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ANALYSIS

Russian gas at European energy market: Why adaptation is inevitable

Andrey A. Konoplyanik*

Foundation Institute for Energy and Finance, Arkhangelskiy pereulok, 6, bld. 1, Moscow 101000, Russia

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ABSTRACT

Economic crisis of 2009–2010 plus steady decarbonisation of the European Union (EU) energy policy decrease EU energy demand while gas supplies to the EU continue to increase as well as its multiplicity. Thus competitive niche for gas in Europe tightens, especially for Russian gas supplies with rather non-flexible contractual structures and pricing mechanisms such as long-term gas export contracts (LTGEC) with oil indexation. On top of this, Third EU Energy Package changes the whole architecture of the wholesale EU internal gas market. So risks and uncertainties for oil-indexed LTGEC within this tightening market niche for gas increase. To effectively address them, LTGEC need to become more flexible and adaptable. Gazprom has recently started such adaptation of its LTGEC. Whether this will stay as a temporary step-back or will become company's new regular policy towards more flexible contractual structures and pricing mechanisms in Europe?

1. Russian gas in Europe and Russia-EU gas value chain (overview)

Since adoption in 2006 of the Federal Law "On Gas Export" Russian state-controlled joint-stock company Gazprom has received the monopoly rights on gas export. Single export channel and system of so-called Groningen-type long-term gas export contracts (LTGEC)[1] with petroleum-products-indexation of gas price[2] are the core elements of export strategy of the Russian state and its state-owned gas company. Gazprom exports its gas to Europe on the basis of LTGEC with duration of up to 25 years, which are concluded usually on the basis of inter-governmental agreements.

Export provides for about one third of total gas marketing and almost 60% of Gazprom's revenues. Key export gas market for Russia is Europe where it covers about 25–30% of gas imports. Current Gazprom export volumes to Europe are around 150 billion cubic meters (BCM). During recent economic crisis Russia's share at the EU gas market has diminished (from 28% to 26%, downgraded from almost 190 BCM) since petroleum products indexation price formulas in LTGEC held gas prices above spot gas quotations and adaptation of LTGEC pricing mechanisms to the state of the market took usually rather long time. So importers prefer to switch to spot within the range of flexibility provided by LTGEC.

LTGEC are fundamental for stable and reliable gas supplies both for the producer and consumer in Continental Europe. But LTGEC is not so much a trade instrument, but is a financial tool (instrument of project financing, the latter is key traditional mechanism of raising capital for upstream gas project development) needed to develop long-term and highly capital-intensive production and transportation gas projects. Bearing in mind that almost all Russian gas resources/reserves are located in its remote Northern and Eastern areas far distant from both domestic and key export markets, this additionally increases capital cost for single production and transportation projects. So it is banking and financial community that requested LTGEC to be concluded in order to guarantee pay back of the debt financing which need to be raised for upstream project development.

Among key characteristic features of Russian LTGEC the following two should be mentioned:

(a) pricing formula which links gas price to price fluctuations of key petroleum products (LFO and RFO) with 6–9-months time-lag;
(b) minimum "take-and/or-pay" (TOP) obligations (was on average 85% before 2009–2010 crisis, but during this crisis was downgraded in some contracts to 60%), which means that the customer should pay for the annual minimum contractual volumes this year even

* Tel.: +7 903 199 3601; fax: +7 495 787 7451.
E-mail address: a_konoplyanik@fief.ru.

[1] For detailed description of this model see [1,4,6]. This model is also explained in section 5 on gas pricing below.

[2] Usually for simplicity this is called "oil-indexation", even in professional literature, though one need to distinguish between indexation of gas price to petroleum products (mostly to residual fuel oil (RFO) and light fuel oil (LFO)) in European LTGEC and indexation to crude oil (a basket of crude oils, like Japan Crude Cocktail – JCC) in the Asia Pacific (this issue will be discussed in more details below).

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that he has not off-taken this year. Over the course of the year the buyer could take delivery of less gas (carry forward mechanism) or more gas (make up mechanism) than the quantity represented by TOP commitment for that period. Make up and carry forward rights together are a vital tool in enabling the buyer to modulate its TOP commitments in light of often unpredictable operational and/or commercial requirements.[3]

LTGEC are de facto service contracts which provide to the customer daily flexibility (through mechanism of re-nominations), variation of supplies within a year and commitment of the seller to supply to the customer in the future gas volumes that the latter has earlier paid for under TOP conditions of LTGEC. This is why Gazprom consider that it is fair that LTGEC prices are to be higher than spot prices since LTGEC provide additional service (value) to the customer.

As of today, cumulative portfolio of signed Russian LTGEC is equal to 3.1 BCM of guaranteed future supplies (at their minimum contractual TOP level) for the whole duration of these contracts through 2011–2035. Major customers of Russian LTGEC are Germany, Turkey, Italy, France.

Gazprom is also increasingly active as spot gas trader in Europe through its affiliate Gazprom Marketing & Trading Ltd., which trades gas at hubs in the UK, Belgium, Netherlands, France selling on spot both some volumes of Russian gas as well as the gas which it purchases in Europe.

In the Former Soviet Union (FSU) area, incl. Baltic states, Gazprom has been continuously moving towards contractual framework and pricing mechanisms similar to that in its gas supplies to the EU (see below).

Gazprom has started its gas sales to Western Europe in 1968. At that time of the state entrepreneurship and state monopoly on foreign trade in the Union of Soviet Socialist Republics (USSR), the producer of gas was the USSR Gas Ministry and the seller was Soviet foreign trade association "Soyuzgazexport" – a specialized gas-trade arm of the Soviet Ministry for Foreign Trade. Nowadays producers of Russian gas are multiplicity of companies: state-owned Gazprom, vertically-integrated oil companies (VIOC) (state owned Rosneft and private Lukoil, TNK-BP, etc.), non-integrated gas producers (Novatek, etc.), but the right to export gas belongs to Gazprom only.

Since that time and as of today, Russia-EU cross-border gas value chain consists of three consecutive groups of long-term contracts (LTC) (see Fig. 1):

(a) "producer" LTC: Groningen-type LTGEC between Russia's sole exporter Gazprom and wholesale traders-importers of Russian gas – vertically integrated companies like E.ON Ruhrgas, ENI, GDF, etc., and/or trading companies. Delivery points for Soviet/Russian gas under its LTGEC have been located since 1968 at the former political border between the then East and West (western border of COMECON[4] and eastern border of EU-12/15, now located deep inside EU-27) [1];
(b) "wholesale trade" LTC: LTC between the wholesale buyers of Russian gas and its large end-users (power plants, energy-intensive industry plants) and/or retail traders, and
(c) "retail trade" LTC: between the latter and small end-users (households, commercial users).

Recent developments at the EU gas market has influenced significantly this contractual structure of Russian gas supplies with its pricing mechanism.

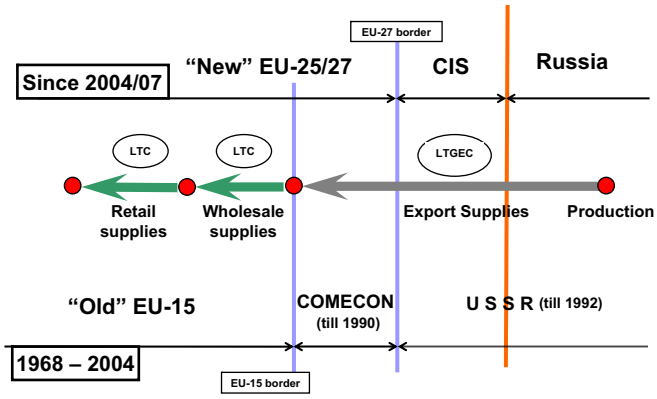

Fig. 1. Russia-EU gas value chain: three-step LTC structure since 1968 till nowadays.

2. Acute gas glut

From this author's view [2], since 2009 we are living in the new gas world, especially within the "broader energy Europe". Under the latter term I do understand the whole area which unites the EU with the neighbouring producer and transit states with the cross-border fixed (immobile) infrastructure such as pipelines and electricity grids. This means that common technical infrastructure predetermined the high level of interdependence between the states within this area. "Broader energy Europe" includes today the whole geographical Europe, North Africa, part of Asia (producer fields and transportation networks in Western Siberia and Central Asia) and in the future it will be inevitably expanded to Middle East, Eastern Mediterranean, etc.

The most immediate challenge for natural gas industry, affecting contractual structures and gas prices, is a so-called "acute gas glut" (as defined by the IEA) [2a] reflecting collision of unprecedented collapse in gas demand due to recession/economic crisis of 2009–2010 (and it is not yet clear whether the new wave of recession will not follow soon), and new waves of supply resulting in sum-total from new LNG supplies, new pipeline supply of conventional gas, and material results of "quiet shale gas revolution" that has been taking place in unconventional gas production in North America.

Indeed, in the 2000-ies prior to global economic crisis the United States of America (USA) has faced a boom in unconventional gas production including shale gas. "Quiet shale gas revolution" was stipulated by multiplier effect from combination of technological achievements (like 3-D seismic plus horizontal drilling plus hydro-fracturing, etc.) supported by competitive institutional structure of US gas industry, specific for that country characteristics of land and subsoil ownership, and by continuous growth in gas prices which increased competitiveness of non-conventional gas. Gas prices, in turn, have followed with few month time-lag world oil prices, the latter have been steadily growing since the beginning of that decade until their absolute historical peak in July 2008.

At this upturn gas price development, global recession has downgraded gas consumption volumes at key markets. Decrease of domestic gas demand with simultaneous growth of domestic supply of shale gas has tear down US needs in imported liquefied natural gas (LNG) down to zero levels. In result, LNG supplies within the Atlantic basin that were earlier destined for the US market, were re-oriented to Europe. But demand in Europe has also diminished, as in the US, due to the global crisis. This resulted in oversupply of gas in Europe. The radical difference between Europe and the US, though, is that imported LNG was competing in the US with domestic shale gas – and has lost its market share. And in Europe additional volumes of imported LNG began to compete with another imported gas – pipeline gas mostly from Russia, Norway, Algeria. At oversupplied European gas market (the state of oversupply stays in the EU since 2009 and until nowadays) spot LNG has

[3] For more details of gas sales and gas transportation agreements, princip0les and practice, see [1a].

[4] Council for Mutual Economic Assistance, former "Eastern block's" countries (USSR, Central and Eastern European socialist states & Cuba).

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its competitive advantage in flexibility over pipeline gas under LTGEC with oil-indexed pricing. That created a major challenge for Russian gas in Europe and has raised a problem of its long-term competitiveness in this region under current (historically existing) contractual structures and pricing mechanisms.

EU-oriented LNG supplies came mostly from rather new projects in Atlantic basin and Middle East (in Qatar, Nigeria, Oman, etc.) which were recently started under "project financing" terms. This means that they were developed mostly by debt capital. This is why LNG suppliers from such projects have by any means – even by deep damping, though still above their production cost level – to market their gas in order to pay back recent debt-financed project investments and to return their project-related debts to the lenders (banks and other financial institutions). This is why spot LNG suppliers were ready to and thus undertook quick and sharp price decrease in order to capture and/or expand their market share. At the same time, pipeline gas suppliers at LTGEC terms can change/adapt pricing formulae only in result of bi-lateral agreements on the basis of negotiations between supplier and purchaser. This requires additional time and within this time-lag contract prices for pipeline gas stayed higher than spot prices for LNG.

In this circumstances buyers of pipeline gas diminish their purchased volumes to minimal contractual TOP obligations and require from suppliers either to further formally downgrade this TOP limit, or to allow them to buy below minimal TOP obligations without contractual sanctions, or to review contract formulae and to index it to spot quotations and, in longer term, to deviate from oil indexation. Or they require some other actions that would diminish contract prices for pipeline gas in LTGEC to the current level of spot prices (non-dependent whether of LNG or pipeline origin). Adaptability to the changing market environment of LTGEC is objectively lower than of short-term and spot contracts. This has indeed resulted in partial loss by Gazprom of its current gas market share in Europe. Whether this loss will be temporary or not depends, first of all, on Gazprom itself. As Domenico Dispenza, President of Eurogas, said in November 2009, Russian exports have declined much more than those of Norway or Algeria and Russia's lack of contract flexibility was a "*very strong warning for the Russian gas industry. It is a call for change, in order to adapt to a market that has so profoundly shifted in its fundamentals in such a little time*" [43]

3. Rosy prospects for Europe?

Current state of European gas market can be characterized as "crisis situation" (economic crisis which led to decrease in gas demand) and "transition situation" to:

(a) new demand-side for gas energy policies (making further prospects for gas more uncertain),
(b) steady appearance of additional supply sources (sharp increase of assortment and sources of supplies which is being leading to increase, at least potential, in supply volumes), and
(c) new market structure (in result of implementation of the Third EU Energy Package).

Under these circumstances a number of euphoric publications for European customers have appeared which extrapolate current "in-crisis" situation in the gas market (when supply overbalance demand) to "post-crisis" period (when supply and demand will most probably balance again on pre-crisis or close levels). Moreover, they extend to the post-crisis period current characteristics of in-crisis price competition (until this moment lost by Gazprom) between its slowly adapted pipeline LTGEC gas prices and heavily dumped prices of spot LNG.

In many (mostly Western-based) publications it is predicted that European countries – major consumers and importers of natural gas – will very soon begin to produce in huge volumes their own, domestic shale gas which will be very cheap for end-users (since produced near consuming centers) in addition to continuous flows of imported LNG. According to these scenarios, plentiful flows of such locally-produced cheap European shale gas will further displace from energy balances of many European states expensive imported "traditional" pipeline gas (means, first of all, Russian/Gazprom's gas). Alternatively, this will lead to intensive growth of competition between producing states of traditional pipeline gas (Russia, Norway, Algeria) and LNG (Qatar, Algeria, Nigeria, Oman, Trinidad & Tobago) destined for export markets in Europe and Asia, since both regions would be increasingly supplied by their own domestic shale and other unconventional gas (like coal-bed methane). In result, gas consumers will see continuing downward pressure on gas prices. This will, in turn, lead to further expansion of short-term and spot trade and futures pricing, development of liquid hubs. Finally, gas market liberalization will spread over and Anglo–Saxon model of open, competitive, liquid gas market/marketplaces will be established in the Continental Europe, further to the US and the United Kingdom (UK), backed up by the Third EU Energy Package regulatory rules. This is the vision that I would like to further discuss/argue in more details below.

4. Major challenges and justified trends in European gas

One of the key messages from the 24th European Autumn Gas Conference, held in Bilbao in northern Spain in November 2009, was that "*there is no map of the new energy landscape and Europe's gas and energy companies are having to adapt rapidly based on an emerging understanding of the environment*" [3]. The latter, in turn, is to be based on justified trends in European gas market developments. What are they in regard to evolving architecture of international gas markets? Since the time in the middle of economic crisis, when conference in Bilbao took place, the debate on future developments in European gas is nor less hot and the future itself is still rather uncertain. I see the following major challenges in this regard.

There are two principally different models of gas market organisation: "Anglo–Saxon" model, based on development of liquid marketplaces (like in the US and the UK), and "Continental" one, based on vertical integration and long-term contracts (like in the Continental Europe and Asia) [4].

There are three models of international gas pricing: "cost-plus" pricing[5] (dominating at initial stages of any market development), "net-back replacement value" pricing[6] (expanding within the Continental Europe since 1962 till nowadays, and in Asia Pacific) dominating within competitive markets of physical gas, and pricing based on "commodities exchanges"/liquid marketplaces[7] (USA, UK) within competitive markets of paper gas [4,5].

Whether further development of pricing in the Continental Europe will go according to Anglo–Saxon model, or through further modification of Groningen-type LTGEC pricing formula? And if there is any "third way" in further evolution of pricing models, like return to cost-plus and/or other - totally new – options, like it happened with introduction by the Dutch Government of the "replacement value" concept in

[5] When the price of gas is defined by direct accumulation of production and transportation costs from the wellhead to the delivery point.

[6] When the competitive price of gas at the wellhead and/or delivery point is calculated by deduction from its competitive price at the end-user (calculated, in turn, as a replacement value of gas alternatives at the burner-tip) transportation costs to this end-user from corresponding delivery point or wellhead.

[7] When the price of gas is defined as an equilibrium price based on supply-demand balance of physical energy (at the market of "physical" energies – at the earlier stages of energy markets development) or on supply-demand balance of energy financial derivatives (at the market of "paper" energy – at late stages of energy markets development, like global oil market and/or regional US and UK gas markets) [10,12].

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1962 after discovery in 1958 of huge Groningen gas field? And which direction adaptation of gas pricing formulae within LTGEC will follow: approaching "oil parity" (thus de facto moving away from "replacement value principle"), or expanding the basket of formulae ingredients alternative to gas (thus following the "replacement value" principle and de facto deviating from "oil parity")? This will have major impact on Russian gas in Europe.

We'll discuss these issues further on. But let's examine firstly how contractual structures and pricing mechanisms has emerged at the European gas market and in "broader energy Europe" in previous 50 years.

5. Gas pricing: A background

Historically and till nowadays the dominant export gas pricing mechanism in continental Europe and Eurasia is net-back replacement value gas pricing (linked to end-user prices — at the burner-tip) with price indexation formulas where gas price is mostly linked to petroleum product prices in Europe while to crude oil in the Far East.

Prior to 1962 gas pricing in Europe was organised on cost-plus basis. In 1962, the Netherlands' government has proclaimed its new energy policy aimed at maximization of long-term resource rent from the development of the then newly discovered super-giant Groningen gas field. Based on these principles a concept of long-term gas export contract (LTGEC) was established, well-known worldwide since then as "Groningen model of LTGEC" [1,4,6]. Its major characteristic features are:

long-term contract, *plus*

pricing formula linked to gas replacement values (prices of gas replacing fuels at the consumer-end within competitive energy market), *plus*

regular price review (including both recalculation of the price level for current period under existing formula, and review procedure of the formula itself), *plus*

net-back to delivery point (which means deduction from end-user gas price of the transportation costs from delivery point to the end-user so contracted gas will be competitive at end-user burner-tip), *plus*

minimum delivery and take obligations (take-and/or-pay provision - TOP), *plus*

protection from price arbitrage to the detriment of exporter (so-called "destination clauses"), etc. [1].

Why "Oil-Indexation" was chosen as a replacement-value-based pricing mechanism for gas in Groningen-type LTGEC? *Indexation* is a mechanism of softening price fluctuations by weighting them within the reference period (nowadays usually it's a period of 6–9 preceding months to the application period) and thus fixing the price for application period. This procedure is been repeated on a revolver-type basis prior to each next application period (usually next quarter). Indexation was linked to "*oil*" (more precisely — to petroleum products in Europe) since in the 1960-ies key replacement fuels for gas in Europe were petroleum products: RFO in electricity generation and industry and LFO in the households. Oil price at that time was low and stable (due to the policy of the cartel of major oil companies knows as "Seven sisters" who dominated in the international oil market since 1928 till early 1970-ies), so were RFO and LFO prices. In the 1960-ies oil-indexation as a mechanism of softening potential price volatility of key replacement fuels fully corresponded to replacement value philosophy, it was also easy to implement and requested rare adjustments. In sum-total, it was an economically justified and convenient gas pricing tool.

This mechanism provided opportunity to market gas within evolving market structure and competitive pricing environment to the mutual benefit of both producer and consumer. All further development of capital-intensive gas infrastructure in Europe and of the whole European gas industry was based on implementation of such Groningen-type LTGECs.

In addition to this economic background, the multilateral political background has appeared for LTGEC at the very same time. On 14 December 1962 United Nations (UN) General Assembly has approved its Resolution 1803 (XVII) "Permanent sovereignty over natural resources" which, inter alia, stated in its Article 1 that "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." This principle of sovereignty over natural resources was later made legally binding in international law by the corresponding Article 18 of the Energy Charter Treaty signed in 1994 and entered into force on 16 April 1998.

Based on the above, it is the sovereign right of the resource-owning state/exporter of non-renewable energy resource (such as gas) to provide or not to provide for an importing country politically-motivated concessions in the form of either lower export price levels or by establishing such pricing formula structure that would lead to the lower export price level, which will in both cases mean to share resource rent of the exporting state with the importing state. This means that implementation of the "cost-plus" pricing principle instead of "net-back replacement value" export pricing, or presentation of politically motivated concessions to market price, equals to politically motivated formation of export prices. Such practice was broadly used, inter alia, between the USSR and COMECON countries up to the end of the 1980-ies, between Russia and Ukraine since 1992 till 2006 (for natural gas originated from Russia), between Central Asia, Russia and Ukraine between 1992 and 2009/2010 (for natural gas originated from Central Asia), between Russia and Belarus since 1992 till nowadays (though price concession mechanisms throughout this period differs), etc. But from this author's view [5,10], the general trend since 1962 till nowadays was expansion of the Groningen-type LTGEC contractual structures with oil-indexation within the EU and further Eastward within "broader energy Europe".

6. Evolution of export gas pricing in continental Europe and FSU: 1962–2010

Fig. 2 illustrates evolution of gas pricing mechanisms within continental Europe and FSU area in the recent decades. If the "cost-plus" principle is used, the price of gas produced in the East (say in Russia or/and Central Asia) and delivered to the end-users at Western markets (in the EU) should be calculated by net-forward approach from the cost of production at the exporter's well-head (in direction from right to left at Fig. 2 through the Central Asia — Russia — EU gas value chain presented at the *X*-axis). If the "net-back replacement value" principle is used, the price of gas is calculated as replacement value at the end-use market netted-back to the delivery points (in direction from left to right at Fig. 2 through the Central Asia — Russia — EU gas value chain presented at the *X*-axis). In this case, since the price of gas in European import LTGECs is mostly pegged to the price of petroleum products (gas oil/diesel and residual fuel oil), the higher is the international oil price, the higher is contractual price of gas calculated by the "net-back replacement value" principle. Thus the value of exporter's resource rent in both latter cases would be different due to different value of the Hotelling rent: Hotelling rent would be lower (equal to the difference between B1 and A at Fig. 2) in case of low oil price, and it would be higher (equal to the difference between B2 and A at Fig. 2) in case of high oil price (see Fig. 2).

As was mentioned, in 1962 European gas pricing started to be converted from the "cost-plus" to "net-back replacement value"

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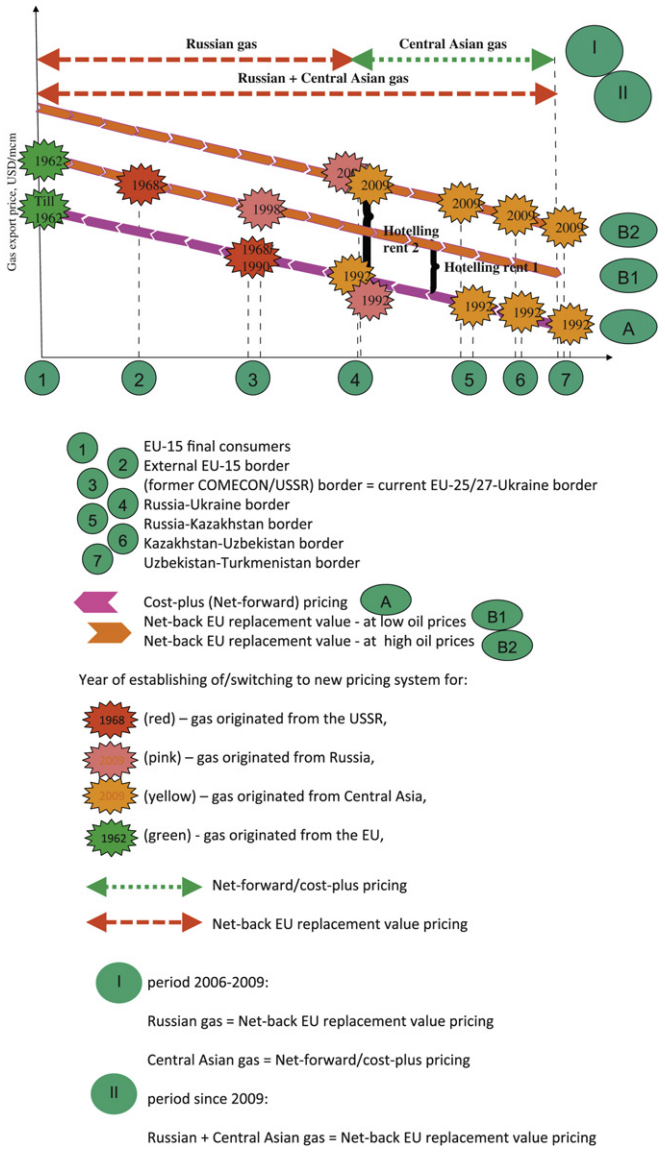

Fig. 2. Evolution of gas export pricing in continental Europe & FSU: 1962 till nowadays.

principle [6]. Since that time the latter principle and Groningen model of LTGEC with pricing formulas, utilizing this principle, has been slowly but steadily spreading over Europe and FSU in Eastward direction [4,5,11].

In April 1968 first Soviet gas export supplies to the West started (to delivery point Baumgarten in Austria within the contract with Austrian company OMV) based on modified Groningen-type LTGEC with pricing formula based on replacement value principle. At the same time, the COMECON states located on the same export route of Soviet gas to Europe received their gas at politically-motivated discounted prices calculated at "cost-plus" principle. After dissolution of the COMECON system in 1989, the then already politically-independent states of Central Europe still continued to receive their imported gas from post-Soviet Russia at the discounted prices until end-1990-ies, when Russian export contracts with them were transformed in line with the European practice — to the Groningen-type LTGECs with gas pricing based on replacement-value principle linked to petroleum products. Since 1998 was the low peak of the international oil prices (in result of the Asian financial crisis), the imported gas price increase, due to transfer from "cost-plus" to "replacement-value" principle, was insignificant. According to estimates (made by G. Gounul, the then Senior Expert of the Energy Charter Secretariat), for Czech and Slovak Republics it was less than 10 US dollars per thousand cubic meters (USD/mcm) [5,7]. This is why such transfer from politically-motivated to economically-justified pricing (from curve A to curve B1 at Fig. 2) has passed through rather painlessly for the importers and did not stimulate political tensions.

This was not the case within the FSU area. After dissolution of the USSR in end-1991, all gas export pricing within FSU space was organized at the cost-plus principle, both in case when Russia was acting as an exporter of its gas to Commonwealth of Independent States[8] (CIS) states, as well when it was acting as an importer of Central Asian gas (Russia has been purchasing Central Asian gas at the external borders of Central Asian states and then reselling it as Russian gas (since title of ownership has been transferred to Russia) mostly to Ukraine). It was only in 2006 with Ukraine and in 2007 with Belarus that Russia has started to transfer its export gas pricing with transit CIS states (those transiting Russian gas to the EU) from cost-plus to replacement value principle. This transfer of gas pricing for Ukraine then referred only to the gas originated from Russia and did not refer to the gas originated from Central Asia.

Replacement value for Russian gas was calculated at the EU end-user market since it was this market (and not the markets of Ukraine and/or Belarus) that provided the highest marketable price and at that time an excessive demand for Russian gas, and thus the highest resource rent for the resource-owning state. Unfortunately, the time for such transformation was chosen not as good as it has been chosen earlier with the Central European states in end-1990-ies when the oil prices were low. 2006 (transition to "European pricing formulas" with Ukraine) and 2007 (the same with Belarus) were the fourth and fifth years of continuing growth of international oil prices which increasingly widen the gap between economically-justified replacement-value gas prices and politically-motivated cost-plus gas prices. In 1998 (when this transition was made with Czech and Slovak Republics) this gap for Ukraine was equal only to 15 USD/mcm, but in 2005 — already to 160 USD/mcm. For Belarus in 1998 it was equal to 25 USD/mcm, and in 2006 it exceeded 170 USD/mcm [5,7]. This explains why such transfer from political towards market-based pricing (a shift from curve A to curve B2 at Fig. 2) was so economically painful for CIS importing states, why it has increased political tensions between the states in question, and why different intermediate/transition schemes were introduced in order to soften the burden of price increase on importing CIS states.

Major element of softening the pressure of increased gas price for Ukraine was continuation of supply to Ukraine of Central Asian gas by Russia, which Russia has been buying at the external borders of Central Asian exporters at cost-plus basis. From this author's view [4,5,8,9], by mixing the gas, originated from Central Asia (on this gas relatively low export price continued to be established at cost-plus basis), with the gas, originated from Russia (on this gas relatively high export price started to be established at replacement value basis), this being done at the balance sheets of Russian–Ukraine Swiss-registered intermediary RosUkrEnergo, Ukraine managed to receive through 2006–2008 period the discounted level of imported gas price. The mechanism of price discounting for Ukraine at that time was the mixture by Russia of two incoming flows of gas (originated from Russia and from Central Asia) with two different pricing mechanisms into one contractual outgoing flow of gas destined for Ukraine with weighted average price level.

In case of Belarus, soft transition to "European formulas" was done differently since only Russian gas was delivered to this country. This is why it was agreed by the parties that during transition period (initially

[8] 13 states of the FSU united in a CIS treaty after dissolution of the USSR.

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established for 2007–2011) a special discounting ratio to EU-based market gas price would be established, each year narrowing the gap between factual export Russian price to Belarus and the price calculated on the basis of "European formulae" [4,5]. The discipline of such transition was not followed (price discounts have not been diminished in line with the agreement) and finally the parties has recently agreed that Belarus (as being a part of the "United Russia–Belarus state") will start to receive imported gas from Russia at the domestic Russian price, e.g. calculated at cost-plus principle. In 2009 the net-back replacement value pricing principle was finally expanded to the Central Asian gas – the most remote to the East part of the gas transportation network (cross-border gas value chain) within the "broader energy Europe" [5,10,11]. So, it took almost 50 years to expand net-back replacement value pricing principle to the whole continental Europe and FSU area through the existing EU-oriented gas value chains. And it was at this same moment that, after slow, steady and sometime painful expansion of the Groningen-type LTGEC structures alongside gas value chains within "broader energy Europe", Gazprom was forced (faced himself in a position) to start adaptation of its contractual structures and pricing mechanisms to new realities, de facto deviating from the general trend of the previous 50 years.

It is quite clear that this challenge was met by this company without any enthusiasm at all. Gazprom has just finished in 2009–2010 establishment of Groningen-type system in the Eastern part of the "broader energy Europe" (with CIS states) when it found itself at the same moment under strong pressure from its traditional Western partners to deviate from this system in the Western part of the Russia-EU gas value chain.

7. Net-back replacement value pricing in Europe: evolution of pricing formulae

At the beginning of LTGEC, gas replacement value was justifiably based on oil indexation. "Replacement value" corresponded to "oil (petroleum product) indexation" at the stage of formation (1962) and further implementation of LTGEC Groningen formulae. As was already mentioned, in the 1960-ies residual/heavy fuel oil (RFO) in the industry and electricity generation and gas oil/diesel oil (LFO) in the households were in fact gas-replacing fuels. Low efficiency of their utilization was compensated by low oil prices and stable and abundant supplies from Middle East and North Africa (MENA) through this whole "Golden Decade" supported (effectively managed) by the "Seven Sisters" policy in international oil trade [12].

Price of gas oil/diesel is generally by 15% higher, and of RFO – by 30% lower than crude oil price, so if correlation of RFO/LFO is established at the 60/40 ratio (as in the original Groningen LTGEC gas pricing formulae) or 50/50 (as in the most recent 2009 Russia–Ukraine LTGEC), then the ratio of contractual gas price to oil price is about 60–80% [13,14].

Later on, for reasons of simplification of implementation and calculations, pricing mechanisms in LTGEC moved, (a) from economic substance of the contractual gas pricing formulae as an average value of the basket of gas replacement values – to calculation of arithmetic equivalent of the-then existed "gas-to-oil price ratio", and (b) from calculating gas replacement value at end-user – to calculating crude oil price ratio at EU-15 border: the German border (Average German Import Price – AGIP) or in Italian ports. This took place instead of strictly following "replacement value" principle which would have resulted in specific (individualized) packages of gas-competing energies in each sphere of gas consumption in different states. "Replacement value" pricing formulae is to consider specificity of the state and consumption area (this is why, for instance, export price for Russian gas to China will always be lower than to the EU, if both based on same net-back "replacement value" principle). Since contract prices for neighbouring states under "replacement value" not necessarily should be equal, this either justify economically inclusion of "destination clauses" in LTGEC (which was in fact an integral part of original Groningen and later LTGECs) – to prevent transfer of the portion of resource rent from producer to wholesale buyer/reseller, or pave the way for price arbitrage within open markets [1].

After oil crises of the 1970-ies, gas replacement value deviates away from oil, but indexation to petroleum products in the indexation formulae remains. RFO is no more a gas-replacement fuel in industry and electricity generation (only as a reserve fuel), but the role of gas oil/diesel in the EU households (individual housing) is preserved. So, decrease of the share of relatively cheap (cheaper than crude oil) RFO in the formulae leads to increase of gas price/oil price ratio towards 100% (effect of arithmetics). At the same time, new energies alternative to gas appeared in major spheres of its consumption: coal, primary electricity (hydro, nuclear), renewable energy sources (RES), energy saving which (like coal) might move gas-oil price ratio downwards.

Nevertheless, Gazprom has been presenting continuous statements in support of "oil indexation" (as stabilization factor for gas prices) and even aims to reach "oil parity". Gas Exporting Countries Forum (GECF) has approved Ministerial Declarations of 19.04.2010 and 02.12.2010 in support of "oil parity" (which means gas–oil price ratio equal to 1) [15]. Inertia of contractual structures has preserves oil-indexation as well, e.g. conclusion and further prolongation of LTGEC has led to fixation of formulae with oil indexation for the coming decades despite the contractual possibilities for price/formulae review.

New sources and contractual forms of gas supplies appeared (LNG, unconventional gas (shale, coal-bed methane (CBM), etc.), spot gas) and gas-to-gas competition has been added to fuel mix in the formulae. During oversupply period in the market inclusion of "gas-to-gas completion" component into the formulas definitely leads to diminishment of gas–oil price ratio. Major question arise: whether spot/futures (exchange/commodities) pricing will stay as a new, additional element of LTGEC pricing formulae or whether it will act instead of the LTGEC formulae at all?

8. Battleground between two pricing models

Contrary to spot, LTGEC is not just a trade instrument, as was mentioned above, but an investment vehicle. *"It is not possible to plan investments aiming at spot prices… Gas will not be produced unless it is sold, and the pipeline will not be built unless the gas designated for transportation is sold. This is major principle of investing into any transportation system…"*, says Alexander Medvedev, Deputy Chief Executive Officer (CEO) of Gazprom [16]. Andrey Kruglov, Head of Gazprom Finance Department, is echoing: *"We only decide to develop new pipelines if we already have the gas off-take contractually guaranteed"* [17]. So, LTGEC is a project financing tool.

What means "long-term" within LTGEC? Minimum duration of LTC from economic point of view (pay-back period of upstream investment project with IRR 10–15%) equals 7–10 years; general starting point of LTC (according to Kim Talus [18]) is 10 years; normal duration of LTC is 20–25 (Talus [18]) or 25–30 (Klaus Schafer [19]) years. Average duration of new LTGEC to EU, signed in the given year, both pipeline & LNG, according to Christian von Hirschhausen and Anne Newmann [20], had declined for 1980–2004 from 30 to 15 years though this means that duration of existing LTGEC in any given year is much longer.

Gas professionals have similar views on gas-pricing structures of LTC worldwide and in Europe in particular. Peter Voser, CEO of RD Shell, consider that *"in South-East Asia and Asia–Pacific share of LTC is 90% and they are linked to oil prices. In Europe this figure is about 70%, and there LTC are also linked to oil prices,*[9] *and share of spot is about 30%.*

[9] More accurately: to petroleum products prices – A.K.

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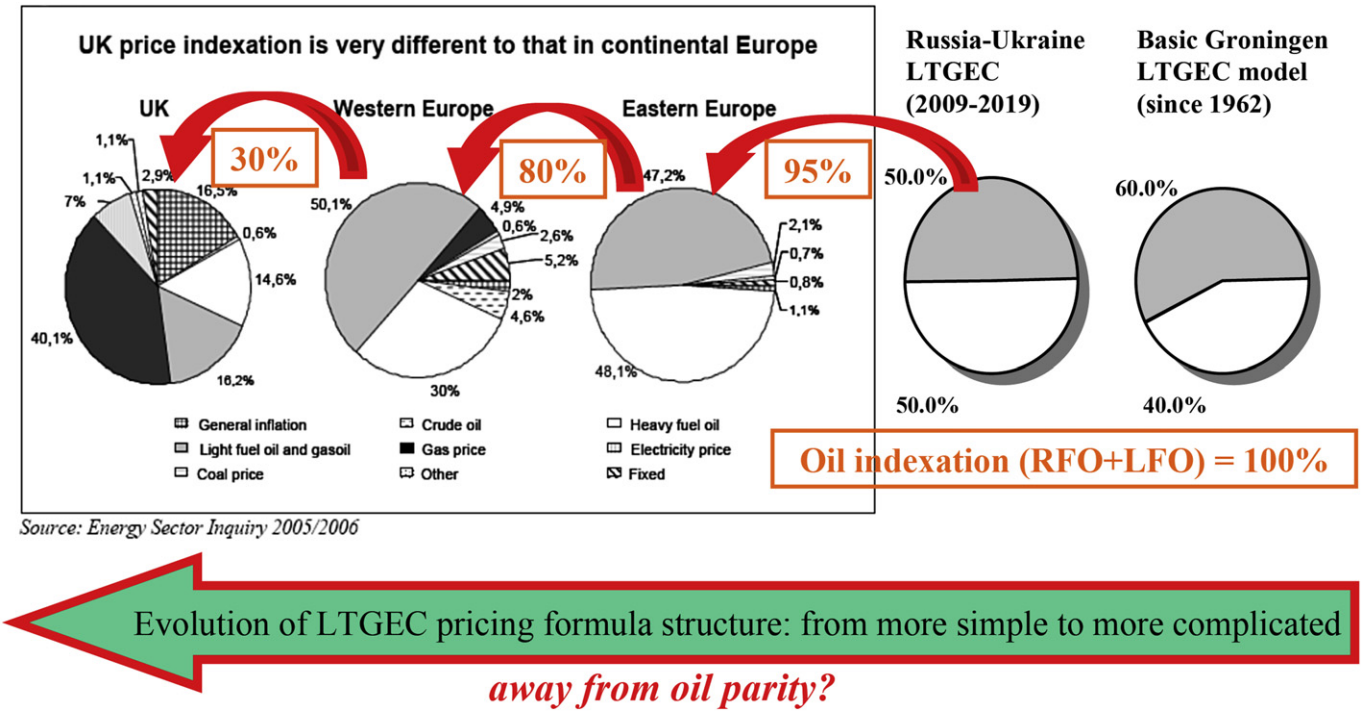

Fig. 3. LTGEC in Europe: Indexation by region — historical evolution from less to more liberalized markets.

In the US practically all the contracts are spot[10] *due to availability of the Henry Hub marketplace*" [21]. According to Rob Fenton and James Ball (Gas Strategies) "*…long-term sale and purchase contracts … priced differently in the main markets around the world: crude oil indexation in Asia, oil product indexation in Continental Europe, and gas trading hub-based pricing in North America and North–West Europe (primarily UK). Many have anticipated that amid the turmoil and emergence of global trade, the differences would be eroded as prices converged with the result that oil indexation mechanisms would be replaced by some form of gas market indexation. Today, on the contrary, oil indexation of long-term contracts appears to be holding up, albeit coming under renewed strain in Europe. … Continental Europe is increasingly emerging as a battleground for pricing, between oil-product indexed LNG and pipeline gas on one hand and hub-based pipeline gas and LNG on the other*"[22].

According to the "EU Energy Sector Inquiry 2005–2006" [23] (taking into consideration high inertia of contractual structures and of LTGEC pricing formula, it means that the figures are generally still valid), gas price indexation within the EU is mostly oil-product-indexed: 75% of contractual EU gas price attributes to RFO + LFO. For major gas exporters to the EU oil-indexation ratio of the gas price is even higher: RFO + LFO covers 87% of export gas price of Norway and 92% both of Netherlands and of Russia. Price indexation structure is different within the EU both between the Anglo-Saxon-modeled UK gas market and Continental Europe, while in the latter there is a difference between its Western and Eastern parts. In Eastern Europe (former COMECON states, which have just recently joined the EU and have started to develop more liberalized and competitive market) combined share of RFO + LFO equals to 95%, while in Western Europe (which develops its liberalized and competitive market within historically longer period) — to 80%, and in the most liberalized UK — only to 30%, compared to 100% of RFO + LFO in original Groningen (1962) and recent Russia-Ukraine (2009) LTGEC (see Fig. 3). The general trend can be clearly identified: in gas-importing states of the EU evolution of LTGEC pricing formulae structure leads to its increasing complexity and diminished role of oil-indexation in line with development of more liberalized and competitive markets. But it is justified to start implementation of LTGEC (like in the FSU, non-dependent of the time of signature first long-term "European-type" contracts with "non-political" pricing mechanisms) with more simple pricing formulas (like in Russia-Ukraine 2009 case) and then step-by-step to adjust them towards East European type, then to West European type, and finally to UK type.

9. Russia gas in Europe: competitive niche is narrowing, business risks are increasing

Today security of Russian gas export to the EU is under double pressure. Firstly, future competitive niche for Russian gas supplies to Europe has been either narrowing or at least became more uncertain. Secondly, within this narrowing (or more uncertain) competitive niche for Russian gas, business risks, including for external suppliers, have been increasing.

Competitive niche for Russian gas has been influenced both from demand and supply side. On demand side, economic crisis 2009–2010 has temporarily downgraded gas demand worldwide, including in the EU. Comparison of the pre-crisis forecasts of gas demand in the EU (say, made in 2007) with the same made in post-crisis time (say, made in 2010) clearly shows that within same groups of projection's authors the following dominant trends can be identified:

- the corridor of uncertainties (difference between maximum and minimum levels of projections/scenarios) regarding future gas demand volumes in the EU has been increasing, while
- the general trend for gas demand growth has been slowing down, while
- the lower limit of projections has changed its vector from positive (gas demand growth) to negative (gas demand decline) (see Fig. 4).

[10] If only pricing mechanism is taken into account; regarding duration — LTC are available in the US market, though their prices will be linked to spot/futures transactions — A.K.

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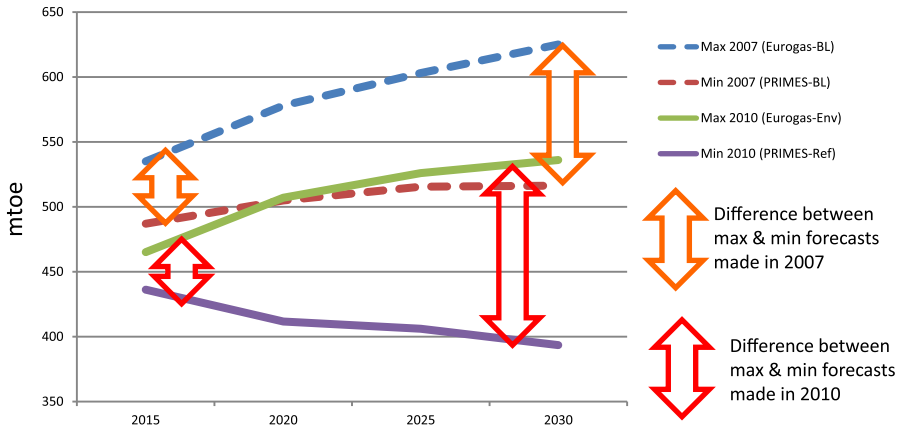

Fig. 4. EU future gas demand forecasts: corridor of uncertainties has been increasing, general trend has been lowering, bottom line became negative. Source: compiled by V.Protasov on the basis of the database of [24].

This is the result of the current EU energy policy aimed at decarbonisation of its energy balances (discussion on this issue in not the aim of this article). This new policy is incorporated in "Europe 2020 targets" which are in climate change/energy sphere aimed at reaching greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower than 1990, 20% of energy from renewables, 20% increase in energy efficiency [25]. This future can be even more decarbonised according to 'Roadmap 2050: a practical guide to a prosperous, low-carbon Europe' outlining various scenarios for renewable energy in Europe, that has been published by the European Climate Foundation (ECF) in which it is attempted to be proved that "achieving at least 80% greenhouse gas reductions in 2050 based on zero carbon power generation including renewable energy in Europe is technically feasible and makes compelling economic sense" [26].

Moreover, Russia–Ukraine gas crises of Januaries 2006 and 2009 has changed EU perceptions of reliability of Russian gas supplies (22 days, namely, 3 days of supply interruptions in January 2006 and 19 days in January 2009, have crossed out in the minds of many EU politicians and in public opinion the previous 40 years of secure and reliable Soviet/Russian gas supplies to Europe). This, together with the policy of decarbonisation of the EU energy future, has led to increasing uncertainties in future gas demand in Europe, though gas is the cleanest fossil fuel and the development of renewable energies (which are mostly wind and solar for centralised electricity generation) is not possible without back-up capacities which are gas-fuelled. The EU thesis that gas is a "transition" fuel, from my view, may reflect, in sum total, new EU reality – mostly politically motivated intentions of some politicians to move away not so much from gas in general, but from Russian gas in particular.

When we look at some of the most recent forecasts of European future gas consumption, we see a projected decline instead of an increase of consumption (Fig. 4). Moreover, the latest official EU forecast shows that future gas consumption will/might be below the amount that is already contracted by Russian suppliers to Europe. This is the case of EU Commission-sponsored PRIMES model according to which 2010 scenario prospective EU demand for gas import until 2030 will be lower even its already contracted volumes (see Fig. 5). But the credibility of this model and thus Commission-sponsored gas demand forecasts was not only questioned by Russian experts in the course of preparation of the joint Russia-EU study under the umbrella of the Russia-EU Energy Dialogue [24], but was also put under question by the Western professional community reflected in the recent article in "Financial Times" [27] which says that "the credibility of a European energy review has been cast into doubt by experts who point out that long-term plans to cut carbon

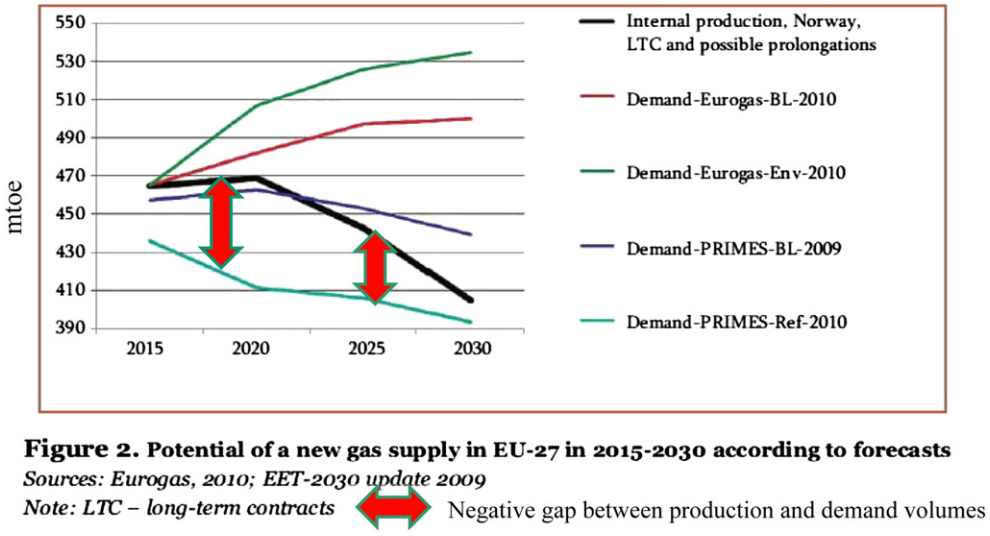

Figure 2. Potential of a new gas supply in EU-27 in 2015-2030 according to forecasts

Sources: Eurogas, 2010; EET-2030 update 2009

Note: LTC – long-term contracts Negative gap between production and demand volumes

Fig. 5. What messages energy forecasts sponsored by the Commission send to gas business (is it practical to forecast future demand volumes below already contracted volumes?). source:[24].

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emissions are based on an economic model owned by a single Greek university that cannot be independently scrutinized… The European Commission has used it for many years to help guide the bloc's energy policies but industry critics complain its assumptions are impossible to question because the model is privately owned."[11]

The EU's future energy demand will be of vital importance to Russia. In order to fill all infrastructure and pipelines, big investments are needed in the gas value chain outside the EU, somewhere deep in Western Siberia or far up in the North of European Russia or Arctic offshore. It is quite clear that Russia and the EU are mutually interdependent, with Europe staying Russia's major energy export market. They are not just interdependent as buyers and sellers, but are also connected through a fixed and immobile infrastructure, in particular the gas infrastructure. In the long term this infrastructure will need to keep functioning, as Russia and the EU will stay key interdependent players when it comes to energy. So, for this investors will need to invest heavily and be able recover their investments. So, if there is no clarity about the EU's future demand, this will cause incremental risks for the investors regarding pay-back of their prospective investment in gas supply (production plus transportation).

Secondly, in order to plan our investments we need clarity about the EU's long term policy goals. The main gas fields are nearing their natural production decline and this will need to be compensated by developing new fields and thus by new investments. Besides supplying our domestic market and Europe, Russia also have an intention to send its gas to the East. So, Europe's energy demand trends will be key in shaping Russia's energy development strategy, both for the domestic and export markets. In this respect, it is clear that the development of the EU's legislation concerning energy, plays an important role for us. It is not just EU policy, which sets the aims, such as the 20/20/20 policy, but also the legislation that plays an important role.

On the supply side situation is different. Increase in external supplies to Europe has continued even in crisis. Firstly, due to putting on stream of EU-oriented gas-export projects (both pipeline and LNG) which have been started before the crisis, in early/mid-2000-ies, when both oil and gas prices were going upward. Shale gas developments in the US has not only almost fully closed this market for the imported gas, but has put on the agenda the US liquefaction plants projects so that US might become a LNG-exporting country. Meanwhile, export LNG volumes, initially aimed at the US market, were re-oriented to Europe within the arbitrage deals in the Atlantic basin (since the UK gas hub National Balancing Point (NBP) prices stayed higher compared to US gas hub Henry Hub). So even today there is a strong competition on the EU market between pipeline gas and LNG, and between LNG suppliers. So competitive niche for Russian gas at the EU market at least does not grow not only because of demand slowdown, but also because of increase of competitive supplies to Europe. And it was at that moment of gas oversupply in Europe that Third EU Energy Package came into force on 3 September 2009.

10. Russian gas in Europe and third EU energy package

Historically the gas delivery points of Soviet/Russian gas to the EU were located on the border of the former West (EU-15) and East (COMECON) (see Fig. 1). However, after the dissolution of the COMECON and the USSR, and the expansion of the EU, these delivery points found themselves deep inside the EU. So, the legal regime that applies to the existing trade flows and future investments, needed for expanding existing or developing new infrastructure, in order to deliver additional supplies from Russia, is of key importance to Russia.

The EU is expanding its legal rules through the cross border gas value chains, stretching from the EU to the gas producing countries. This is done through different mechanisms. The EU's first directives were 'exported' through the Energy Charter Treaty (ECT), because the ECT is based on the principles of the EU's first Energy Directives. Characterising for the 2nd Energy Directive, from 2003, was the Mandatory Third Party Access (MTPA) and the unbundling of transportation and production. This was simultaneously spread outside the EU through the Energy Community Treaty. Former USSR republics, Ukraine and Moldova, became full members of the Energy Community Treaty in 2010. So, we see that the legal regime related to energy has not only been changing in the EU itself, but also in the neighbouring countries. This means that the potential challenges, the positive outcomes, but also the potential risks for external gas suppliers, such as Russia, need to be carefully assessed.

Third Energy Package provides a number of potential challenges for external suppliers, but at the same time creates a number of today's uncertainties and risks due to a lot of unclear provisions in its documents that already entered into force (those regarding gas are: Directive 2009/73/EC [28] and Regulations (EC) 713-2009 [29] and 715-2009 [30]). And the further regulatory documents that need to clarify technical details of the Third Package and it unclear provisions (non-binding Gas Target Model and 12 Framework Guidelines, and 12 legally binding Network Codes) are just in the process of being drafted and simultaneously being debated on principal issues of EU internal gas market architecture between the stakeholders (see Fig. 6).

Third Energy Package has radically changed the wholesale gas market architecture in Europe (the second element in the above-mentioned three-step Russia-EU gas value chain — see Fig. 1) as a further step towards creation of the common internal European market in gas. But there are still many uncertainties regarding implementation of the Third EU Energy Package. Firstly, what is clear, that there will be no single (homogenous) internal EU gas market in the near future even as economic model, but a number of market zones, all of

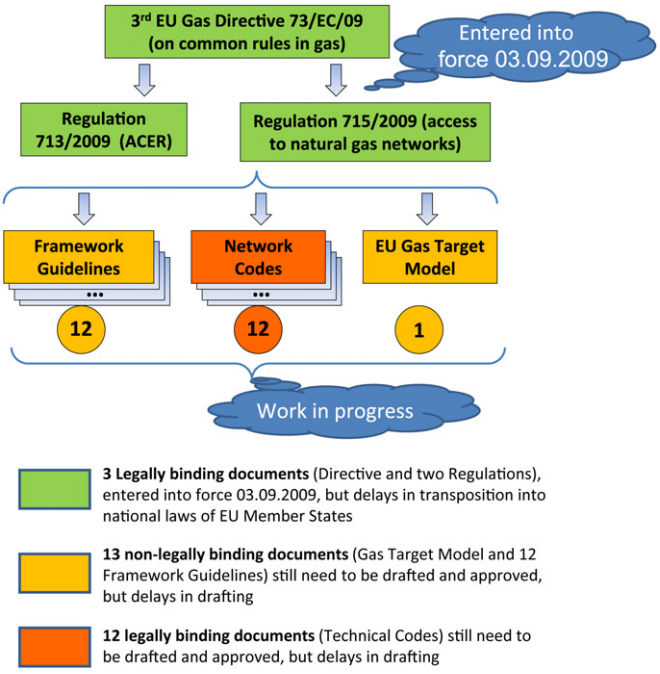

Fig. 6. Third EU energy package (gas).

[11] Examination of the energy scenarios is not the aim of this article. This work has been already undertaken within EU-Russia Energy Dialogue already since 2009 and some preliminary results of such joint studies have already been published [24]. This work will be continued within Working Group 1 of the EU-Russia Energy Dialogue on forecasts and scenarios (looking at broader energy issues) and within Task Group 1 of the recently established EU-Russia Gas Advisory Council (with specific emphasis on gas).

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them organised at the same rules – as entry–exit zones with virtual liquid hub in each zone (Fig. 7). This is a logical development to uniform capacity allocation mechanisms (proposed universal mechanism is so-called "bundled products") and gas pricing mechanisms (proposed universal mechanism is currently spot and then exchange pricing). But a number of still open questions remains on which international debate is continued [31]. New architecture of the internal EU gas market will have a major influence on Russia since it can change delivery mechanism of its LTGEC. Plus "ownership unbundling" provisions of the Third Directive (sovereign decision of the EU Member States) means that in the future Gazprom can be present at the EU market only as a shipper (and not simultaneously as owner/operator of gas transportation systems in the EU) [31].

The certain clauses of the 3rd EU Energy Package are further exporting EU legislation to neighbouring countries. The 3rd Package demands that companies from these countries, that wish to invest and do business in the EU, should be organised in their mother states according to EU market legislation. And in case of violating these 3rd Energy Package's provisions the mother companies from the third countries can be penalised in amounts of up to 10% of the global turnover of the mother-company. This of course has a direct affect on the costs and risks the external suppliers need to take. On the other hand, these external suppliers have the privilege to take their upstream investment decisions independently, according to their sovereign rights, and are not obliged to implement decisions, for example, from Brussels. So, when we are looking at how this legislation is developing, we are trying to understand whether it serves as a stimuli for future investments and whether it encourages trade flows into the EU. It is therefore natural to question whether our long term cooperation with the EU, based on mutual interdependency, will broaden. Possibly, in case these new developments are regarded as discriminatory to the investments of external suppliers, the area of cooperation could narrow.

EU Member States were to transpose Third Directives into their domestic legislation in March 2011, but implementation process has been generally delayed. EU Commission has raised non-notification infringements against 18 Members States (MS) in gas in September 2011. As of January 2012, nothing notified was by 8 MS in gas and only in four MS certification was completed or in progress [45]. Austria was among the first EU Member States to adopt its Gas Act on November 21, 2011 [32], thus implementing the rules of the Third Directive at the national level. Implementation of the Third Package will most probably took place in 2014, according to most recent decision of EU Council and statements of EU Energy Commisioner G. Oettinger.

A critical observation should be made in this regard. From my view, Anglo-Saxon model of organising open competitive liquid markets which has been established in the global oil market and in the US and UK gas markets, will not effectively work in Continental Europe since the bulk of its gas supplies comes from foreign sovereign states and from mostly mega-fields which needs long-term upfront security of future revenues to pay-back huge capital expenditures (CAPEX) to develop such projects [4]. Drafters of Third Package regulatory documents took as a starting point of the EU "Gas Target model" the in-crisis European gas market situation with temporarily increased to its highest possible margins the number and the volumes of spot transactions of up to 30% of the market and spot gas prices going well below contract gas prices – almost two-fold at the peak of the crisis. Though this is a traditional situation for any crisis and oversupply periods, such market structure will changed back after gas glut is over. EU Gas Target Model based on dominance of short-term and spot transactions will not provide reliable supplies for the end-users (both in volume and price terms) and will create additional investment and trade risks for producers.

This is why business risks for Russian gas will/might increase within the narrowing (more uncertain) competitive niche for it at the EU gas market.

EU public consultations (a very effective tool of legislative work in the EU) on draft subsidiary documents to Third Energy Package, firstly on Gas Target Model, have demonstrated a lot of disagreements between the stakeholders on principal issues. Such heatedly debated issues like long-term access to long-distant transportation capacity, "contractual mismatch" problem, correlation between contractual and physical flows of gas, inadequate liquidity of European hubs to provide fair long-term pricing signals for investors into upstream gas projects, impossibility and impracticality of switching all gas trade in Europe to spot/futures trading, etc. – all these issues are very sensitive for Russia and other non-EU suppliers. This is why Russia/Gazprom Group experts have been holding since January 2010 continuous informal consultations with Energy Regulators of EU Member States with participation of the EU Commission on the problematic issues of implementation of the Third EU Energy Package aimed at finding mutually acceptable draft solutions on the issues of justified concern of Russia [33].

11. Emerging EU gas market adds uncertainties and volatility to the prices

Let's consider correlation between contractual pricing/prices and spot pricing/prices. This can be presented in the form of two related sinusoids. One sinusoid refers to LTGEC supplies with formula pricing, another one – to spot supplies with futures pricing (See Fig. 8). Price volatility (both diapasons and frequency of price fluctuations) of the second curve would be much higher than of the first one. What are the preferences of the key market players?

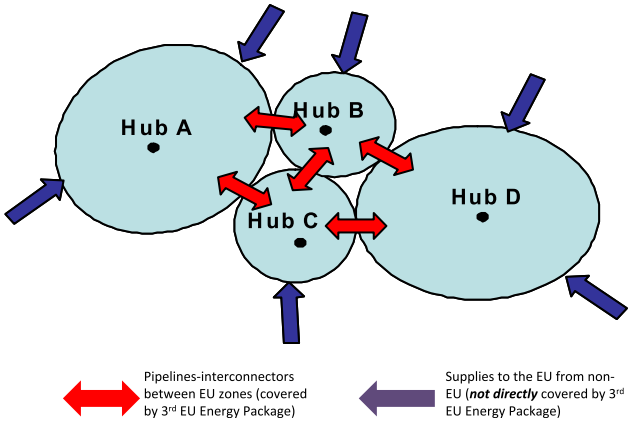

Fig. 7. Future organization of internal EU gas market according to third EU energy package: radical change of wholesale EU gas market architecture.

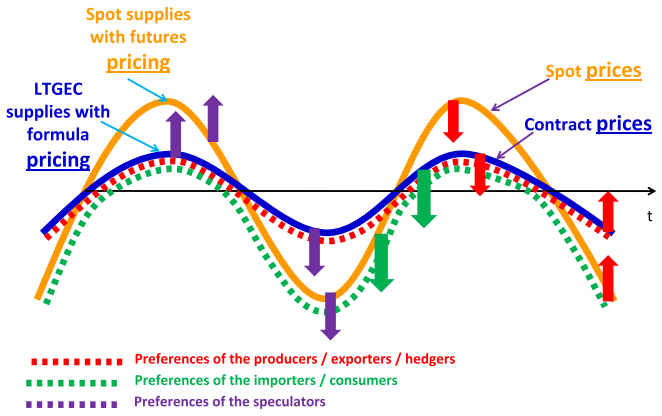

Fig. 8. Producers, consumers & speculators price/pricing preferences.

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One group of players is producers/exporters/hedgers, e.g. those actors who are interested to minimize price risk of their physical deliveries (of their activities at the physical gas market) by financial instruments (which are available at the emerging paper gas market in the EU). They are the actors of the physical market while the paper market is secondary for them. They are interested to go along the LTGEC pricing curve since this curve provides the lowest level of price fluctuations, the highest predictability and transparency of future price behavior, at least within some time frame (due to indexation formulas). And they will be interested to diminish, to narrow the gap of price fluctuations, to decrease price volatility which is detriment to their (mostly long-term) investment and trade decisions non-dependent what is the absolute level of gas prices. For the project investors it is not the price level that does matter, but the predictability of price behaviour, its transparency which directly influence pay-back of their (usually capital-intensive and long-term) investments.

The preferences of the second group – importers and consumers – are different. They would prefer to follow at any given moment of time this particular pricing curve which would enable them to receive lowest possible price level. This means that they would not like to follow in the long-term a spot price curve or a LTGEC price curve, but they would prefer to switch from one curve to another dependent on the state of the gas market situation. If the market is oversupplied (and the spot prices go below contract prices) they would prefer to buy spot, if it is undersupplied (and then spot prices will inevitably overcome the LTGEC price levels) they would prefer to buy at contract prices. This means that within preferential consumer's behaviour it was not yet possible (it is rather difficult in principle?) to create a contractual structure which will be stable, transparent, etc. and would reflect the buyers interests in full. This group of actors is interested to downgrade both curves in their respective areas where one curve is lower than the other and to receive the lowest market price at any given moment.

If the so famous in the US and the UK so-called "Anglo–Saxon model" of the gas market architecture is to be developed in the continental Europe (and this is, or at least was, the initial intention of the drafters of the Third EU Energy Package), this does mean that we will have a third group of players to appear in the gas market, in particular in its paper segment: speculators with the growing role of non-gas speculators (entrants from the other segments of global financial markets – similar to oil market developments). This group of players has been growing in importance when the paper market is being developed (which the oil market story has proved already [12,34]). They will have totally different preferences: they definitely would prefer to increase the price volatility, to expand the gap, the corridor of price fluctuations since they are earning their money not in physical deliveries, but in trade in paper energy, in energy-related financial instruments (gas contracts derivatives). Developments in the global oil market in 2008–2009 showed high turbulence in price behavior within this most open, competitive, liquid market, which is the model that has been steadily developed within the gas market of continental Europe. Development towards Anglo-Saxon model in gas in Continental Europe creates the risk of gas bubble here similar to what we have faced in the oil market. "*…I really hope that speculation doesn't take over. Having many players in the market and having financial instruments linked to commodities is important to make the market more liquid and efficient, but I think also there should be controls and regulation in place to avoid a bubble emerging; and we all know how difficult that is to unravel. I wouldn't want gas to become the next dot-com or real estate or credit-derivative. I like to think that people in this business are level-headed and a three-year or two-year spot market will develop, which the industry should try to make work as best as possible.*" [35]

I have strong concerns regarding "security of supplies" provided by this model and huge price risks for both consumers and producers generated by volatile price fluctuations which are immanent for Anglo-Saxon model. So I see the continuation of very difficult debate on developing such market structures and such pricing mechanisms that will manage at least to minimize price fluctuations at the emerging global gas market (when/while LNG has been continuously putting together regional and mostly pipeline gas markets). But the lower or higher level of development of spot/futures gas pricing in Europe in any case determined from Gazprom to be more adaptable and flexible in its contractual structures and pricing mechanisms.

12. How to proceed and not to lose

"*Necessity has grown at the market to review pricing methodology within long term gas contracts*", says Lawrence Neal, President of Platts. "*We face already today specific difficulties with LTC – they were drafted considering other economic realities and today they are not fully actual… They should better consider this new economic reality which does exist nowadays. …There are two possibilities: either to link gas prices within LTC to some spot gas quotations, either to preserve, as it has been done in many cases, oil indexation, but to draft it slightly differently… To use gas price indicators for determination of contractual (gas) price within LTC creates concerns (within gas industry representatives) due to this particular volatility that we have been facing nowadays at the gas markets. This is why market participants consider oil quotations as more reliable pricing instrument just because they are less volatile. But there is a need for re-tuning of pricing formulas so that gas price will be lower. … Totally new pricing system has been emerging, I will call it a "mixed" or a "hybrid" one*" [36]

Klaus Schafer, Chairman of the Management Board of E.ON Ruhrgas AG, distinguishes three levels of adjustment of traditional LTGEC pricing to new market conditions: (a) price level – adjustment to relevant market price level; (b) price indexation – re-design of indexation mechanisms; and (c) price review mechanism – frequency and speed of adjustments [19]. How this can be done in practice? Business community gives its answer: only through negotiations, no radical interventions, the value embedded in them (and thus the risk of unintentional danger) is too big. About 350 delegates of the 24th European Autumn Gas Conference participated in the electronic voting about future of LTGEC and how to adapt them. The majority of 37% considered that LTGEC indexes will be re-negotiated in line with traded market price levels but keeping element of oil indexation. And the absolute majority of 65% considered that settlements will be negotiated – the issues are too profound and complex to leave to arbitrary panel outcomes [3]

Industry would not like to give up LTGEC. According to B. Reutersberg, the then E.ON Ruhrgas CEO: "*Gas purchased under LTC guarantees security of supply and gives the buyer the flexibility of make-up gas and daily nominations. On spot markets, you have no guarantee to get the gas volumes you want for fixed prices. Spot gas and LTC are two entirely different products. … LTC are not out of fashion. They have always been and will remain the back-bone of European gas supply … element of sustainability and reliability*" [37].

LTGEC and spot are bound to transfer their conflict of opposites into competitive complementarity. How best to proceed in this?

13. Gas pricing: which way to go in Continental Europe?

Within the current debate on future trends in gas pricing mechanisms it is possible, from my view, to identify five major routes (see Fig. 9) of possible changes of currently dominant gas pricing mechanism in Continental Europe:

(1) Switch to overall spot/futures pricing within the EU internal gas market;
(2) Maintaining status-quo (staying with current LTGEC with oil-indexation formulas);

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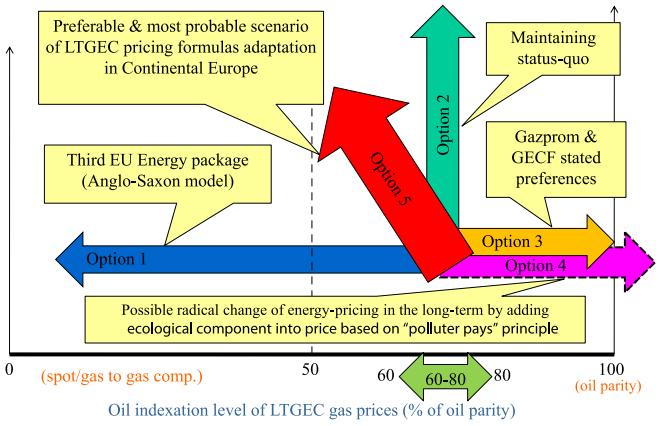

Fig. 9. Evolution/adaptation of gas pricing mechanisms in Europe: major options.

(3) Moving from current gas-to-oil price ratio, equal to 0.6–0.8, to gas-to-oil parity;
(4) Possible radical change of energy-pricing in the long-term when gas price in result might even exceed oil parity;
(5) Adaptation of current LTGEC with oil-indexation formulas in line with historical evolution of the concept "net-back replacement value of gas alternatives at the end-user market".

From this author's view, debated in [10,15,31,38,39], adaptation of current LTGEC with oil-indexation formulas in line with historical evolution of the concept "net-back replacement value of gas alternatives at the end-user market" is the preferable and most probable scenario of LTGEC pricing formulas changes in Continental Europe and in "broader energy Europe" (above-mentioned "Option 5" at Fig. 9).

The following alternative vision of the EU gas market architecture currently under development can be discussed, namely, with two market-based competitive segments of gas supplies structure (this is being discussed, inter alia, at the ongoing informal expert consultations between experts from Russia/Gazprom Group and energy regulators from the EU Member States with the participation of the Commission on the open issues of implementation of the Third EU Energy Package which raised justified concerns of the Russian side). First segment – long-term supplies (firm contracts, main/basic demand load): more flexible (regarding, firstly, off-taking of contractual volumes, pricing formulas and price review rules) and shorter-term LTGEC, plus long-term access to transportation capacity for full duration and volume of LTGEC (based on a revolver-type "open seasons" procedures to exclude appearance of the so-called "contractual mismatch " problem [40–42]), plus gas replacement value based formulas with price indexation not limited to oil-pegging (indexation not only to petroleum products).

Second segment – short-term supplies (interruptible contracts, additional/semi-peak and peak demand load): short-term/spot contracts, plus spot/exchange pricing established at the regional European "liquid hubs" (futures quotations, gas indexes, forward curves).

On the basis of the analysis presented above, let's consider recent changes in the Gazprom contractual structures and pricing mechanisms in Europe: whether they are of just temporary or of a long-lasting character.

14. Gazprom's recent policy changes in Europe: how long-standing they are

As any company who would like to stay long at the market, Gazprom is interested to protect its market share to maximise its long-term revenues and not to maximise its short-term returns only. Gazprom would definitely prefer to stay long at the European market – the latter has been and would stay as a key export market for Russian gas. So Gazprom is interested to be competitive at this market in the long-term which means to be as flexible in pricing as it is practical in order to receive highest possible marketable price at any given point of time. If in the periods of gas gluts the import demand for Gazprom's gas is falling below minimum TOP in its contracts with European buyers, it is preferable for Gazprom to sell some gas below its TOP contractual obligations not at contract (oil-indexed) but at spot prices (which in practice means that Gazprom downgrades its minimum TOP to a new lower level and is selling the difference at spot). By this Gazprom, firstly, preserves its historically existing importer (counter-party) for continued long-term relations and thus saves the transaction costs related to possible change of the trade partner in case of price disagreements. Secondly, it saves the achievable revenue (from purchased volumes at available sales price) – if the buyer would refuse to buy from Gazprom at higher contract price, he would buy at the market at lower spot price. Thirdly, Gazprom saves prospective litigation costs which it might face in case of price disagreements, etc.

That was, from my view, the key economically justified reasons explaining recent changes in Gazprom's contractual structures and pricing mechanisms in Europe (see Table 1).

The downgrading of minimal TOP obligation in Gazprom's European contracts from 85 to 60% plus converting 15% of contractual volumes from oil-indexation to spot price (calculated as the mean value at major European hubs) was an involuntary measure. It reflects Gazprom's forced adaptation to the new realities of the Continental European market as result of the economic crisis and related consequences which were explained above. The major trigger in these circumstances was "quite shale gas revolution" which played, at least from my view, its positive role for Gazprom (in addition to its negative consequences for Gazprom which resulted in factual closure of US market for imported LNG, inclusive of prospective Russian LNG) by creating a "domino effect" which resulted in Europe, in final end, in forcing Gazprom to start adapting its contractual structures and pricing mechanisms – first time in 40 + years – to the changing realities of the market where the buyers might take the lead. I would hope that this first round of adaptation of Gazprom's trade policy will not stay as a singular episode but will become a regular practice for this company thus leading to maximization of its resource rent collection and shareholder's value within the changing state of the market.

I hope that since end-2000-ies and further on Gazprom would be more flexible in his endeavour to protect its market share in Europe and thus it would provide more flexible pricing within its pricing formulas to reflect the current state of the market at any given time. If the gas glut would continue longer than expected, say, by Gazprom itself (until 2012 [16]) or EON (until 2015 [19]), the company would most probably present additional flexibility in its contract structure if reassessment of the situation at the end of 3-year-long "concession period" (see Table 1) will request such measure.

15. Gazprom: LTGEC adaptation modes

According to Walter Boltz, Head of Austrian Energy Regulator "E-Control", *"Gazprom is probably a little bit more proactive than the Algerians…Things might develop in a way that we will not have 95% (like in Eastern Europe – A.K.) but only 80% (like in Western Europe – A.K.) of long-term gas contracts sold on an oil-indexed basis. The shift away from oil-indexation is a trend that cannot be halted. People will see a growing share of gas contracts which will have more flexible indexation. Many gas companies see the current disadvantages of long-term oil-indexed contracts, as they are forced to pay more for gas than prices on the spot market… now, a willingness is evolving to renegotiate*

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Table 1
Gazprom: adaptation of contract provisions and pricing mechanisms in Europe since 2009.

Actions	Companies
Buyers' demands for price reviews and contract adjustments following "significant market changes"	E.On, Wingas, RWE, Botas, Eni, GdF Suez, EconGas, Gasum
Downgrading minimum TOP obligations from Gazprom's average 85%	E.ON, Botas: from 90% to 75%; ENI: from 85% to 60% for 3 years = >Gazprom total 15 BCM for 3 years = 5/140-145 BCM (2010) = 3.5% RF gas export volume
No penalties for violation of minimum TOP obligations	Naftogaz Ukraine, Botas; Eni, E.ON pending
Gas sales above minimum TOP obligations at current spot prices	E.ON, GdF, Eni
Adding gas-to-gas competition component into pricing formulae thus decreasing/softening oil-indexation formulae link	E.ON, GdF, Eni–Gazprom = 15% based on a basket of European gas hubs, E.ON-Statoil = 25%; Statoil average up to 30%, requests to Gazprom up to 40%
Increasing flexibility of contractual provisions	Gazprom's "promotional package"
Recalculating base formulae price	Wingas
Direct price concessions	Naftogas Ukraine, Botas (tbc)
Manoeuvre by contract volumes within contractual time-frame + requests to cancel obligation to off-take contracted volumes within 5-year period	E.ON, Eni
Stimulating measures ("packages") for purchases in excess of (downgraded) minimum TOP	
Shorter contract durations	Sonatrach
Shortening of recalculation period/interval	Possible
Shortening of reference period	Possible
Some buyers files lawsuits against Gazprom over long-term prices (within Price Review/Dispute Settlement LTGEC clauses)	Edison S.p.A. (AC SCC), EON-Ruhrgas, RWE, PGNiG, etc.

the terms of long-term oil-indexed contracts with the tendency to include spot gas and coal prices into the pricing formulae" [43]

As any big institutional structure, Gazprom was late to start adapting its contractual and pricing policy, and thus has temporary lost 1–2–3 percentage points of its market share in Europe (though in a longer-term its share, especially in some countries, will grow, like in Germany – from 32% in 2009 to 36% in 2020, according to E.ON Ruhrgas [19]). But it is clear, that only *"such companies will win who are rather flexible to spurt into the lead"* (Christof Ruehl, BP Chief Economist [44]). It seems that Gazprom began to start spurting (see Table 1), trying to at least ease the gap with those companies that have started adaptation of their contractual structures earlier.

The most detailed description of the adjustment principles of Gazprom's contractual and pricing policy in Europe was presented by its Deputy CEO Alexander Medvedev in June 2010 [16]: *"Gazprom Group was to consider realities of the in-crisis market and to demonstrate flexibility in relations with partners. Changes that we incorporate in some contracts, are not the one-way-street. At negotiations with partners our company makes advances to them taking into consideration unprecedented situation at European gas market. Our partners also do not put under question necessity to follow their contractual obligations, but endeavour only to reschedule some of those to later periods. At the same time, we propose them a stimulating package which motivates the buyers to off-take gas over minimum contractual volumes. Principle "take or pay" stays firm. In no case it is supposed to refuse from the system of LTC & pricing with oil-product link. Discussed measures are temporary. Gazprom Group plans to come back to pre-crisis conditions after full revival of gas demand in Europe. However, up to this year-end we do not expect this, including equalization of spot prices & LTC prices. We are not indifferent on which conditions to sell our gas. We cannot be satisfied with attempts to destroy the system of LTC based on TOP principle with oil-indexed prices. It is oil-indexation that gives both to producer & consumer predictability & reliability of planning, which finally guarantee payback of investments. Prices, of course, will recover, as well as pre-crisis demand. But today's state of the market is not a reason to break secure & effective system which provided, provides and will provide security of consumers and suppliers (producers). Current situation does not comfort any gas producer, incl. producers of LNG & shale gas."*

Major gas players foresee that European gas market will recover rather soon: from 2012 (Gazprom [16],) till 2015 (EON-Ruhrgas [19],) according to different scenarios. Nevertheless, adjustment of pricing formulas will most probably possessnow a more regular character, and not just an exceptional, temporary one (for the period of gas glut only), as was cited above.

It seems for me that market changes in contractual structures and pricing mechanisms could be irreversible, firstly for non-European gas suppliers, including Russian Gazprom. As my former boss, Acting Prime Minister in the first post-Soviet Russian Government, late Egor Gaidar, used to say, "Reforms are usually made not when there is time and money for them available, but when it is not further possible to escape them". Recent developments at the international gas markets resulted in such changes at the European gas market that they has been forcing Gazprom (non-dependent whether he like it or not) to adapt its LTGECs and their pricing mechanisms in order to return and maintain its competitive long-term market share in Europe.

I hope that when supply and demand will balance again at European gas market in post-crisis economy, regular, timely and effective adaptation of Gazprom's LTGECs and their pricing mechanisms to evolving realities of international gas markets will become already a permanent and irreversible element of Gazprom's export policy.

16. Summary

Economic crisis of 2009–2010 plus steady decarbonisation of EU energy policy decrease EU energy demand while gas supplies to the EU continue to increase as well as its multiplicity. Thus competitive niche for gas in Europe tightens, especially for Russian gas supplies with rather non-flexible contractual structures and pricing mechanisms such as long-term gas export contracts (LTGEC) with oil indexation. On top of this, Third EU Energy Package changes the whole architecture of the wholesale EU internal gas market. So risks and uncertainties for oil-indexed LTGEC within this tightening market niche for gas increase and LTGEC competitiveness in the given circumstances downgrades. To effectively address these risks and uncertainties, as well as new potential opportunities provided by the Third EU Energy Package, LTGEC need to become more flexible and adaptable. Gazprom has recently started such adaptation of its LTGEC. Whether this will stay as a temporary step-back (hopefully, not) or will become company's new regular policy towards more flexible contractual structures and pricing mechanisms in Europe (hopefully, yes) is yet to be seen, most probably in the nearest future.

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List of abbreviations

ACER	Agency for Cooperation of Energy Regulators (of the EU Member States)
AGIP	average German import price
BCM	billion cubic meters
CAPEX	capital expenditures
CBM	coal-bed methane
CEO	chief executive officer
CIS	Commonwealth of Independent States
COMECON	Council for Mutual Economic Assistance
ECT	Energy Charter Treaty
ECF	European Climate Foundation
EC	European Communities
EU	European Union
FSU	Former Soviet Union
GECF	Gas Exporting Countries Forum
IEA	International Energy Agency
JCC	Japan Crude Cocktail
LFO	light fuel oil
LNG	liquefied natural gas
LTC	long-term contract
LTGEC	long-term gas export contract
mcm	thousand cubic meters
MENA	Middle East & North Africa
MS	Member State (of the EU)
mtoe	million tons of oil equivalent
MTPA	mandatory third party access
NBP	National Balancing Point (UK gas hub)
RES	renewable energy sources
RFO	Residual fuel oil
TOP	take-and/or pay (provision of LTGEC)
UK	United Kingdom (of Great Britain and Northern Ireland)
UN	United Nations
USA	United States of America
USD	Dollar of United States
USSR	Union of Soviet Socialist Republics

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