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Speaker

# Prof. Dr. Andrey A. Konoplyanik

Topic

## ‘A View on the Evolution of International Energy Markets and Russia’s Gas Export Strategy within the Changing Global Economic and Gas Landscape’


**PROF. DR. ANDREY A. KONOPLYANIK**

Adviser to the Director General, "Gazprom export" LLC; Co-chair Work Stream 2 "Internal Markets", Russia-EU Gas Advisory Council; Professor on International Oil & Gas Business, Russian State Gubkin Oil and Gas University (National Research University)

# ‘A VIEW ON THE EVOLUTION OF INTERNATIONAL ENERGY MARKETS AND RUSSIA’S GAS EXPORT STRATEGY WITHIN THE CHANGING GLOBAL ECONOMIC AND GAS LANDSCAPE’

*Supporting figures and tables for this lecture can be found in Annexes*

## EVOLUTION OF INTERNATIONAL ENERGY MARKETS: A PIECE OF THEORY

In order to understand the current oil and gas landscape, we need to understand its evolution, the long-term trends of the international energy markets and the reasons why we are facing today the shift from the perception of the “peak supply” to the perception of “peak demand” as a general paradigm on the international energy markets’ development.

The past/current energy paradigm is based on perception of “peak supply”. It can largely be contributed to 3 persons: M.K.Hubbert, H.Hotelling, and J.-M.Chevalier.

Marion King Hubbert has created the famous "Hubbert's curve" (1949), a bell-type production curve for non-renewable energy resource extraction, which predicted the US oil production peak of 1970, which predetermined an appearance of “demand-supply scissors” at some stage of energy development due to slow-down of increase in supply to be followed by its decrease and stable (as was predicted at that time) increase of energy demand stipulated by economy and populations growth. Harold Hotelling is the creator of the so-called ‘Hotelling rule' (1931), which said that the future value of fossil fuel in-situ increases by the value of the current interest rate within the time-frame. This was a departure from ‘cost-plus' pricing (lower investment price) to ‘net-back replacement value" (NBRV) pricing (upper investment price). But both of these theories failed to consider potential demand-side limitations, for example, due to environmental considerations.

In 1973 Jean-Marie Chevalier suggested a hypothesis that from the border of 1960-ies/1970-ies the earlier falling down exploration and production costs of oil began to go up (what Konoplyanik have proved and now calls the 'Chevalier breaking point'), due to worsening of natural environment for new discoveries. These three theoretical inputs taken together predetermined the current paradigm of international energy development which is based on the perception of "peak supply". But at least two global investment cycles need to pass before we reach, if at all, this peak: one cycle – to pay-back implementation of existing energy technologies already in use on commercial basis, another one – to bring to and then through the large-scale commercial implementation already known energy technologies which have not yet moved forward from R&DD stage, so investments in their development were already made and thus need to be paid-back.

In this respect, "economists", who think differently from "geologists" (both are figurative terms), say that the curve is moving in upward right direction, which means the peak may not be reached at all. Economic and technical factors, such as for example the US shale gas (and later oil) revolution have demonstrated a clear shift of the 'Hubbert's curve' into upward-right direction (see Figure 1). Shale gas, then shale oil, first considered as unconventional energy resources (which means uneconomic to produce), have now moved to the area below Hubbert's curve and became conventional (which means profitable to produce). This means humanity will now foresee energy limitations from the supply side.

(Figure 1. Economic interpretation of "Hubbert's curves" (acc. to Konoplyanik))

## MARKET STAGES

Due to evolutionary changes in the energy markets they become more and more competitive in their development. In this respect, there is a clear correlation of different pricing and contractual structures with the market development stages.

At the initial growth stage, there is mostly a combination of long-term contracts and cost-plus pricing mechanisms, meaning the cumulative cost of CAPEX and OPEX, incl. cost of raising capital, etc. This establishes a lower investment price-minimum acceptable price for producer, the price of self-financing. At this stage, long-term contracts are an investment tool rather than a trading mechanism as the structure of the contracts (their duration and pricing mechanism) aimed to payback for the investments and to mitigate the risk of their non-return. Since development of new areas usually starts with mega-fields (to utilize economy of scale) duration of LTCs at this stage may be the longest, and it shall always exceed pay-back periods acceptable for the banks providing project (debt) financing. This pricing principle enables producer to extract part of the resource rent called Ricardian rent.

At the next market stage, shorter-term contracts are being developed in addition to long-term ones since the oil & gas deposits became smaller though and more costly (due to more severe their natural environment– effect of Chevalier turning point) and the macroeconomic infrastructure is already (at least partially) been built at the previous stage and its costs were either covered by the state or were imbedded into the costs of mega-fields. When a speedy growth of energy demand exceeds supply, this stipulate producer to implement replacement value based pricing when the contract price is linked with discount to the price of backstop technology (alternative/replacement fuel); the price level can be netted-back from end-user to the delivery point (NBRV pricing) if the latter is located between producer and consumer (like it was in the USSR times when delivery points of Soviet gas to the EU were placed at the political border between East and West, i.e. on the western border of COMECON/eastern border of the EU). This happens when development of delivery infrastructure creates possibilities for consumers (end-users) to choose between different energies. This pricing mechanism enables producer to extract, on top of Ricardian rent, another part of resource rent called Hotelling rent. NBRV pricing mechanism establishes upper investment price-maximum acceptable price for consumer for giver energy source supplied.

At the subsequent stage, a trade price is implemented (starting with the spot deals), not sometimes aimed at the physical good delivery, but at extraction of profit from the trade. Usually this happens when diversity of infrastructure provides multiplicity of choice for both producers and consumers to choose their counterpart and oversupply came to the market.

At the final stage, the market development moves towards creation of a paper energy market which coexists and being developed in pair with a physical energy markets (see Figure 2).

(Figure 2. Evolution of international O&G markets: correlation between market development stages, contractual structures, pricing mechanisms and multi-facet competition at the rising branch of "Hubbert's curve" (1))

Through the development stages of the markets their liquidity (usually measured by churn rate which shows relation between volumes of trade and delivery at the particular marketplace) is also evolving. In the first phase, where energy is a material good and LTCs and other term-contracts dominates, the churn rate is always equals one. In the second phase, where energy became a commodity/tradeable good, and spot deals increased in volumes on top of LTCs, the churn rate exceeds one through re-trades, mostly in the form of OTC and "daisy chains". In the third phase, in a market of paper markets and future contracts, when energy became a financial asset, traded at the exchanges, the churn rate is going increasingly up and can reach multi-digit figures (see Figure 3).

(Figure 3. Evolution of international O&G markets: correlation between market development stages and markets liquidity at the rising branch of "Hubbert's curve")

Today the world energy market have been moving from the perception of "peak supply" to the perception of "peak demand". Under "peak supply" paradigm, the future energy supplies are more costly and more limited, this is why low-cost NRES wins more rent and market share today, and development of higher-cost NRES is delayed to the later stages.

But under the "peak demand" paradigm, the competition among energy suppliers increases and the future energy supply became more plentiful (partly due to demand limitation) and thus less costly (in the oversupplied markets the users can choose between the suppliers, while the latter would like to market their energy produced by proposing price discounts). This is why low-cost NRES wins, but now they takes all market and higher-cost NRES are cut off (See Figure 4). This is why we are facing today further increase of competition at international energy, including gas markets.

(Figure 4. World Energy: The Change of Paradigm?)

## LNG IS MAKING GAS A GLOBAL COMMODITY

Global gas markets of the future would be much dependent on LNG which has created a second gas revolution, after the first revolution created by US shale gas. Contrary to regional pipeline markets that were first developed as national ones, LNG market is being developed immediately as international one, bringing together regional markets of pipeline gas into global integrated - pipeline plus LNG – gas market. Similar to shale gas, LNG will bring about regulatory changes and related domino effects.

We face changes in institutional structure of globalized (global?) LNG market as it moves from historical base-load LNG demand (in such "energy islands" as Japan, Korea, Taiwan – pioneers in large-scale LNG demand) to increasingly flexible demand to cover semi-peaks of load curves (competitive demand), and also driven by supply diversity (security of supply).

We saw shifts from investment stability to trade flexibility due to the move from large-scale projects (oriented at extraction of "economy of scale" benefits) with LTC (an investment tool) with NBRV pricing (oil indexation) & fixed destination (initial stage of LNG development) to delivery flexibility (from DES/CIF-based to FOB-based contracts) & portfolio purchases (energy majors with assets in both upstream & downstream).

"Smaller-scale economy" opens new business areas for LNG. In the upstream, cost-cutting technical progress enables the move from "economy of scale" as instrument of resource rent extraction to technological rent extraction, i.e. by using floating LNG (FSRU/FSLU). More small players can enter the market, with their lower credit ratings, but that risk will be balanced by lower-risk floating LNG, which is a liquid asset. This respond to lower credit ratings of new LNG market entrants creates a spin-off effect for LNG market growth. In the downstream/end-use, small–scale LNG opens new business areas for gas, i.e. in mobility (road transport, river and sea bunkering), decentralized gas supplies (gasification of households).

Gas industry has imported NBRV pricing model from oil industry providing gas exporter to extract both Ricardian and Hotelling parts of resource rent. In LNG pricing this historically means use of oil indexation. "Gas-to-gas" competition when oversupply came brings "gas indexed" pricing and returns back exporter to extraction of only Ricardian part of resource rent. Such pricing is present today in USA (Henry

Hub as key marketplace), in Europe (TTF and NBP as most liquid EU hubs). In Asia-Pacific emerging hub(s) yet to be developed in JKM whether the placement of the hub/exchange is discussed between Tokyo, Shanghai and Singapore.

Today we can face dual gas pricing beyond USA in Asia-Pacific, with crude oil indexation (JCC-based) vs Henry-Hub-based (de facto “cost plus”, but more correctly “spot plus”) LNG pricing, and in the EU, with indexation to petroleum products (Russian LTC mostly adjusted to TTF) vs EU hubs (TTF/NBP). This is why multiple (hybrid) pricing models will most probably coexist in different geographical segments of evolving global LNG (and integrated – pipeline plus LNG - global) market.

## SIMILARITY BETWEEN OIL & LNG MARKETS DEVELOPMENTS

There are many similarities between the oil market developments in the 1980s, on the one hand, and the current evolving global LNG market, on the other hand. Contract duration, unit contract volumes, company size of new players and their credit ratings are all decreasing. This has increased the risk and volatility of the LNG market, which is calling for to hedge risk. This stipulates development of “paper” (financial segment of) LNG market from both producer’s and consumer’s side.

Because of LNG in the gas market, the regional gas price differences become "spreads" or traded differentials, which means that the material good is being transformed into a commodity. Price arbitrage deals are drivers of trades which stipulate development of “paper” (financial segment of) LNG market from the traders’ side.

Nevertheless, development of LNG paper market is still in its early stages due to technical difficulties with back up storage capacities (evaporation; discrete cargoes), there is no standard LNG contract yet which is a prerequisite for financial trades (though two LNG model contract templates exist: GIIGNL (FOB & DES) template contract – more European slanted, and AIPN template contract – more American slanted; most recently both EFET and BP has proposed their draft LNG model contracts). So LNG is a global commodity, but not yet a global financial asset, like oil.

## GLOBAL LNG MARKET REGULATION: PROSPECTS FOR THE GECF?

Based on what we are seeing now in the global LNG market, we can draw parallels with the experiences of the European Commission (EC) during the Rotterdam spot oil market development in the late 1970s. During that time, the EC was trying to register and monitor.

This is where we see both opportunity and challenge for the GECF. Could the GECF carry out a similar role to the EC for global LNG market regulation?

The opportunities for a standardized contract need to be explored and if this is to be done, registering and monitoring is necessary. It is a chance to find out whether it will be possible to go towards standardization. The LNG market is developing and the question is not only whether the market can be standardized but also who will do it. Also, without standardization, there is no development of the financial market.

Since global LNG trade is international in its nature, it cannot be regulated on a national basis. Energy is quite a specific vehicle. And LNG is very specific. So who would be best placed to regulate?

From our point of view, it is the role of the States that are actually in this business. However, any model that will be developed by a singular country will be challenged by other countries. Not a single regulatory entity or government could cover the global LNG industry (as pointed out in a study by the EC's DG Energy).

There are some similarities between what the EC as a supra-national authority has been doing and the opportunity the GECF might have. The GECF perhaps has an opportunity to try and develop a common level playing field in global LNG that will enable the next stage of its development. But there is a challenge. These days, producers are facing more and more risk, facing the situation as less stable. There is a demand for more monitoring. But a balance of interests needs to be found. And this is where there could be a role to play for the GECF.

## EXTERNAL CHALLENGES FOR RUSSIAN GAS

There are positive and negative challenges for Russia in the current gas market developments, first of all in Europe as its current key export market.

The EU gas market is a mature one with stagnating (or even declining, according to some forecasts) future gas demand. However, there is a growth of import gas demand due to both a decline in domestic gas production (e.g. UK, Norway North Sea, Groningen), and withdrawal from coal (mainly because of environmental concerns) and nuclear power stations (radiation safety). Forecasts predict that future gas demand in the EU will be coved by three major sources of supplies in approximately equal portions. This is domestic supplies, Russian pipeline gas and import LNG. In the meantime, Russian gas export has reached a new historical record exceeding 200 BCM in 2018.

The EU sees LNG as competitor to (Russian) pipeline gas in Europe (motivated by diversity of supplies preferences), but large-scale LNG producers don't want EU as a destination market and prefer other (non-EU) premium markets. This is justified by the low (25% only) utilization rate of existing EU regaz facilities which means that EU market is less attractive for global LNG. Moreover, there is not enough connecting pipelines from coastal EU regaz facilities to inside the EU (according to REKK only about 25%). This means that 75% of the LNG delivered to the EU needs to be used in coastal areas while the bulk of demand is inside the EU.

So Russian pipeline gas in EU has won its dominant niche in the EU market (it now holds about a 34% stake) in fair global competition with international LNG (*according to S.Dale @BP) because of the simple fact that it is cheaper than (US) LNG.

What does US LNG is doing in order to compete with Russian gas in Europe? The answer seems to be based on approach to take off a competitor. There are many attempts made by US LNG to enter Europe, both with legislative, economic and administrative support of both the US and EU administrations within Euro-Atlantic cooperation. For example, a US-EU 2018 Summit decision on EU purchases of US LNG with EU to co-finance (under Projects of Common Interest) and build 9-11 new regaz LNG terminals (despite existing excessive regaz capacities) and connecting North-South pipelines in the “Intermarium” area in Eastern Europe (within the area of historical Soviet/Russian gas supplies).

A US legislative act was introduced in 2018 for one billion dollars to be provided by the US in financing European energy projects (natural gas interconnectors, storage and LNG import facilities, reverse flow capacity, etc.) over the period 2019 - 2023. However, US administrative support of US LNG to Europe has the main goal to create jobs in the US and favor US businesses, and not to benefit the European market, since US LNG will be more costly to the EU and will decrease its welfare by payment of so-called “security premium” for “molecules of freedom”. Equally, artificial barriers are planned to be created for Russian pipe gas to the EU in favor of the US LNG (such as 2017-2018 Quo Vadis project of the Commission with tentative modelling of regulatory reform of EU gas market). On top of this, multiple US & EU economic sanctions have been introduced on Russia, Russian businessmen, businesses & projects, incl. special emphasis on energy projects, incl. demonization of “North Stream -2” gas pipeline.

## RUSSIAN RESPONSE TO THE EXTERNAL CHALLENGES: EU DECARBONISATION

The EU over time turned into a major promoter of steadily increased environmental targets. But natural gas has been long been victimized by climate-change-oriented consumers among other fossil fuels, especially after 2015 Paris climate agreement (COP-21), regardless of the fact that gas is the cleanest of them all.

Until recently, gas has been considered in EU as "transition fuel" within the EU earlier vision of its all-electric “digital, electrical, renewable” carbon-free energy future based only on renewable energy sources (RES) inspired by intended shift from “dirty foreign molecules” to “green domestic electrons”.

Now the CEC's attitude to gas has changed from all-electric "RES only”-based to a "RES-electric plus decarbonized gas”-based EU energy future. The most promising decarbonized gas is hydrogen with three key technological avenues of its production: water electrolysis (power-to-gas/PTG), methane steam reforming with CO2 emissions and thus with CCS (carbon capture and sequestration), and methane pyrolysis (and related technologies of hydrogen production without access of oxygen) without CO2 emissions.

This creates new potential for additional Russian gas supplies to the EU for H2 production, bearing in mind that pipeline cross-border gas supplies with LTC are immanently more appropriate for decarbonisation than spot and/or LNG supplies from economic standpoint, since investment projects of hydrogen production are more financeable in case of more stable and predictable gas flows. Since 80% of GHG emission within Russia-EU cross-border gas value chain takes place within the EU, methane-based EU decarbonisation more appropriate to undertake downstream.

Best effective participation of Russian gas in the EU decarbonisation is a topic for Russia-EU inter-government cooperation and this is a key topic in the current agenda of the Work Stream 2 “Internal markets”, EU-Russia Gas Advisory Council.

Three stages of Russia’s proposed input into EU decarbonisation (I called it “three-steps Aksyutin’s pathway” after the name of Deputy-CEO of Gazprom Oleg Aksyutin who has introduced it) presents:

- at the first stage, structural decarbonisation, which means rapid reduction of GHG emissions by the means of switching from coal in power generation and petroleum motor fuels to natural gas (in latter case to both CNG and LNG). For instance, Russian small-scale LNG for Black Sea and Danube region;
- at the second stage, technological decarbonisation based on existing technologies & infrastructure. This means the use of methane-hydrogen fuel (MHF) in energy

and transport without costly infrastructure changes. For instance, MHF can be used as fuel gas for compressor stations (KS) at pipelines, both in Russia and the EU, based on H2 production technologies at KS on-site without CO2 emission;

- at the third stage, deep technological decarbonisation based on innovative technologies' breakthroughs. This means transition to hydrogen energy based on efficient low-emission technologies of hydrogen production from methane. Such H2 production without CO2 emission (based on Russian and/or on jointly developed under RF-EU cooperation technologies) has its cost-competitive advantage compared to PTG/electrolysis (which is too much energy intensive - by the order compared to H2 production from methane - and thus too costly) and/or Steam Reforming with obligatory CCS (CCS adds incremental immanent cost component up to 30+%).

## RUSSIAN RESPONSE TO THE EXTERNAL CHALLENGES: UKRAINIAN TRANSIT

There are also new risks within the existing cross-border gas value chain which has appeared after dissolution of the COMECON and the USSR and it took long for Russia to find the best effective way to mitigate them based on the balance of interests of all the parties involved, which means producer/exporter, consumer/importer and transit states.

Prior to dissolution of COMECON/USSR delivery points of Soviet gas to the EU were placed at COMECON-EU border, but producer/exporter had full operational control on gas value chain from the wellhead to the delivery point. So de facto no transit via COMECON existed then.

After dissolution of COMECON/USSR new sovereign independent states have appeared between producer/exporter (post-Soviet Russia) and the EU, producer has lost control on transit part of gas value chain, and transit risks has appeared. They are being called generally as "transit risks", but as such they consist of different components, creating sort of "risk pyramid". In its fundament lays legal (third country sovereign law), regulatory (adequacy of legal transit regime to fulfillment of supply obligations between parties to LTGEC from third countries), and contractual components of transit risks needed to exclude appearance of "contractual mismatch" problem (inconsistency between supply and transportation contracts). Next level - technical component of transit risk which means adequate maintenance of transit system by its TSO (which is foreign to both parties of the sales contract of the commodity to be transported through the territory of this third to them– transit–state) to provide technical stability and reliability of transit. And only at the upper level (last in the queue) lays political component - change in political relations between transit states and its neighbors that can create interruptions of supplies through transit state. So the name of the transit country is the element of last importance in the logical chain of "transit risk" appearance.

To minimize transit risks for importer and exporter means to diversify:

- for the importer: multiple sources of supply, routes (plus suppliers)?
- for the exporter: multiple markets, routes (plus importers).

This means that diversification of routes is within common interest for producer/exporter and importer, they both are to be interested to exclude transit totally or to develop alternative pipelines (by-passes) without and/or alongside with transit routes.

In our opinion, the best strategy would be to move from linear/radial (pre- 2019) to circle-radial (post-2019) architecture of Russian gas supplies to the EU (see Figure 5).

(Figure 5. Two forming circles of future gas supplies to Europe: "disrupted" circle of global LNG supplies and integral with internal backup circle of Russian pipeline gas supplies)

Within this new architecture there will be a redistribution of Russian gas export flows destined for Europe which will lead to the changing role of transit routes.

Historically, since the 1960-ies, central transit corridor (through Ukraine and later also via Portland) was the key export route for Soviet/Russian gas to Europe. Now, in post-2019 time, after finalization of both Northern (in addition to existing "North Stream 1") and Southern routes, both consisting of offshore and onshore part, they will take the main Russian export gas flows to Europe. But Ukrainian transit will stay, though with the new – and very important – role: it will provide flexibility to the market, addressing both seasonal and market (due to changing prices at the EU hubs) demand fluctuations. Such architecture addresses justified economic interests of all the parties involved (Russia, the EU, Ukraine) and will present new balance of interests in the evolving gas market within 'Broader Energy Europe" following the evolving global energy trends.