRV pricing; CAPEX pay-back secured by guaranteed flow of commodity to/revenue from single specific LTC buyer

Consumer/buyer (end-user)

(B) Mature stages of market developments (over-supplied/over-contracted markets)

Producer/seller

Intermediaries (commodity trading companies)

Paper energy market

LTC/MTC/STC (decreasing duration); NBRV pricing; CAPEX pay-back secured by guaranteed flow of commodity to/revenue from single specific LTC buyer

Consumer/buyer (end-user)

STC & spot; NBRV pricing (gas & LNG: first “oil-indexed, then “gas-to-gas” (hub-indexed)); CAPEX pay-back secured by guaranteed flow of commodity to/revenue from competitive diversified though oversupplied market => then secured by hedging at paper energy market
Contractual structures in the market (acc. to Heather, 2015)

Figure 1. The routes to the market

- **Energy markets**
  - **Exchange**
    - Regulated Standardised Cleared
      - Paper (physical delivery or financial settlement)
        - Futures
        - Options
  - **OTC**
    - Non regulated Standardised Bilateral
      - Physical (always actual delivery)
      - Paper (usually financial only)
        - Spot
        - Prompt
        - Forward
        - Swap
        - Options
        - Swaption
  - **Direct**
    - Non regulated Non standard Bilateral
      - Counterparty Risk

Source: (Heather 2015)


Trend to shorter and smaller contracts with emerging buyers

Рынки разветвленнее, диверсификация, но институциональные риски растут

Source: Shell LNG Outlook 2017 – slides, slide 12
Эволюция срочности нефтяных контрактов с течением времени

Срочность сделок на рынке бумажной нефти, казалось бы, увеличивается. Но… (см. следующий слайд)

A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
NYMEX: Зависимость объемов открытых фьючерсных контрактов (сырая нефть, WTI, 1-й кв. 2012 г.) от сроков их исполнения

Расчет выполнен Н. Алиевым, магистром РГУ нефти и газа им. Губкина, июнь 2012 г.

… но большая часть объемов торговли сконцентрирована в пределах ближайших месяцев => увеличивающаяся краткосрочность (short-termism) неблагоприятна для долгосрочных капиталоемких инвестпроектов, хеджирование же лишь отодвигает во времени инвестриски, а не ликвидирует их.
Эволюция рынка нефти: объемы торговли - объемы поставок

Долгосрочные контракты

Разовые сделки (спот)

Форвардные сделки (2) (*)

Краткосрочные контракты

Форвардные сделки (1) (*)

Фьючерсы и опционы

Объемы торговли превышают объемы поставок – внебиржевой рынок (последовательные перепродажи неунифицированных товарных партий – «маргариточные гирлянды»)

Объемы торговли многократно превышают объемы поставок – рыночные/биржевые площадки (разнонаправленные перепродажи унифицированных обязательств по поставкам)

Растущая ликвидность, но и растущая нестабильность рынка; хорошо для торговцев и спекулянтов, но краткосрочно и угнетает проектное финансирование

Товарные рынки («физической» нефти)
Финансовые рынки («бумажной» нефти)

(*) (1) в пределах обеспеченности накопленными товарными запасами, (2) за пределами такой обеспеченности

A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
<table>
<thead>
<tr>
<th>Северная Америка и Великобритания</th>
<th>Континентальная Европа и Япония / Корея</th>
</tr>
</thead>
<tbody>
<tr>
<td>развитие на базе собственных ресурсов, изначально нет зависимости от импорта</td>
<td>с самого начала высокая зависимость от импорта</td>
</tr>
<tr>
<td>поставки на основе малых и средних газовых месторождений</td>
<td>поставки на основе импорта с гигантских и сверх-гигантских месторождений</td>
</tr>
<tr>
<td>стандартизованное взимание ренты, решения по развитию принимает частный сектор</td>
<td>максимизация ренты странами-экспортерами, решения о развитии принимают страны-экспортеры</td>
</tr>
<tr>
<td>эластичность спроса благодаря электроэнергетике</td>
<td>ограниченная эластичность спроса</td>
</tr>
<tr>
<td>конкуренция между поставщиками газа, но цены на газ всё ещё следуют ценам на нефть</td>
<td>цены формулы привязаны к ценам на нефть</td>
</tr>
</tbody>
</table>

Источник: «Цена энергии: формирование международных механизмов ценообразование на нефть и газ», Секретариат Энергетической Хартии, 2007, с.113
Исторически сложившаяся контрактная структура сегодняшней трансграниченной производственно-сбытовой цепи газоснабжения Россия - ЕС

Поставки (розничные)
ДСК
Поставки (оптовые)
ДСК
Пункты сдачи-приемки газа при поставках из РФ в ЕС по ДСЭГК
Зона транзитных рисков для транспортных контрактов российского газа после распада системы СЭВ и СССР
ДСК = контракты производителей (ДСЭГК)

«Старый» ЕС-9/12/15
СЭВ
«Новый» ЕС-25/27/28
СНГ
Россия
ДСК
Компании-производители:
- Газпром
- Нефтяные ВИК
- Неинтегрированные компании

Оптовые торговые (импортеры):
- ВИК
- Неинтегрированные компании-оптовые трейдеры

Крупные конечные потребители:
- электростанции
- энергоемкие промышленные потребители
- Розничные трейдеры

Мелкие и средние конечные потребители:
- домашние хозяйства
- коммерческие потребители

Добыча (Газпром и другие производители)
(Газпром = Производитель и монопольный экспортер)

Экспортные Поставки
(Газпром = Производитель и монопольный экспортер)

ДСК = контракты производителей (ДСЭГК)

Зона транзитных рисков для транспортных контрактов российского газа после распада системы СЭВ и СССР

Граница «старого» ЕС-15
Граница «нового» ЕС-27
Figure 4. Russian Gas Supplies to Europe: Zones of New Risks for Existing Supplies Within Russia’s Area of Responsibility

Direction of Russian gas flow to Europe

Zones of new risks

<table>
<thead>
<tr>
<th>France, Switzerland, Italy</th>
<th>Germany, Austria, Greece, Turkey</th>
<th>Poland, Slovakia, Czech R., Hungary, Romania, Bulgaria</th>
<th>Belarus, Ukraine, Moldova</th>
<th>Russia</th>
</tr>
</thead>
</table>

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

New Risks 1 zone

New Risks 2 zone

Direction of Russian gas flow to Europe

EC – 25/27

EC – 15

A

B

COMECON

USSR

RF

A. Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
Структура индексации цен газа в ЕС до 2009 г.

Стоимость нефтепродуктов оказывает решающее влияние на индексацию цен газа в ЕС

Европейский Союз

Структура индексации цен газа в ЕС до 2009 г.

Мазут + дизтопливо и газойль = 75%


A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
Индексация отличается в зависимости от страны-экспортера

Нидерланды Остальное производство в ЕС Великобритания

Алжир Норвегия Россия

Основные экспортеры газа в ЕС: преимущественно нефтяная индексация

Нидерланды, Норвегия, Россия:
- мазут = 35-39%;
- дизтопливо и газойль = 52-55%;

В сумме М+ДТ/Г:
- Нидерланды = 92%,
- Норвегия = 87%,
- Россия = 92%

Эволюция структуры ценовой индексации европейских ДСЭГК при движении от менее к более либерализованным рынкам

Эволюция структуры ценовой формулы ДСЭГК: от простого к более сложному

Обоснование структуры ДСЭГК Россия-Украина (2009) и Китай (2012): практичнее (понятнее и надежнее) начинать с менее сложной формулы ценообразования, схожей с отработанной на практике базовой Гронингенской формулой

Вероятная дальнейшая эволюция структуры формулы: в сторону «диверсификации» индексации цены по траектории Вост. Европа => Зап. Европа => Великобритания => => УХОД ОТ НЕФТЯНОЙ ПРИВЯЗКИ ???!!!

A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018

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Эволюция экспортной цены на газ в континентальной Европе и странах бывшего СССР с 1962 по 2009 г.

Российский газ = ценообразование методом «нет-бэк» (по стоимости замещения в ЕС)
Газ из Средней Азии = ценообразование методом «нэт-форвард»/«кост плюс»

Год принятия, перехода на новую систему ценообразования (розовый – газ из России, желтый – из Средней Азии, зеленый – из ЕС)

1968/1990
1992
2009 г.

«Нет-бэк»: при (2) Высоких ценах на нефть
(1) Низких ценах на нефть «Нэт-форвард»
ЦЕНЫ И ЦЕНООБРАЗОВАНИЕ НА РОССИЙСКИЙ ГАЗ ДЛЯ ЕС И СТРАН ПО ТРАССЕ ЭКСПОРТНОГО ТРУБОПРОВОДА — И РЕНТА ХОТЕЛЛИНГА

ЦЕНА РОССИЙСКОГО ГАЗА ДЛЯ ВОСТОЧНОЙ ЕВРОПЫ И СНГ


А.Конопляник, Корпорат.Ин-т Газпрома, 02.06.2017
Ценовые предпочтения производителей, потребителей и биржевых игроков

Поставки по ДСЭГК с формульным ценообразованием

Разовые сделки с фьючерсным ценообразованием

Спотовые цены

Контрактные цены

Предпочтения импортеров/потребителей

Предпочтения производителей/экспортеров/хеджеров

Предпочтения импортеров/поставителей

Предпочтения спекулянтов
Table of contents

• From old to new paradigm of international energy development
  • Hubbert curve, Hotelling rule, Chevalier break-even point
  • Role of US shale gas revolution
  • Role of COP-21
  • Consequences for International Energy Governance

• Gas supplies to the European gas market: historical and new development
  • General evolutions of contractual structures
  • Russian supplies diversification: from “one market – one pipe” to “one market – two pipes”
  • Liberalization of EU gas market: historical trends

• Competition of existing and new gas supplies to Europe within the new paradigm of international energy development
  • Russian pipeline gas vs US LNG in Europe
    • US LNG story
    • Russian new gas pipelines story
      • In the North
      • In the South
  • EU Quo Vadis project – from liberalization to protectionism?
Contracted volumes of Russian gas supplies to Europe & related options

How to minimize transit / transportation risks for contracted (existing) & new supplies

Expanding niche for (at least partial?) substitution of terminating EU-destined LTC supplies at the border by new (adapted) LTCs, spot deliveries & trade at EU hubs; or partial redirection of terminating EU-destined LTCs to the East?

Source of primary graph:
T.Mitrova (ERI RAS) in: «The Russian Gas Matrix: How Markets Are Driving Change», Ed. by J.Henderson & S.Pirani, Oxford University Press, 2014, Fig.3.1/p.53.
Transit risks through the territory of Ukraine has increased post-2014 (1)

- Physical security of transit system has been worsening in the absence of necessary investments in its modernization (reports on damages & emergencies, panic repairs) & due to terrorist threats,
- Adopted UA laws enables to stop Russian gas transit as a means of sanctions against Russia and forbid Russian investments in UA GTS,
- Unilateral decision of UA NRA in 2015 to increase transit tariffs since 2016 (contrary to acting transit contract) in result of implementation of EU legislation within UA due to UA’s membership in the Energy Community Treaty,
Transit risks through the territory of Ukraine has increased post-2014 (2)

- Administrative pressure on Gazprom, incl. decision of UA antimonopoly body to penalize Gazprom (3+ USD bln) as if for “abuse of dominant position at the gas transit market of UA” *(NB: Gazprom does not provide, but receives transit services)*
- Lack of mutual trust between the two parties (crisis in relations) prevents to coordinate mutually acceptable conditions of transit after current transit contract expires
- Low level of gas injection into UA UGS (14.3 BCM early October contrary to appr. 19 BCM needed to safely pass through Winter season) increases the risk of unauthorized off-takes from transit flows (precedents at least in Jan’2006 & Jan’2009)
- \(\Rightarrow\) transit risks are still there & increasing
Minimization instruments of transit risks

• To settle transit dispute/crisis after/in case it occurs:
  – International law instruments (Energy Charter Treaty, Art.7) are aimed at minimization of negative consequences of the dispute/crisis which is already in place (by accident), but
    • Availability of mutually agreed rules does not preclude that they will/might not be violated (like transit crises Jan’2006, Jan’2009)
      – Especially if there is no mechanism of inescapable punishment for violation of the mutually agreed rules => they oriented mostly on goodwill of the parties (sort of “idealization” of international law), => in the post-Cold War 1990-ies nobody can even imagine, after 30Y+ of stable and non-interruptible transit through the Cold War era, that transit flows can be interrupted by purpose
  – Risk that transit dispute/crisis will occur still remains

• To prevent (to exclude/decrease probability of) the very fact of transit dispute/crisis occurrence:
  – Diversification of routes (“multiple pipelines”) = liquidation of transit monopoly => diminishment of transit risks, and/or
  – Full abandonment from transit routes = non-transit bypasses to the destined markets (escaping third countries, if possible) => nullification (total liquidation) of transit risks
Historical preconditions for alternative (risk-avoidance) pipelines:

• **Russia:** from historical USSR GOSPLAN’s “single pipeline” concept of risk mitigation / minimization (“one market – one pipe”) to current “multiple pipelines” concept (“one market – two pipes”)
  
  – **Historically:** when producer/exporter (USSR) controlled both the pipe & gas in the pipe through the whole cross-border gas supply chain within USSR/COMECON territory to delivery points at the EU-COMECON border
  
  – **Currently:** when preconditions for such control does not exist anymore after dissolution of the COMECON/USSR, enlargement of the EU & evolution of institutional structure of the EU gas market (unbundling, MTPA, etc.)
Legal & economic motivation for alternative (risk-avoidance) pipelines

- **Legal motivation:** Sovereign right for producer / exporter to evaluate supply / transit risk since:
  - it is his responsibility to timely deliver contractual gas volumes to delivery point/customer
  - “Sovereignty” means that development of natural resources “must be exercised in the interest of their national development and of the well-being of the people of the State concerned” (Res.1803 UN GA of 14.12.1962)

- **Economic motivation:** EU unbundling (since 2nd EU Energy Package 2003) predetermines free choice for supplier to choose least risky transportation route, if he considers it to be necessary, to fulfill its supply obligation, incl. after expiration of existing transit/transportation contract

- **Resulting change of export strategy:** from “one market – one pipe” to “one market – two pipes” concept
UKRAINIAN BYPASSES: alternative pipelines (two routes for each market-1)

- Nord Stream project pipelines
- Yamal pipelines
- Ukrainian transit flows
- South Stream project pipelines

Bottlenecks at Ukrainian route to Southern EU (justification for South Stream with new delivery point):

1. Ukraine transit crises Jan’2006/Jan’2009
2. TAG auctions Dec’2005/May’2008

Prior to 01.12.2014

UKRAINIAN BYPASSES: Russia’s alternative pipelines (two routes for each market-2)

- Nord Streams projects pipelines
- Yamal pipelines
- Ukrainian transit flows
- Turkish Stream project (to EU border)

Bottlenecks at Ukrainian route to Southern EU (justification for South Stream with new delivery point at Tarvisio):
- Ukraine transit crises Jan’2006/Jan’2009
- TAG auctions Dec’2005/May’2008

Post 01.12.2014 & 18.06.2015, but prior to 24.11.2015; again post 10.10.2016
Nordstream-2 system within Russian gas ring: view from Austria

Legal & economic motivation for alternative (risk-avoidance) pipelines: sovereignty

- **It is exporter’s responsibility** to timely deliver contractual gas volumes to delivery point/the customer (Groningen LTGEC concept)
- **Sovereign right for producer/exporter to evaluate supply/transit risk** by himself since:
  - Res.1803 UN GA of 14.12.1962 "Permanent Sovereignty over Natural Resources": “1. The right of peoples and nations to permanent sovereignty over their natural wealth and resources must be exercised in the interest of their national development and of the well-being of the people of the State concerned.” =>
  - **International demand vs national supply**
  - **Maximization** of the marketable resource rent (both Ricardian & Hotelling rents) = sovereign right of the resource-owning state =>
    - Maximization of the exporter’s net-revenue = **minimization** of production and (especially within cross-border gas value chains like in Russia-EU case) transportation (transit) costs & risks leading to cost increase:
      - Maximization of revenue = commodity market (EU post-2003)
      - Minimization of transportation costs = capacity market (EU post-2003)
Legal & economic motivation for alternative (risk-avoidance) pipelines: EU legal system

- EU legislation (since 2nd EU Energy Package 2003) predetermines:
  - Unbundling (separation of commodity & capacity markets/contracts): free choice for supplier to choose less/least risky transportation route, if he considers it to be necessary, to fulfill its:
    - continued supply obligation after expiration of existing transit/transportation (capacity) contract while supply (commodity) contract continues (contractual mismatch), &/or
    - new supply obligations
  - Supply to the single EU MS = supply to the EU =>
  - This means: (Potential) transit states between RF & EU cannot force supplier to the EU to pass through their territory, but can only stimulate supplier to chose its transportation route to go via their territory =>
    - Transit states to work at diminishing transit costs & risks
Ukraine: gas transit risks & costs for RF

**Transit risks:**
- “transit interruption probability index” at maximum,
- nevertheless EU (& US) insists on continuation of RUS gas transit to EU via UA, why?

**Transit costs:**
- UA is a member of Energy Community Treaty & thus implements EU energy rules domestically not being EU Member-State => from “distance tariffs” to “entry-exit tariffs” => UA NRA / Naftogas demanded for immediate (as of 01.01.2016) increase by (at least) 25-35% of acting transit tariffs for Gazprom, **BUT:**
  - “Pacta sunt servanda” = current transit tariffs governed by 2009-2019 Gazprom-Naftogas transit contract (UA TSO = Ukrtransgas), but what about post-2019 transit tariffs level?
  - What means “European methodology”? If E-E tariffs, then:
    - How CAPEX in modernization & development of UA GTS were calculated (ingredients of tariff to cover the costs/ to pay back investment)?
    - Whether cumulative debt of NAK “Naftogas of Ukraine” was (or was not?) included in “investment” part of tariff? Etc.

**=> Why Gazprom shall continue with UA transit after 2019 if it is more risky & more costly? If it has the legal (EU law) & sovereign (international law) right & economic motivation to choose?**

To evaluate possible interruptions of transit supplies we consider 1139 newsbreaks, related to gas relations between Russia and Ukraine through 30.12.2008 to 11.12.2015 period. These newsbreaks were taken from the newswire http://newsukraine.com.ua/. Then they were filtered to and ranged within 251 newsbreaks which, in case of their realization, would have a main effect on interruption of gas flows in transit within the Ukrainian territory.

After damages (06.10 & 20.10.2015) & demolition (22.11.2015) of electricity line Melitopol-Dzhankoy in Kherson Oblast (which supplied electricity to Crimea), this index has reached (and will stay at) its maximum since possibility of demolition of, say, compressor station at gas pipeline now became a reality, unfortunately...

Calculated by M. Larionova, Russian Gubkin State Oil & Gas University, Chair “International Oil & Gas Business”, Master’s programme 2013-2015, on methodology, jointly developed with A. Konoplyanik, based on principles of credit ratings evaluation by major international credit agencies.
EU support for transit via Ukraine: the end (real final aim) or just the means? (1)

• It seems that EU & US support for existing & future transit of RUS gas via UA is not the end, but just the means; the real goal is (?):
  – to provide UA with steady financial flow of transit revenues from RUS supply contracts to EU via UA (USD 2bln/a) – instead of donating corresponding EU/US financial aid to UA, and
  – to finance/guarantee pay-back of potential investment of trilateral UA-EU-USA GTS consortium (acc.to UA Law 4116a) in modernization of UA GTS (NB: continued transit of RUS gas is the only way to make consortium financeable;
    • either under existing formula of RUS supply to EU (RUS supplies directly to inside EU through UA transit) => RUS will continue taking transit risk via UA,
    • or by new CEC proposed formula: delivery of RUS gas at RUS-UA border, in which case:
      – either EU companies will take the transit risk via UA by themselves (which they are not willing yet),
      – or there might be a possible role for de facto EU Single Purchasing Agency mentioned in the Energy Union Package (?) [“options for voluntarily demand aggregation mechanisms for collective purchase of gas during a crisis and where Member States are dependent on a single supplier”] => whether this idea is still alive?
  – BUT: cost of debt financing for UA GTS modernization to be relatively higher (Russia to provide transit revenues to pay-back such higher costs?)
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  - Consequences for International Energy Governance

- **Gas supplies to the European gas market: historical and new development**
  - General evolutions of contractual structures
  - Russian supplies diversification: from “one market – one pipe” to “one market – two pipes”
  - Liberalization of EU gas market: historical trends

- Competition of existing and new gas supplies to Europe within the new paradigm of international energy development
  - Russian pipeline gas vs US LNG in Europe
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    - Russian new gas pipelines story
      - In the North
      - In the South
  - EU Quo Vadis project – from liberalization to protectionism?
Quo Vadis 2017: continued liberalization of EU energy legislation – OR factual deviation from liberalization trends (i.e. same rules for all?) to protectionism and discrimination of (selective preferences for) some players?

(in the narrowing relative demand niche for fossil fuel within changing paradigm of world energy development: from “peak supply” to “peak demand” perceptions)

Treaty of Rome (EEC)

Paris Treaty (ECSC)

1st EU Energy package (gas)

2nd EU Energy package

3rd EU Energy package

Network Codes to 3rd EU Energy package preparation


General trend of liberalization tendencies in EU energy legislation till 2017

Visual factual directivity of Quo Vadis – to change (deviate from ) existing trends?

Suggestion of expected directivity of Quo Vadis:

(i) this comes from the logic of prior 60Y+ historical development of common EU economic space, incl. in energy;

(ii) it is expected to be the project for efficiency evaluation of the gas regulatory system of the still emerging internal EU energy market;

(iii) the latter has been teleologically developed through the past 60Y based on provisions of the Treaty of Rome and progressively liberal instruments of their implementation
Организация единого внутреннего рынка газа ЕС в соответствии с Третьим Энергетическим пакетом

Источник: 17-й Мадридский Форум (январь 2010), энергетические регуляторы стран-членов ЕС

Источник: ACER Gas Target Model, 30-й Мадридский Форум (октябрь 2017)
Формирование Третьего Энергопакета ЕС (газ): 2009-2017

Третья Газовая Директива ЕС 73/EC/09 (единые правила)

Регулирование 713/2009 (Агентство по сотрудничеству энергорегуляторов)

Регулирование 715/2009 (доступ к газотранспортной инфраструктуре)

Рамочные Руководящие Указания...

Сетевые Кодексы (СК)...

Целевая модель рынка газа (ЦМРГ: 2011, 2013)

3 юридически обязывающие документа, вступили в силу 03.09.2009,

Разработка ЦМРГ – и, отчасти, СК по новым мощностям ГТС - инициирована российской стороной!!!

Предыдущая Еврокомиссия отрапортовала в конце 2014 г., что подготовка документов Третьего энергопакета в основном завершена, но де факто завершилась только в начале 2017 г.: два последних СК (по новым мощностям ГТС и по тарифам): публикация 17.03.2017, вступление в силу 06.04.2017 => Теперь (2017): Quo Vadis => оценка эффективности (остановиться, оглянуться…)

А.Конопляник, CEPMLP seminar, Dundee, 12-13.02.2018
Whether 3rd EU Energy Package will overcome investment-related inefficiencies of 2nd EU Energy Package?

• 2nd EU Energy Package (2003):
  – Unbundling => separation of commodities & capacities markets => risk of “contractual mismatch”
  – MTPA => risk for Project Financing (risk for pay-back of CAPEX)
  – 2nd Gas Directive Art.21-22 => derogation from core EU rules as a mainstream for investing in infrastructure => about 40 major EU infrastructure projects (pipelines + LNG terminals) developed on the basis of Art.21-22

• 3rd EU Energy Package (2009):
  – Investors expectation: 3rd package will establish rules which will enable to develop infrastructure projects WITHOUT any derogations, BUT
  – Real life: concentration on derogations from the rules (3rd Gas Directive Art.35-36) as mainstream of investor-friendly EU regulatory development
Mismatch between duration/volumes (D/V) of long term supply (delivery) contract & transit/transportation contract as integral part to fulfill delivery contract => risk of non-renewal of transit/transportation contract at existing capacity or non-creation of adequate new capacity => risk of non-delivery for existing/new supply contract (incl. arbitration consequences).

Core issue: to guarantee access to/creation of adequate transportation capacity for volume/duration of long term contracts; shipper’s contracts (booking guarantees) best financial security for debt/project financing.
Изъятия из законодательства ЕС для новых инфраструктурных проектов в газовой отрасли

Exemptions for New Gas Infrastructure from EU Regulation

Источник: Д. Хандога, презентация на IX Международной конференции «Энергетический диалог: Россия – ЕС. Газовый аспект», 14.05.2014 г., Брюссель
Evolution of EU gas market organization & pricing

Producer does influence both on transport. cost & on selling price

Cost-plus price

Margin (IRR)

Tax

Cost

Bundled markets

Producer does influence on transport. cost, but does not on selling price

Marginal price

Oil-indexed price

Tax

Cost

Bundled markets

Producer does not influence nor on transport. cost (TSO establishes tariffs), nor on selling price

Gas-indexed price (gas-to-gas competition) at physical market + futures-based financial derivatives at paper market

Unbundled markets, undersupplied, distance tariffs

Marginal price

Unbundled markets, oversupplied, entry-exit tariffs

Marginal price

Tax

Cost

1998 - 1st Energy Package

2003 – 2nd Energy Package

2009 – 3rd Energy Package
Газовые хабы в ЕС

European gas hubs by development phase

**FORMATIVE**
- Turkey
- Spain (AOC)
- Poland

**IMMATURE**
- Czech Republic
- Austria (CEGH)
- Italy (PSV)

**LIQUID**
- Germany (NCG)
- Germany (GASPOOL)
- France (PEGS)
- Belgium (Zeebrugge)

**MATURE**
- Britain (NBP)
- Netherlands (TTF)

Целевая модель рынка газа ЕС, ее основные параметры – и соответствствие им: индекс рыночной концентрации HHI

Источник: M.Graf. Developing interactive models in Austria for regional markets integration. – 7th European Gas Conference, Vienna, 29.01.2014
Сравнительная ликвидность европейских газовых хабов

Газовые хабы Европы:
- NBP (Соед.Королевство) и TTF (Нидерланды) 10-15
- Zee (Бельгия) 5
- Остальные хабы континентальной Европы 3 и менее

Для сравнения:
- США (нефть): NYMEX (WTI) (Feb.2010) 1680-2240
- Соед. Королевство (нефть): ICE (Brent) (Feb.2010) 2014
- США (газ): NYMEX Henry Hub (av.2009) (377) (26*)

Пороговое значение «чёрн» для ликвидных рыночных площадок:
- общепринятое мнение бизнеса 15
- Целевая модель рынка газа ЕС (2012) 8

«Чёрн» - параметр, обычно применяемый для оценки уровня ликвидности рыночных площадок; соотношение между объемами, выставленными на торги, и фактически поставленными с данной торговой площадки

Источник: “Gas Matters”, IHS-CERA, IEA, M.Kanai (СЭХ) , GasTerra
(*) Jeff D. Makholm. There Is But One True Hub, and His Name Is Henry. – “NATURAL GAS & ELECTRICITY”, June 2016, p.27-30 (28)
Объемы торговли на хабах ЕС и темпы роста 2012-2015


Source: Trayport, Hub operators and NRAs 2015.

Note: Over-the-counter trade (OTC) refers to volumes traded among parties via brokers, with either the parties managing credit risk or trading being cleared by the broker. Exchange execution refers to those volumes supervised and cleared by an organised central market operator. For Spain, data also include physical swaps and bilateral deals.
Насколько сегодняшние хабы в ЕС соответствуют критериям ликвидности оптовой торговли, по мнению участников рынка (результаты опроса) (1)

**Price discovery:**
*Deal count per day vs. trading horizon 2013*

- **Less developed hubs:**
  Relevant prices generated less than 3 months into the future (far below requirement of 36 months)

- **Most developed hubs (TTF, NBP):**
  Relevant prices generated only 14-19 months into the future (well below requirement of 36 months)

- **Stakeholder requirement:**
  *Liquid trading horizon:*
  ≥ 36 months into the future

- **Stakeholder requirement:**
  *Price relevance threshold:*
  ≥ 15 deals per product/hub/trading-day

Источник: A. Wagner. Functioning of European wholesale gas markets. Quantitative study. - Presentation at the 3rd ACER Workshop on Gas Target Model review and update, Brussels, 15.05.2014
Насколько сегодняшние хабы в ЕС соответствуют критериям ликвидности оптовой торговли, по мнению участников рынка (результаты опроса) (2)

Источник: A.Wagner. Functioning of European wholesale gas markets. Quantitative study. - Presentation at the 3rd ACER Workshop on Gas Target Model review and update, Brussels, 15.05.2014
One of the factual aims of international expansion of EU acquis is to provide standards of work and investment protection for EU business abroad adequate to such standards at the internal EU markets(s) => thus diminishment of transaction costs, increase competitiveness of EU business abroad.
Figure 3. ECT & EU acquis in their comparative development

<table>
<thead>
<tr>
<th>Legal norms (key examples)</th>
<th>ECT</th>
<th>EU Acquis (1-st Gas Directives)</th>
<th>EU Acquis (2-nd &amp; 3-rd Gas Directives)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory TPA</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Unbundling</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

ECT = integral part of EU acquis communautaire (ECT = minimum standard through stand-still & roll-back mechanisms)

(1) 1-st EU Gas Directive (1998)
(2) 2-nd EU Gas Directive (2003)
(3) 3-rd EU Gas Directive (2009)

Level of “liberalization” of energy markets - general tendency

Growing gap between EU acquis & ECT

ECT enlargement

ECT observer-states (23+)

ECT enlargement

Domestic legislation of ECT member-states prior to their participation in ECT

Rest of ECT (beyond EU & ECOMT)

Level of “liberalization”

EU liberalization trend

Increase of liberalization level of EU acquis
For the period since 2001 (since the first ‘investor-state’ claim based on ECT Art.26) till 21.04.2015 – total of 67 such claims, incl. 33 claims (half of the total) is from investors of the EU Member-States against the EU Member-States, notably, within the EU (internal cases) – de facto against EU “liberalization risks”.

Source: У.Руснак, А.Конопляник. Эволюция модели энергобезопасности. Россия и ДЭХ: не остаться на обочине. // «Нефтегазовая Вертикаль». 2015, №10, с.4-12 (7).

Based on: http://www.energycharter.org/what-we-do/dispute-settlement/all-investment-dispute-settlement-cases/
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US LNG export pre-history

• US shale gas revolution domino effects on US gas:
  • Rocket-style increase of domestic shale gas production post-2007 has led to oversupply within US gas market =>
  • US domestic gas market has almost closed for import LNG post-2007
  • Till Feb’2016 US - “energy island” => HH price went down/stayed low => price gap with Europe & Asia Pacific => both foreign non-US areas -premium markets for US gas
  • Debt financing of US shale gas development => growing indebtedness of US shale producers within US “energy island” domestic environment

• To pay-back CAPEX in US shale gas production within low domestic gas (HH) prices => reorientation/economic stimuli for export
  • Conversion of regas import LNG terminals to liquefaction export LNG terminals
  • Key target market – Asia Pacific with oil-indexed LNG price premium (esp. after Fukushima accident)
  • Third line of Panama channel expansion (Summer 2016) for US LNG to Pacific (unit size of LNG cargos increased 3 times)

• **BUT:** New export US LNG strategy was developed in end-2000-ies/first-half-2010-ies when oil price stood high (above 100 USD/bbl)
Buyers seem to became cautious on the competitiveness of Henry Hub based LNG

- Financing of projects with previously signed contracts is unproblematic
- Only one small contract (0.75 Mt/Y) was signed since oil peaked

Convergence of Gas Prices

Source: PIRA

Gazprom Sees No Threat from US LNG to European Pipeline Gas

Source: PIRA

US Benchmark Prices are Poised to Rise Within a Year, Meaning Export Costs to Europe Will Also Gain

Estimated Costs* of US LNG Deliveries to Europe in comparison with European Traded Forwards**

* Based on Henry Hub Forward Curve, \( P = HH \times 115\% + X \), where \( X \) – costs of liquefaction, shipping, regasification

** NBP Forward Curve
Source: Bloomberg, Wood McKenzie

US LNG is less competitive to Russian pipeline gas in the EU by LRMC (CAPEX + OPEX) & is competitive there only by SRMC (OPEX) (Henderson) => this does not diminish the increasing “debt bubble” of US shale gas producers – the resource base for US LNG export => short-term “window of opportunities” for US LNG in the EU?

J.Henderson’s conclusions on US LNG competitiveness in EU are trusted in other parts of Europe…
The cost of US LNG versus European Gas prices (acc. to J.Henderson & T.Mitrova)

US HH prices will tend to increase towards 5-6 USD/MBTU with growing LNG export (US is no “energy island” anymore)

Sources: Cheniere Energy, Energy Intelligence, Gazprom (n.b. oil-linked contract calculated at an oil price of $65/barrel)

Source of original chart: James Henderson & Tatiana Mitrova. The Political and Commercial Dynamics of Russia’s Gas Export Strategy. - OIES PAPER: NG 102, September 2015, p. 44
Thierry Bros on US LNG competitiveness vs Russian gas in the EU

• **Thierry Bros:** “HH price will guarantee Gazprom European rent in 2020e! ... Even if Europe market moves to near full spot indexation, if it is inked to the US via the costs of LNG exports, Europe price could remain 6 USD/MBTU (cost of liquefaction, shipping & regasification) above HH. ... In short, the liquid US market will guarantee minimum profit for Gazprom and revenues for the Russian state”

US LNG prices compared against Russian pipeline gas in Europe

With the cost of:
(1) liquefaction in the US = $3/mln BTU
(2) Regasification of the US LNG in Europe = $0.9/mln BTU (IEA)

Source: A. Konoplyanik, J.Sung, LNG Russia
2016, Moscow, 16-18.03.2016 based on IEA, Commodity price (IMF), EIA
Zones of LNG competitiveness in Asia indexed to JCC (NBRV pricing) and Henry Hub (cost-plus pricing)

- With the oil price of $2/MMBTU at Henry Hub (minimum value: April 2012, beginning of 2016), oil-indexed LNG will be competitive in Asia if JCC price < $50/barrel (at present)
- With the oil price of $6/MMBTU (maximum value: beginning of 2014), oil-indexed LNG will be competitive in Asia if JCC price < $80/barrel (mid 2010 – end of 2014)
- With JCC price above $100/barrel, US LNG becomes competitive if Henry Hub price exceeds $6/MMBTU,
- BUT WHETHER OIL PRICES LIKELY TO RETURN TO $100/BBL AND ABOVE? => My answer is “NO”, at least in the foreseeable future, due to “domino effects” of US shale revolution


A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
US LNG export model

“Cost-plus” model (115% HH price) = saver for gas producer

“Throughput or pay” agreement model = saver for LNG producer

“Net-back replacement value” model within gas-to-gas competition at target export market = risk-transfer to LNG off-taker/exporter

Shale gas producer → LNG liquefaction & export terminal → LNG exporter

Debt financing problems => Repayment of growing accumulated debt for shale producers => Another financial bubble at US market (like in 2008)?

Capacity fee (2.25-3.0 USD/MMBTU) => Cheniere’ Sabine-Pass model = :
(a) risk-free business model for LNG terminal operator;
(b) all risks are on shale gas producer & LNG exporter

(1) Pricing problems = pricing scissors:
(a) purchasing FOB price (Henry Hub) to go upward (US is not “energy island” anymore),
(b) selling CIF price going downward (oil-indexation as NBRV &/or spot)

(2) Price/cost problem = capacity fee fixed obligatory payment (on top of growing HH price)
Expected & factual profitability zone for US LNG prior to & after export begins (2016) and oil prices falls (2014) (principal scheme; no scale observation) (1)

(A) Expectations

- (1) US gas price decrease (US = “energy island”) plus (2) accelerated growth of shale gas producers indebtedness (debt financing) => perception to compensate (in plenty) current losses at domestic US market by future LNG export at high Asian price (oil-indexation plus post-Fukushima Asian price premium);

=> Post 2014/2016:
- USA not “energy island” anymore (2016 onwards) => HH-price to grow? => shale gas producers revenue to grow, but their indebtedness grow as well and converted in “junk debt”; LNG prices (oil-indexed, spot) fell (2014 onwards) => margins of LNG off-takers/wholesale resellers diminished, price risks grew (=> portfolio sales growth); indebtedness of shale gas producers continues => to sell LNG at any price (above SRMC) to diminish losses (sunk costs approach)?

=> Higher LNG prices needed for “US Energy Dominance”/“America First”!

(B) Factual

- USA not “energy island” anymore (2016 onwards)
- HH gas price to grow?
- Shale gas producers revenue to grow, but their indebtedness grow as well and converted in “junk debt”
- LNG prices (oil-indexed, spot) fell (2014 onwards)
- Margins of LNG off-takers/wholesale resellers diminished, price risks grew (portfolio sales growth); indebtedness of shale gas producers continues
- To sell LNG at any price (above SRMC) to diminish losses (sunk costs approach)?

=> Higher LNG prices needed for “US Energy Dominance”/“America First”!

Diminished combined margin of US gas producers & LNG off-takers. How it will be shared? Who will take most of losses?
Expected & factual profitability zone for US LNG prior to & after export begins (2016) and oil prices falls (2014) (2)

=> Prior to 2014/2016:

• (1) US gas price decrease (US = “energy island”) plus (2) accelerated growth of shale gas producers indebtedness (debt financing) => perception to compensate (in plenty) current losses at domestic US market by future LNG export at high Asian price (oil-indexation plus post-Fukushima Asian price premium);

• EU market not attractive for US LNG post-2011 (EU oversupply post 2009) despite excessive/free regaz EU capacities.

=> Post 2014/2016:

• USA not “energy island” anymore (2016 onwards) => HH-price to grow? => shale gas producers revenue to grow, but their indebtedness grow as well and converted in “junk debt”; LNG prices (oil-indexed, spot) fell (2014 onwards) => margins of LNG off-takers/wholesale resellers diminished, price risks grew (=> portfolio sales growth); indebtedness of shale gas producers continues => to sell LNG at any price (above SRMC) to diminish losses (sunk costs approach)? => Higher LNG prices needed for “US Energy Dominance”/“America First”!

A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
US LNG & campaign against Russian gas: to get rid of the rival?

• Different recent Western “studies” present **RUSSIAN GAS AS IF MORE DIRTY** than other gases (both pipeline & LNG) &/or other fossil fuels &/or RES, like (*):
  – US Dep’t of Energy on long-term GHG perspective on exporting LNG from the US as of May, 29 2014 (long-term GHG perspectives for NG)
  – Karlsruhe Institute of Technology (KIT) Study as of March 2016 (argues the results of the above & official estimates of the US Environment Protection Agency)
  – PÖYRY Study as of June 2016 (coal vs NG)
  – EXERGIA/COWI for DG ENER, “Study on Actual GHG Data for Diesel, Petrol, Kerosene, and Natural Gas”, July 2015 (to provide information about the lifecycle GHG emissions of fossil fuels used in transport)

• **NB1:** Current thesis of as if “more dirty” Russian gas is additive to post-2009 thesis of Russia as if “non-reliable” source of gas (supplier)
  – substitution of notions: “non-reliable source” (Russia) vs “non-reliable transit route from the source” to the market (Ukraine)

• **NB2:** The Trans-Atlantic fight against NordStream-2 - of the same origin?
  – To “softly” force Russia to continue gas supplies to EU post-2019 through more risky & costly transit route (to diminish its competitiveness?)

• **NB3:** Parallel with different other (non-energy) spheres, like f.i. WADA treatment of Russian (vs US &/or other) Olympic & Paralympic athletes in Rio & following Olympics?
  – substitution of notions: fact of allowed doping vs source of information (hackers)

(*) Source: D. Leonov, N. Sudarev. COP-21 – role of NG in Decarbonization and Sustainability of EU economy.; K. Romanov. The Role of Natural Gas In Decarbonization and Sustainability.// Russia-EU Gas Advisory Council, Work Stream 2 “Internal Markets” meeting, Vienna, E-Control;’01 July 2016
Conclusion (*)

- J.Henderson: “The potential of North American LNG is huge…”, but (different authors) economics is poor when it is to be delivered to the EU

- A.Konoplyanik: ...so whether US LNG can be competitive in Europe based on free market forces without administrative support to US LNG from the opponents of Russian gas in the EU? Maybe (one of) the real reason(s) of current campaign against Russian gas in the EU is to create administratively competitive advantages for US LNG aimed at getting rid of Russian gas as its rival in the EU?

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Russia’s existing/new supplies to Europe (to the unbundled EU gas market): (1) resource base moves from Nadym-Pur-Taz to Yamal, (2) Ukrainian transit risks & costs increases, => (3) modernization existing (since end-60’s) infrastructure vs new construction transportation route.
### Length comparison of different gas routes from Yamal to Germany

<table>
<thead>
<tr>
<th>Route Description</th>
<th>Distance (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yamal – Greifswald:</td>
<td>4166</td>
</tr>
<tr>
<td>Yamal – Ust-Luga (within RF)</td>
<td>2977</td>
</tr>
<tr>
<td>Ust-Luga – Greifswald</td>
<td>1189</td>
</tr>
<tr>
<td>Yamal – NPTR – Waidhaus:</td>
<td>6051</td>
</tr>
<tr>
<td>Yamal – Sudja (within RF)</td>
<td>3987</td>
</tr>
<tr>
<td>Sudja – Waidhaus</td>
<td>2064</td>
</tr>
</tbody>
</table>

Length of the route via Nord Stream is **1885 km** shorter than through UA GTS, incl. that within Russian territory the distance is shorter by **1010 km**. Route via Ukraine is **45%** longer than via Nord Stream.

A.Konoplyanik, 11th EGC, Vienna, 31.01.2018

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Reminder: Since 2\textsuperscript{nd} EU Gas Package supplies to the individual EU MS = supplies to the EU!
Fight against NS2: multilayer task for EU (& other players)

• To force Russia continue gas transit to EU via UA post-2019 & to pay transit fees (instead of supporting UA from EU/US public finance)

• Special Third Gas Directive amendments for NS2: to slow down (if not to prevent) construction/start-up + export EU acquis (MTPA/ competition between Russian companies)
  • Export EU acquis upstream cross-border gas value chains = regular long-standing EU task in favour of EU business

• Additional (hidden?) aim (?): to provoke further conflict between Gazprom & Rosneft (on Russian gas market “liberalization” issue):
  • Gazprom: state agent (sole pipeline exporter by law) on monetizing Russian pipeline gas (maximize marketable rent) => to escape Rusgas-to-Rusgas competition
  • Rosneft: would like to monetize its large gas resources (preferably internationally), agent agreements on gas marketing at external markets: with GPE vs with BP
  • Political consequences: open conflict between two Russian state companies = a blow on prestige of “Putin’s regime”?

A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
COP-21, low prices, US LNG & fight against Russian gas

**Aim of fight:** to get rid of rival within the narrowing demand niche for gas? (if COP-21-based demand restrictions + low oil price effects for gas) =>

- to present in different Western “studies” **AS IF RUSSIAN GAS IS MORE DIRTY** than other gases (both pipeline & LNG) &/or other fossil fuels &/or RES, like (*):
  - US Dep’t of Energy on long-term GHG perspective on exporting LNG from the US as of May, 29 2014 (long-term GHG perspectives for NG)
  - Karlsruhe Institute of Technology (KIT) Study as of March 2016 (argues the results of the above & official estimates of the US Environment Protection Agency)
  - PÖYRY Study as of June 2016 (coal vs NG)
  - EXERGIA/COWI for DG ENER, “Study on Actual GHG Data for Diesel, Petrol, Kerosene, and Natural Gas”, July 2015 (to provide information about the lifecycle GHG emissions of fossil fuels used in transport)
  - **NB1: Current thesis of as if “more dirty” Russian gas is additive to post-2009 thesis of Russia as if “non-reliable” source of gas**
    - substitution of notions: “non-reliable source” vs “non-reliable transit route from the source” to the market
  - **NB2: The Trans-Atlantic fight against NordStream-2 - of the same origin?**
  - **NB3: Parallel with different spheres, like f.i. WADA treatment of US & Russian Olympic & Paralympic athletes in Rio?**
    - substitution of notions: fact of allowed doping vs source of information (hackers)

(*) Source: D. Leonov, N. Sudarev. COP-21 – role of NG in Decarbonization and Sustainability of EU economy; K. Romanov. The Role of Natural Gas In Decarbonization and Sustainability.// Russia-EU Gas Advisory Council, Work Stream 2 “Internal Markets” meeting, Vienna, E-Control, 01 July 2016
A.Konoplyanik, CEPMLP seminar, Dundee, 12-13.02.2018
From “Peak supply” to “Peak demand”, US LNG & fight against Russian gas in EU (1)

- **IEA**: Current PRR of non-renewable energies 3 times higher (if produced & utilized) than CO2 emissions to stay within 2 degree Centigrade global temperature increase => “unburnable energy”

- **Q**: If 2/3 of future CO2 emissions refer to coal, 22% to oil, and only 15% to gas (IEA), why major aim/victim in the fight (incl. for climate change) in EU is (Russian) gas?

- **A**: many studies have shown that US LNG is not competitive with Russian pipeline gas in EU on LRMC basis => “to kill a competitor” policy within the narrowing competitive niche for gas in EU (“zero-sum-game” approach)
  - To create artificial administrative & other barriers for more competitive Russian gas (*f.i. Quo Vadis scenarios, Third Gas Directive amendment proposal*) + to develop its negative image (*f.i. EXERGIA*) & consequences (*f.i. REKK on NS2*) => to make it non-competitive against US LNG within new energy environment: lower oil prices post-2014, and expected demand limitations induced by “peak demand” paradigm & COP-21 targets
Do you think that US LNG will undermine Russia’s gas monopoly in Europe?

- Yes: 42%
- No: 26%
- Not sure: 32%
How can you comment on the currently increasing inflow in public domain of negative information about Russian gas (too risky to rely upon, it is more dirty that other gases, etc.), Russian gas policy in the EU (political weapon of Kremlin), and new projects on its delivery to the EU (not commercially, but politically motivated)?

- A: There is no such special negative information on Russian gas and gas policy. All information, comments and concerns on Russian gas and Russian gas policy in the EU are well justified, objective and impartial.
- B: Russian gas export creates real threat to European energy security since it is a political tool and energy weapon of Kremlin which real threat is undervalued. This is why it is paid additional attention in the EU media by the energy & policy professionals to signal and demonstrate such threats to politicians to adequately withstand them.
- C: It is a reflection of increasing competition between US LNG and Russian gas which US LNG loses in the current economic environment; so this is part of well-organized information campaign against Russian gas aimed at getting rid of the rival in the EU and thus to broaden administratively secured (both by politicians and media from both sides of the Atlantic) competitive niche for non-Russian gas supplies in the EU.
- D: Other

- A: 9%
- B: 13%
- C: 22%
- D: 57%
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From *competition* between individual new pipeline proposals, based on the “old” EU rules, to *cooperation* of shippers, TSOs, NRAs under “new” EU rules (1)

- Three types of perceived competition in SEE – e.g. between:
  - Russia/producer/exporter-“sponsored” & EU/consumer/importer-“sponsored” pipeline projects (incl. from alternative to Russian supplies),
  - Different EU-“sponsored” pipeline & LNG regas projects,
  - Three different EU regulatory models/procedures of initiation, financing, development of new capacity:
    - “Old”: (a) PCI and/or (b) Exemptions under Art.21-22 (2nd Gas Directive)/Art.35-36 (3rd Gas Directive),
    - “New”: (c) CAM NC INC (originated from Art.13.2 Third Gas Directive)
- “Russia-sponsored” projects:
  - South/Turkish Streams (offshore & onshore parts) e.g. their continuation/prolongation onshore EU, incl. Poseidon project proposal, - to the existing delivery points (destination markets) under existing LTC (supply)
- “EU-sponsored” projects:
  - TANAP-TAP (EU Southern Gas Corridor), incl. its potential capacity expansion
  - Vertical Gas Corridor (CESEC)
  - IGB/IBR & other interconnectors with reverse flows
  - Integration into these pipeline systems of LNG regas facilities & LNG/ storages (both existing onshore & proposed FSRUs)
From *competition* between individual new pipeline proposals, based on the “old” EU rules, to *cooperation* of shippers, TSOs, NRAs under “new” EU rules (2)

- Evolution of pipeline development concept in SEE: From “offer of capacity” based on old EU PCI/Exemptions rules (NABUCCO) - to “demand for capacity” based on bilateral IGAs (South Stream: “no go” if contradicts Third Energy Package) or on new EU rules (CAM NC INC)
  - Failure of NABUCCO: lack of shippers’ readiness to book transportation capacity
  - Failure of South Stream (onshore): opposition of EU to allow unilateral deviation from EU Third Energy Package rules ( unbundling, mandatory TPA) in post-2009 period
  - Contradiction between ( non-compliance of) bilateral IGAs & EU rules for unbundled internal market = prerequisite for development of new EU rules for development of new capacity within unbundled EU gas market based on “demand for capacity” approach

- Difference in the major purpose of development of new capacity:
  - Russia (producer/exporter initiative): firstly, to reroute to the new transportation routes with the same delivery point capacity (transportation) contracts within existing valid long-term supply contracts after expiration of the above-mentioned transportation contract which is part of this supply LTC
    - Originates from the Russian GTS which incorporates existing and new resource bases (multiple fields).
  - EU (consumer/importer initiative): firstly, to develop new transportation routes from the new supply source(s) to diversify from dominant Russia supplies
    - Southern Gas Corridor originates from Azeri Shah-Deniz II (from new single field)
From *competition* between individual new pipeline proposals, based on the “old” EU rules, to *cooperation* of shippers, TSOs, NRAs under “new” EU rules (3)

- Financeability/bankability:
  - former EU rules: competition between the projects for access to EU public finance to make project (new capacity) financeable;
  - new EU rules: demand for capacity = shipper’s readiness to book capacity long-term = security for project (debt) financing = no need for public finance (except “up to 20%” quota for short-term shippers)

- Conclusion: from competition between individual “distance” pipelines to “entry-exit” approach with multiple entry capacities (pipeline and LNG regas) based on “demand for capacity” approach (covering all shippers’ requests) based on new EU regulatory rules (adopted by comitology procedure in end-2016)
  - Southern Gas Corridor to become an integral part of such integrated system: to convert it from isolated East-West pipeline endeavored as alternative to Russian gas supplies into well-integrated in all four geographical dimensions system with reverse flows at ICs
  - Similar approach was proposed in IENE’s June 2016 Publication “TAP is Not Enough”
Turkish Stream: why such complicated route? To by-pass (former) Ukrainian EEZ... but...

Source: http://middleeastnewsservice.com/tag/turkish-stream/
Black Sea delimitation prior to and after reunification of Crimea with Russia

The new reality: Turkish & Ukrainian EEZs do not interlock anymore

Map source: http://img1.liveinternet.ru/images/attach/c/0/113/415/113415843_large_16012_10202054593033675_5644072863940384821_n.jpg
Black Sea delimitation prior to and after reunification of Crimea with Russia: consequences for risk-avoidance offshore pipelines

Map source:
http://img1.liveinternet.ru/images/attach/c0/113/415/113415843_large_16012_10202054593033675_5644072863940384821_n.jpg

Reunification of Crimea with RF opens opportunity (& 24.11.2015 incident & event afterwards votes for its use) to avoid Turkish transit

=> My proposal: offshore pipeline route to Bulgaria/Varna directly via new (expanded) RF EEZ in Black Sea, now by-passing both Ukrainian & Turkish EEZs, with all its positives: shorter lime via shallower waters => benefits to both RF & EU

Source: Lamont-Doherty Earth Observatory of Columbia University
http://www.liveinternet.ru/users/3515935/
Black Sea: map of water depths & offshore routes

Map source:
http://www.perekop.info/black-sea-history/

- South Stream (via Turkish EEZ)
- Turkish Stream
- Possible “New” Stream (?) (via new/expanded Russian EEZ)
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Five selected Quo Vadis scenarios

1) **Tariff reform**
   - nullification of intra-zone E-E tariffs, compensatory increase of entry (to EU wholesale market) and/or exit (to EU retail market) tariffs, centralized redistribution of compensatory revenues (via newly established TCF)

2) **Real merger of market zones**

3) **Virtual merger of market zones**
   - paving the way for virtual reverse flows to UA

4) **Shift of delivery points to the external border of EU** (area of EU acquis => EU + Energy Community area)
   - Russian gas to be delivered to RF-UA border

5) **Expansion of pipeline infrastructure to deliver regasified LNG from coastal import terminals to inside EU** (the main/Rus delivery points)
   - To substitute their Rus gas shifted to RF-UA border? who will finance? Via TCF?

**My final conclusion (devil’s advocate/worst-case interpretation):** Quo Vadis in its current structure presents an integral programme of pushing out the (more cheap) Russian pipeline gas supplies to the periphery of the EU/Energy Community area (RF-UA border) and its substitution in the (Eastern EU) area of its historical presence by (more costly) US LNG
Possible application consequences (schematic) of five Quo Vadis scenarios (4+1), selected for quantitative modelling, under their most negative interpretation for Russian side

- Existing key delivery points of Russian gas to the EU
- New delivery points of Russian gas to the EU as proposed in Quo Vadis report
- Development of new pipeline infrastructure from existing LNG terminals to existing delivery points of Russian gas within the EU as proposed in Quo Vadis report
- Shift of existing delivery points of Russian gas inside the EU to their new locations at the external border of the zone of EU acquis application as proposed in Quo Vadis report
- Transfer of existing transit business of Russian gas to existing delivery point within the EU to the mid-stream companies of the EU as proposed in Quo Vadis report
- New merged regional gas market zones as proposed in Quo Vadis report
- New North-South EU gas pipeline corridor in the Eastern part of the EU to connect new LNG terminals

New (incremental) European gas infrastructure (PCI) (see legend)


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Legend to figure with new (incremental) European gas infrastructure (PCI)

- Natural Gas
  - Terminal for liquefied natural gas (LNG)
    - before 2017
    - between 2017 and 2020
    - after 2020
  - Storage facility
    - before 2017
    - between 2017 and 2020
    - after 2020
  - Reverse flow
    - before 2017
    - between 2017 and 2020
    - after 2020

- Compressor station
  - before 2017
  - between 2017 and 2020
  - after 2020

- Node

- Pipeline
  - before 2017
  - between 2017 and 2020
  - after 2020

- Existing terminal for liquefied natural
- Existing storage facility
- Existing pipeline network


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Quo Vadis, Russian pipeline gas & US LNG in EU: attempt of unfair competition? At the cost of EU? What the Presidents are saying...

In its current structure Quo Vadis seems to be factually aimed at justification of substitution in EU by more expensive US LNG of more cheap Russian pipeline gas; on the routes of the latter to EU (both on existing and on prospective ones) it is modelled to create incremental barriers. => Quo Vadis scenarios well correlate with new anti-Russian US sanctions against existing and new Russian export pipelines and might lead not to increase but to decrease of EU welfare. It seems that Quo Vadis scenarios are constructed not in favour of EU, but in favour of US:

- **US President D.Trump** (Warsaw, 04.07.2017): “Maybe, the price will come slightly higher – but that’s OK...” (“US Energy Dominance” & “America First” strategies)

- **Russian Prime-Minister D.Medvedev** (St.Petersburg, 21.09.2017): “...American Administration - and Congress... try to promote its own suppliers and to substitute Russian Federation at this market”

- **Russian President V.Putin** (Sochi, 19.10.2017): “...recent sanctions’ package adopted by US Congress openly aimed at pushing Russia away from European energy markets, to force Europe to turn to more expensive US LNG ...”
How homogenous is EU (what about internal EU solidarity)? What about Transatlantic solidarity?

- EU = “old” EU + “new” EU or “old” EU vs “new” EU?
- A lot of EU-Russia energy politicization comes either from “new” EU or from abroad
- “New” EU vs “old EU” (still dividing lines?):
  - Brussels vs Washington
  - EU vs NATO (funding etc)
  - Russian pipeline gas vs US LNG (& EU welfare)
  - NWE vs CEE/SEE gas prices/pricing

EU vs USA: allies or competitors?
- Joint sanctions against Russia
- Joint support of Ukraine

BUT: to jointly oppose Russia, to depart from Russian energy = more costly energy for EU => less competitive EU manufacturing globally => who wins in global competition from anti-Russian sanctions undertaken within Trans-Atlantic solidarity? => Anti-Russian sanctions as an instrument of weakening EU global competitiveness ??? (“America First. Nothing personal. Only business.”)
Dividing line from Baltic to Black sea (Project “Intermarium”) – major aim of USA in Europe (acc. to G.Friedman, “Stratfor”)

“...final aim of the US consists in creation of “Intermarium” – territory between Baltic and Black Seas, which concept was developed as far back as by Pilsudski. First aim for US is not to allow that German capital and German technologies were united with Russian natural resources and labour resources in the invincible combination. ... Trump card of US which defeat such combination - dividing line between Baltic states and Black Sea.”

(https://www.thechicagocouncil.org/event/europe-destined-conflict)

Source: Presentation of George Friedman, Founder and President of private intelligence agency “Stratfor” at the conference of “The Chicago Council on Global Affairs”, 4 февраля 2015 г., https://www.youtube.com/watch?v=iOY1dDqa7F0; https://www.youtube.com/watch?v=xewzbMYmC_I
Thank you for your attention!

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