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"Evolution of Gas Pricing in Continental Europe: Modernization of Indexation Formulas Versus Gas to Gas Competition"

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Abstract: It is well known that the dominant gas pricing mechanism in Continental Europe has been historically based on determining the contract price of gas on its replacement value in the end-use sectors, i.e. linking contract gas prices through specific formulas in the long-term gas export contracts (LTGEC) to the prices of energies competing with gas in the final energy consumption. This is the key element of the well-known Groningen concept of the LTGEC, developed in 1962 in Netherlands. The main energies to which gas prices have been pegged in the Groningen-type LTGEC include residual fuel oil (heavy fuel oil – HFO) and gas-diesel oil (light fuel oil – LFO). In view of the crude and product price hike worldwide during this decade, especially manifest after 2004, till mid-2008, LTGEC prices have also been growing rapidly. This called for a discussion about the validity of linking gas prices to liquid fuel prices and a potential transition to a new gas pricing pattern in Continental Europe decoupled from liquid fuel and other gas-replacing energy price developments. Since end-2008 futures and spot quotations of crude oil and petroleum products has been going down, bringing down the spot prices of gas as well – to the levels much lower than contract prices of gas in the LTGEC at the same markets. The prices in European spot trading places (gas hubs) cannot be used as an adequate alternative to the pegging formulas in the LTGEC. At the same time, LTGEC pricing formulas has high adaptation capacity to the changing realities of the international gas and other energy markets. These formulas will continue to evolve towards maximum consideration of the expanding group of energies competing with gas in the end-use, on the one hand, and towards expanding contractual forms of organization of the gas trade, on the other hand. Such pricing formulas will continue to provide the biggest smoothness and the highest predictability of the gas price changes which is the most important factor of sustainable gas supply and of stable relations between all participants of the cross-border gas value chain.

Evolution of Gas Pricing in Continental Europe: Modernization of Indexation Formulas Versus Gas to Gas Competition[1]

Dr. Andrey A. Konoplyanik

Abstract:

It is well known that the dominant gas pricing mechanism in Continental Europe has been historically based on determining the contract price of gas on its replacement value in the end-use sectors, i.e. linking contract gas prices through specific formulas in the long-term gas export contracts (LTGEC) to the prices of energies competing with gas in the final energy consumption.[2] This is the key element of the well-known Groningen concept of the LTGEC, developed in 1962 in Netherlands. The main energies to which gas prices have been pegged in the Groningen-type LTGEC include residual fuel oil (heavy fuel oil – HFO) and gas-diesel oil (light fuel oil – LFO). In view of the crude and product price hike worldwide during this decade, especially manifest after 2004, till mid-2008, LTGEC prices have also been growing rapidly.

This called for a discussion about the validity of linking gas prices to liquid fuel prices and a potential transition to a new gas pricing pattern in Continental Europe decoupled from liquid fuel and other gas-replacing energy price developments. Since end-2008 futures and spot quotations of crude oil and petroleum products has been going down, bringing down the spot prices of gas as well – to the levels much lower than contract prices of gas in the LTGEC at the same markets. This further stipulated debate on evolution of contractual and pricing mechanisms in the international gas markets, in particular in Continental Europe, which region has been historically much dependent on the import supplies of the pipeline gas from the USSR/Russia through the LTGEC with their formula pricing principle.

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[1] Based on a series of this author's presentations (both in English and Russian) and publications (in Russian) in the recent years, which can be viewed at his web-side at www.konoplyanik.ru.

[2] "Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas", Energy Charter Secretariat, 2007, sections 4.4.4-4.4.5.

The key element of this debate relates to proposed re-evaluation of the LTGEC role in the cross-border gas trade in Continental Europe aimed at rejection of the replacement value pricing principle. In particular, it is most often suggested that the duration of the LTGEC need be shortened, up to total their substitution by the spot trade, and/or their prices should be linked to exchange quotations in liquid European markets. The prevailing proposal is to peg pricing within European LTGEC to gas prices at the National Balancing Point (NBP) of the UK, a notional spot trading place of this most liquid market in Europe.[3]

The proponents of that proposal usually proceed from the standard economic theory that the more liquid the market is, the more it is competitive and the lower are the prices on it as a result of supply competition. However, pricing for finite natural resources (incl. non-renewable energy resources) does not fit into the standard economic theory but is addressed by its specific chapters.[4] Therefore, finite natural resource price developments at liquid markets are sometimes explicitly different from (up to something diametrically opposite to) those relating to prices for manufactured goods purportedly based on standard economic theory. This applies to both the most liquid global oil market[5] and the liquid regional gas markets in the United States and the United Kingdom.[6]

At another margin of the debate on the proposed replacement of the gas pricing formulas based on gas replacement values, is the idea voiced in some producing states to return to the cost-plus pricing in consideration that the latter will provide the higher gas prices than the gas price calculated as replacement value within the declining oil price environment.

Talking about an emerging single (common) gas market in Continental Europe, it may be asserted that even its most liquid national segments (such as the today's UK market) cannot – either today or in the foreseeable future – serve as a basis for sustainable gas pricing in Europe. The prices in European spot trading places (gas hubs) cannot be used as an adequate alternative to the pegging formulas in the LTGEC. At the same time, LTGEC pricing formulas

[3] Ibid, section 4.3.4.

[4] Ibid, Ch. 2.

[5] The prices at this market has first sky-rocketed to the unprecedented levels and then has dropped down which price behaviour in principle can not be proved by the standard economic theory.

[6] Ibid, Sections 3.4, 4.2.5-4.2.6, 4.3.4.

has high adaptation capacity to the changing realities of the international gas and other energy markets. These formulas will continue to evolve towards maximum consideration of the expanding group of energies competing with gas in the end-use, on the one hand, and towards expanding contractual forms of organization of the gas trade, on the other hand. Such pricing formulas will continue to provide the biggest smoothness and the highest predictability of the gas price changes which is the most important factor of sustainable gas supply and of stable relations between all participants of the cross-border gas value chain.

Key words: Gas pricing, Russia, Two-tier pricing, indexation formulas, competition, Europe

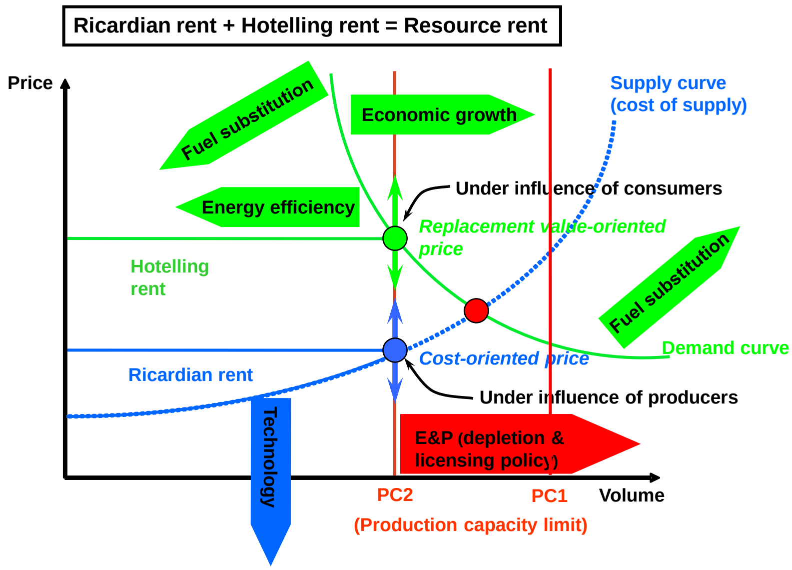
Resource rent associated with gas exports and the mechanism to extract it

As is known, the "standard" economic theory says that the equilibrium price for goods produced is located at the cross-point of the demand-curve and supply-curve for such goods. This statement is correct in regard of goods produced by manufacturing industries. The situation is somewhat different with extractive industries as far as finite natural (*inter alia*, non-renewable energy) resources are concerned, e.g. gas. There are objective capacity constraints to produce such non-renewable resources in a given country due to their uneven distribution in the subsoil. Depending on whether demand for non-renewable energy resources is higher or lower than their production capacity limit in the given country, the mechanisms of (both domestic and export) equilibrium price formation and, consequently, such price levels will differ significantly because in such cases the resource rent will contain different components.

Where demand for a non-renewable energy resource does not exceed its production capacity level, the equilibrium price will indeed be located at the crossing of the demand and supply curves. In this case, the producing country will only extract (receive) the Ricardian rent which is based on the competition within the given non-renewable energy extraction industry – i.e. between individual projects/fields – and equals the difference between the production costs at a particular field and the marginal costs within the given industry ("cut-off costs") that are a function of the equilibrium price level.

If demand for non-renewable energy resources in a given country exceeds its own capacities to produce them and this country needs to import them, then the producing (exporting) country has the sovereign right to extract the maximum economic rent from development of such its own non-renewable resources and set a price for them on the basis of inter-industry competition. In this case, the price (e.g. for gas) is based on the replacement value of energies competing with gas in end-use sectors ("on the burner-tip"). It becomes possible for the producing/exporting country to extract the Hotelling rent in addition to the Ricardian rent. The sum-total of these two rents composes economic (resource) rent of the country-owner of non-renewable energy resources **(Figure 1).** [7]

Figure 1. Pricing of Non-Renewable Energy Resources: Ricardian vs. Hotelling Rent



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Thus, there may be two types of equilibrium prices depending on which pricing system is used: a price based on costs of production and delivery of energy to its consumer (cost-plus) or a price based on the replacement value of the given energy (i.e. the cost of consuming alternative energies) at the consumer. Both pricing systems are economically justified and apply to both the domestic market and export supplies.

The levels of prices defined by two different pricing mechanisms are not fixed within the time-frame and are dependent on different factors, which, in the case of cost-plus pricing, are mostly the function of producer's behaviour, and in the case of replacement-value-based pricing - the function of behaviour of consumers. In both cases there are factors that influence both prices simultaneously in the upward and downward directions.

Marginal-cost-oriented price is under down-ward pressure in result of scientific and technical progress in exploration and production technologies, which brings down the whole supply curve. On the other hand, in result of exploration activities the new reserves are being discovered and proved, which moves to the right the production capacity limit,

[7] For more information see "Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas", Energy Charter Secretariat, 2007, Chapter 2 "Explaining Oil and Gas Pricing Mechanisms: Theoretical and Historical Aspects" (available at: www.encharter.org).

which, in turn, moves upward the marginal costs level and the price based on cost-plus formula.

Replacement-value-oriented price is under upward pressure in result of economic growth, which increases demand for non-renewable energy and moves to the right the demand curve, thus moving in right-up direction its crossing point with the supply curve. But in case when domestic demand exceeds domestic supply (when supply curve is approaching or has approached domestic supply limit or production capacity level), supply curve begins to increase vertically in line and in parallel with this production capacity limit, i.e. matched with it[8]. Energy efficiency moves the whole demand curve to the left, thus providing downward pressure on the replacement-value-based prices. And fuel substitution turns over the demand curve which can lead both to the upward as well as downward pressure on replacement-value-based prices, dependent on which fuel substitutes which other one **(Figure 1)**.

One need to understand that in today's circumstances behaviour of cost-plus-based prices and replacement-value-based prices has been characterized by different volatility within the time frame:

- prices of the first type has more smooth fluctuations since they are based on project's economics,
- prices of the second type are more volatile since their values (usually defined by the pricing formulas within long-term contracts) are mostly linked to the prices at the commodities markets, and the behaviour of the latter has been characterized by the growing volatility.

The principle of state sovereignty over natural resources (enshrined in UN General Assembly Resolution No. 1803 of 1962 and in Article 18 of the 1994 Energy Charter Treaty[9]) lays down an international legal framework for the absolute economically motivated desire of energy producing states to extract maximum economic rent from the use of their non-renewable energy resources on the domestic and/or export markets. (It need to be clear, that the term " maximum economic rent" in this context means maximum achievable in the course of price competition with other, alternative to gas - since we deals with gas in this article - energy resources). It also leaves up to sovereign state that produces such non-renewable energy resources to decide what to do with its resource rent:

- whether to dispose it at the time of sale of the produced energy resources in the monetary form (by selling its energy resources on the domestic and export markets at the replacement-value-based price, thus extracting both Ricardian and Hotelling rents); or

- whether to transfer the portion of this rent to its own nationals as a social subsidy and compensating the losses at domestic market by export earnings – by selling a

[8] The price in this case is growing in strictly vertical direction and not in a right-up direction as in the case of cost-plus-based price growth, which means that, all other parameters being equal, expansion of demand leads to a bigger replacement-value-based-price growth than expansion of supply leads to a growth of marginal-cost-based-price.

[9] The ECT entered into force in 1998 and since that time is an integral part of the international law system.

non-renewable energy resource on an export market at the replacement-value-based price (thus extracting both the Ricardian and the Holelling rents) and selling it domestically at cost-plus price (extracting the whole Ricardian rent and only a portion, at best, of the Hotelling rent) or even below such value, i.e. at “cost-minus”, thus extracting neither the Hotelling rent nor even in full the Ricardian rent; or

- whether to “exchange” it for commercial (barter) and/or non-commercial (political) concessions from the importing buyers, thus transferring (donating) a part of the Hotelling rent to the government/population of a foreign country in exchange for their friendly behaviour towards the state-owner of the non-renewable energy resource and its exporter.

Pricing mechanism which consider both components of the resource rent in the gas price and which enables the state-owner of the gas resources to extract both the Ricardian and the Hotelling rents thus leaving with the consumer the choice to select between gas and its competing (alternative) fuels, was first presented within the evolving European gas market by the government of the Netherlands within the contractual structure which became known as the Groningen (Dutch) model of the long-term gas export contract (LTGEC).

Resource rent and gas pricing in Europe: Groningen model of LTGEC & its particularities

This concept was developed in the Netherlands in the early 1960s when the Groningen field – the then world’s largest gas field – was discovered in 1958, subsequently lending its name to the concept itself. The concept was driven by the Dutch government’s desire to maximise the long-term natural resource rent – or rather a specific part of such resource rent, the so called “Hotelling rent” – from the development of that uniquely sized field (prior to this the key pricing principle in European gas was “cost-plus”). The key elements of this new model were formulated in a statement made by the then Dutch Minister of Economy, Mr. de Pous, in 1962 to the national parliament, establishing the main principles of a new government energy policy (the statement became known since then as the “Nota de Pous”). The intent of the new policy (which was fully reflected in the Dutch LTGEC concept) was to generate maximum revenue for the gas producing country in the long term.

As well known, according to the legal model of the subsoil use being spread over in Europe, the title of ownership on the resource in place belongs to the resource-owning state with no exception. The Dutch state was the first to face the challenge of selecting legal and economic model of developing the gas field which resources/proved reserves (which means, the scale of financial flows necessary for and generated by its development) predetermined unavoidable strong influence of such model on the macroeconomic parameters of the whole country. Based on the sovereign rights of the state on its own natural (energy) resources, confirmed by the UN General Assembly in the same 1962, the Dutch state was interested to obtain a maximum long-term effect achievable for the country and its population from the development of such unique resources, i.e. maximum – in the long-term – resource rent from Groningen field development. To achieve this aim the optimal – again in the long-term – concept of development of this unique field was to be selected which size made it impossible to optimize its development within the short-term time horizon. Therefore, the Groningen LTGEC concept is a mechanism to optimize the development and depletion policy of this uniquely sized field and marketing of its gas produced based on market-oriented competitive considerations, e.g. in the best interest of the resource-owning state, on the one hand, and providing competitive choice for the consumer of this resource, on the other hand.[10]

The Groningen LTGEC is characterized by the following key elements **(Figure 2)**:

<u>Figure 2.</u> Groningen (Dutch) & Russian/Soviet LTGEC Models: Differences & Similarities

	Groningen LTGEC model (since 1962)	Russian / Soviet LTGEC model (since 1968)	Russian / Soviet specifics (why Russian /Soviet LTGEC model differs from Groningen LTGEC model)
Contract duration	Long-term	Longer-term	Larger West Siberian fields & unit CAPEX, longer transportation distances & pay-back periods
Delivery point	Upstream to end-user	Upstream to end-user - on EU-15 border; one delivery point served for few final consumers	Historically: on political border between East & West
Pricing	Replacement value (RFO + LFO) + net-back to delivery point + regular price review + minimum pay obligation (take-and/or-pay)		West: both for export & domestic sales; East: only for export sales
Protection from price arbitrage	Destination clauses		More important since in one delivery point - few contracts with much more differing export prices destined for different markets
Role of transit	None (minimal)	Significant – especially after dissolution of COMECON & USSR & after EU expansion	New sovereign states appeared upstream to historical delivery points + new rules discriminating transit

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(a) it is based on a <u>long term contract</u> between producer/supplier and consumer/purchaser which secure lasting and stable demand for gas produced from the field which development requires multibillion investments. Such demand guarantees are needed to minimize non-commercial risks of investing in development of upstream project (the larger the field is the more numerous and larger are such risks). The contract duration is a function of the need to: (i) secure lasting, predictable and stable cash flows from gas exports necessary to pay back the investment in the upstream project (field development, incl. related transportation infrastructure) and (ii) match the duration of guaranteed gas sales from the upstream project with the optimal (i.e. economically

[10] For more information see “Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas”, Energy Charter Secretariat, 2007; Correlje A., van der Linde C. And Westerwoudt T., Natural Gas in the Netherlands: From Cooperation to Competition? (Oranje-Nassau Groep, 2003).

justified – by providing maximum efficient recovery rates and maximum resource extraction) duration of this project life-time[11];

Thus both parties to the contract – producer/supplier and consumer/buyer – demonstrate their commitment and legally-binding readiness to fix their commercial mutual relations on the long-term and non-alternative grounds. Producer is ready to supply its non-renewable resources to this particular economic entity within this particular market on the specified conditions. Consumer is ready to tie up specific and fixed segment of market demand with supplies from particular given source on specified conditions. Such non-alternative mutual linking of producer and consumer to each other is based, contrary to a broadly disseminated aberrations of LTGEC opponents, on a stable market and competitive background: both parties of LTGEC are interested to provide marketing of supplied/purchased gas at maximum marketable price under its competition with other energies and the suppliers of such energies which seek, as well as gas suppliers, to win their own consumer. This is provided by switching from the previously dominated pricing principle based on production costs at the producer-end ("cost-plus" or "net-forward" pricing) to the pricing mechanism based on the replacement costs of gas at the consumer-end;

(b) both domestic and export gas prices are pegged to gas replacement value (the price of gas substitutes for the end user, i.e. "on the burner-tip"). This allows the producer/exporter to derive from its gas sales the maximum resource rent (incl. both the Ricardian and the Hotelling rents) but keeping the gas competitive to alternative energies within its specific consumption segment in a given consuming country. The market price for gas (equivalent to and competitive with the cost of replacing gas with alternative energies) is calculated by a specific formula which serves as an integral part of any LTGEC.

Basic (historically original) pricing formula includes two gas alternative fuels:

- gasoil/diesel fuel (light fuel oil – LFO), which reflect its competition with gas in the households, usually with the weight of 60% in the pricing formula, and
- residual fuel oil (heavy fuel oil – HFO), which reflect its competition with gas in industrial electricity and heat generation, usually with the weight of 40% in the pricing formula (**Figure 3**) [12].

[11] Long-term character of the contract is predetermined by the rigorous requests of financial community to oil and gas companies in regard to the "bankability" of their upstream projects. Such projects in oil and gas have been usually financed since 1980-ies on the basis of debt financing (project financing). Under such financial technologies project investments need to be recouped by the future financial flows that would be generated by this same project which requests debt financing.

[12] Description and analysis of the pricing formula within the LTGEC is not the aim of the current article. See for further details, f.i., Box 8 "Stylised Price Formula under the Netback Concept of Long-term Contracts" in "Putting the Price on Energy: International Pricing Mechanisms for Oil and Gas", Energy Charter Secretariat, 2007, p.154-155; ESMAP (Joint UNDP/World Bank Energy Sector Management Assistance Programme) "Long-term Gas Contracts: Principles and Applications", ESMAP Report No 152/93, January 1993.

(c) there is a special contractual clause on <u>regular price review</u> (both within the given contract pricing formula as well as review of this formula itself) to reflect the changing price environment within evolving and competitive gas consumption spheres. A regular price review is needed to reflect and adapt to price fluctuations of gas substitutes in order to maintain gas price on a competitive marketable level.

<u>Figure 3.</u> A Typical Net Back Replacement Value Based Gas Price Formula & its Review

Pm = [Po]
+ [0.60] x [0.80] x 0.0078 x (LFOm - LFOo) *{**up**/down}*
+ [0.40] x [0.90] x 0.0076 x (HFOm -HFOo) *{up/**down**}*

+ [... (coal)] *{**up**/down}*
+ [... (electricity)] *{**up**/down}*
+ [... (gas-to-gas competition] *{**up**/down}*

NB: [...] – parameters in brackets usually subject of renegotiation; elements in bold reflect historically original Groningen (Dutch) pricing formula

Long-term evolution of price review mechanism:
- reflect its adaptation to the new state of development of energy markets,
- changing shares of existing competing fuels (LFO/HFO ratio in favour of LFO) *and* incorporation of new competing fuels *and* gas to gas competition,

but

LFO & HFO are still dominant replacement fuels in gas pricing within long-term gas export contracts

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Price behaviour within pricing formulas created on a replacement value (net-back replacement value) principle is more dynamic (volatile) compared to prices calculated on a cost-plus (net forward) basis. This is why the first type of prices requests more frequent corrections.

Within the long-term field development project one can rather steadily calculate (evaluate) the production costs and apply agreed methodology of calculations for quite a long time period. This is why production costs are quite predictable and have relatively constant character (i.e. characterized by rather monotonous fluctuations). And, consequently, the prices based on costs (within cost plus or net forward pricing methodology) will fluctuate also rather monotonously, except force-majeure or similar occasions.

After transition to a replacement value based pricing the dynamics of replacement fuels began to be established and/or linked to behaviour of liquid commodities markets, such as, for instance, global oil market. This is why we face intensive speculative price fluctuations of gas replacement fuels followed by fluctuations of contract gas prices (though in a smoother manner as a result of special structure of pricing formulas). In order to reflect (and/or flatten out) these price fluctuations of the replacement fuels and to support at the same time competitive character of gas at the consumer market, a regular review of price formula is needed. Such mechanism was established in the Groningen model of LTGEC and it is the necessary element of the latter.

This is why from the very beginning a possibility was established within Groningen LTGEC model to adapt its pricing formula to the changing realities of competitive environment of gas marketing at the consumer market (**Figure 3**). Taking these changes into consideration, producer will be able to continue extracting maximum resource rent within the new – continuously changing – environment, i.e. to receive maximum marketable price which is the function of gas competitiveness in the changing external conditions of its marketing. Among such new conditions are: broadening nomenclature of energies competing with gas, appearance of new technologies which lead to increasing efficiency of using both the gas itself as well as its competing energies, changing pricing parameters of gas alternatives, appearance of new contractual forms of international gas trade competing with LTGEC[13], etc.

Today gasoil/diesel oil (LFO) and residual fuel oil (HFO) stays as still the major structural elements in the pricing formulas of LTGEC of major gas suppliers to Europe, though the role of HFO has been steadily decreasing (**Figure 3**).

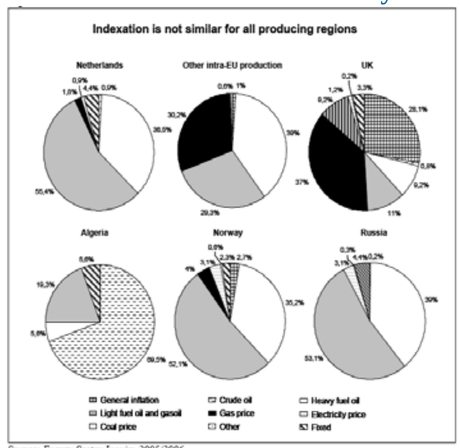
The results of the study undertaken by the DG COMP (Directorate for competition of the Commission of the European Communities) [14] have shown that for LTGEC of Russia, Norway and Netherlands – the key European gas exporters – the role of HFO in the gas pricing formulas is equal to 35-39% and of LFO – to 52-55%. The sum total of these two components in the pricing formula equals to 87% in Norwegian and to 92% each in Hollandian and Russian gas export contracts. Other components of pricing formulas in European gas export contracts are: coal, crude oil (specific feature of Algerian gas contracts)[15], electricity, inflation, price of gas defined by other than in a LTGEC-way (usually – spot prices or futures quotations, as for instance in the UK), and in some contracts part of the price in its formula is fixed (see **Figure 4**).

[13] About evolution of contractual gas market structure, see, f.i.: “Putting the Price on Energy: International Pricing Mechanisms for Oil and Gas”, Energy Charter Secretariat, 2007, chapter 2.

[14] CEC DG COMP. Energy Sector Inquiry 2005/2006.

[15] For specific reasons for this see, f.i.: “Putting the Price on Energy: International Pricing Mechanisms for Oil and Gas”, Energy Charter Secretariat, 2007, chapter 4.4.4.

Figure 4. **LTGEC in the EU: Indexation by Producer**



Source: Energy Sector Inquiry 2005/2006

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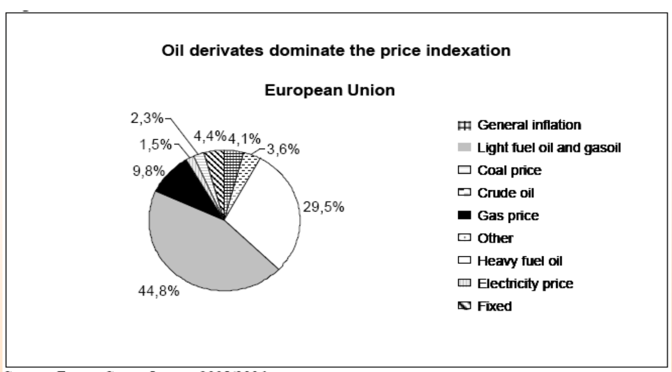
Long term evolution of gas pricing mechanism within the process of its contractual review rounds – which is an integral part of any LTGEC – reflects the process of adaptation of pricing formula to the new realities of energy markets development by expanding the number of formula components and changing of their weight which reflect competition between "old" and "new" energies alternative to gas and competing with each other as well, on the one hand, and between "old" and "new" contractual forms of organization of international trade in gas, on the other hand. Nowadays the aggregate EU pricing formula is composed at least of about 10 ingredients compared to only two in basic Groningen formula (**Figure 5**).

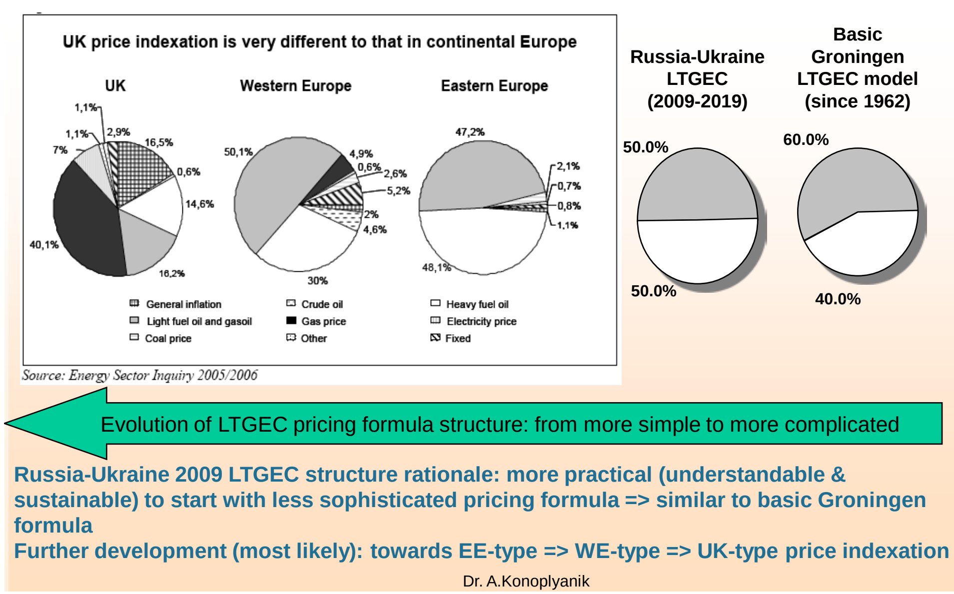
Figure 5. Price indexation structure in the EU as a whole



Source: Energy Sector Inquiry 2005/2006

The general tendency in evolution of the pricing formula can clearly be seen if one compares the pricing structure of the original Groningen formula with the pricing structures of gas supplies to Eastern and Western Europe and the UK (**Figure 6**). The longer is the history of gas supplies to the market and the more sophisticated and diversifies is the gas supply and transportation system, the more complex is the gas pricing formula with increasing substitution of, first of all, the HFO portion by new replacement fuels and new ingredients in the pricing formula. The structure of the pricing formula evolves from more simple to more complicated one. The ratio of LFO/HFO has been moving from 50/50 (basic Groningen formula) to 47/48 (Eastern Europe) and to 50/30 (Western continental Europe) and to 16/14 (the UK) while the role of other ingredients in pricing formulas have been slowly increasing in number and in share from less to more liberalized markets (**Figure 6**).

Figure 6. LTGEC in Europe: Indexation by Region Through Historical Evolution from Less to More Liberalized Markets



It is not necessary that the later in time of appearance the formulas are, the more complicated they would be (compared to those that have appeared earlier). It mostly depends not on the timing *per se*, but on the state of market development: the more competitive is the market (in terms of alternative supplies in different spheres of gas consumptions) – the more complicated the formula can be due to the bigger number of competing/replacing options for the consumer and the more ingredients the seller and the buyer need to take into consideration to provide marketability of the gas to be produced and exported. In this regard Russia-Ukraine 2009 LTGEC structure (see **Figure 6**) presents another dimension of its economic rationale: it is more practical (understandable and sustainable) to start transition from political to market-based contractual and pricing structure[16] with less sophisticated pricing formula (similar to basic Groningen's one) to minimize transaction costs.

Further development of the contractual structures within the CIS in general and in Russia-Ukraine and/or Russia-Central Asian gas contracts in particular is most likely in the following mode: towards Eastern-European type, later to Western European type, then to the UK type structure of price indexation within the LTGEC.

(d) minimum pay obligations (known as "take and/or pay" – TOP – obligation) which guarantee that the producer will market his minimum sales and will receive minimum guaranteed revenues from gas sales. On the other hand, the buyer will have a flexibility to decide whether to off-take all contracted volumes or only a part of them within the range allowed under the contract, say, down to the level of 75-80% of contractual volumes (i.e. within 20-25% "flexibility diapason").

TOP formula provides flexible and mutually beneficial exchange of long-term obligations by the parties in contract. On the one hand, it is an obligation of the producing state to develop its sovereign right on its energy resource in such a manner that will enable him to supply part of such resource to the common need of the producer and consumer (whether domestic and/or foreign). At the same time, consumer takes an obligation to market a minimally agreed portion of such resource, i.e. to provide a marketable demand on it. Thus the producer takes the "resource" risk associated with the upstream activities (risk of producing energy resources, geological risks inclusive, and of transportation of gas produced up to the delivery point), while the consumer assumes the "market" risk associated with the downstream activities from the delivery point to the end-user (risk of energy marketing and sale). So the producer and consumer spread between them the supply risks within the cross-border gas value chain according to their competence and responsibility within this chain to provide secure, stable and predictable supply;

(e) net back to the delivery point (gas replacement value for the end-user less transportation costs from the delivery point to this end-user). This clause (pricing principle) secures competitiveness of gas exports delivered to various markets via different routes. This clause also means that if gas is supplied from a single source (producer) to various export markets via one delivery point, the export price for such gas at such delivery point may vary significantly under the terms of different contracts due to the differing end-use prices (gas replacement values) on such export markets and differing transportation distances to such markets from this delivery point;

(f) destination clauses whose appearance has been necessitated by the fact that gas exports through the same delivery point destined to different export markets can lead to

[16] Discussion on the evolution of Russia-Ukraine gas export structure is not the subject of this particular article. The author has expressed his views on this issue in a number of publications and presentations since 2006 that are available at his web-site at www.konoplyanik.ru.

existence of different contract prices from the same producer/exporter at this point. To rule out re-export of cheaper gas (purchased by the importer under one contract for a more remote market) at a higher price (specified in another contract for a closer market), gas resale restrictions are imposed – the so-called destination clauses, or territorial sale restrictions. Such clauses protect for exporter receipt of maximum possible resource rent based on the competitive conditions in the consumer's market and prevent the gas buyer (usually, wholesale buyer who acts as intermediary between the producer and the end user) from using in his favour price arbitrage opportunities to the detriment of the producer resulting in an undercut of producers' resource rent[17].

The closer to the end-use market the delivery points are located, and the less diversified is the gas transportation/transmission system of the importing state(s), and the smaller is the number of consumers served by the single delivery point, then the less actual – at least for producer – is the topic on destination clauses. And, vice versa, the bigger is the number of importers served by the single delivery point, and the more sophisticated and diversified is the gas delivery system within the importing state(s), and the more distant is the delivery point from the end-use market of the importing state(s), then the more economically substantive and thus more actual is the topic of destination clauses for producing and exporting state.

Such clauses protect economically justified interests of producers/exporters. On the one hand, such clauses enable producer to receive maximally achievable resource rent dependent on the competitive environment at the consumer market for the gas produced and exported to this market. On the other hand, such clauses prevent the importer of the gas (usually the wholesale importer-intermediary between the producer and end-user of the gas) to use price arbitrage possibilities which lead to receipt by the producer of the lower value of the resource rent (by non-receiving by him of the portion of the Hotelling rent).

Destination clauses were not invented by the Soviet and/or Russian gasmen, as has been frequently presented by the Western press, though it was the presence of such clauses firstly and mostly in the Soviet/Russian and to some extent in Algerian LTGEC that stipulated a long and heated criticism from and debate with the major opponents of destination clauses (such as the European Commission and its DG COMP in particular) as contradicting with the EU competition rules. Destination clauses were from the very start the immanent part of the Groningen LTGEC model which provide economically justified mechanism of escaping price discrimination of producer/exporter by protecting him from price arbitrage to its detriment[18]. Moreover, destination clauses in LTGEC have

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[17] For more details see, f.i.: A.Konoplyanik. Russian Gas to Europe: From Long-Term Contracts, On-Border Trade, Destination Clauses and Major Role of Transit to …? – *"Journal of Energy and Natural Resources Law"*, 2005, vol.23, N 3, p. 282-307; А.Конопляник. Российский газ для Европы: об эволюции контрактных структур (от долгосрочных контрактов, продаж на границе и оговорок о пунктах конечного назначения – к иным формам контрактных отношений?). – «Нефть, газ и право», 2005, № 3, с. 33-44; № 4, с. 3-12

[18] It started as the mechanism of protection of interests of Dutch producing/exporting company Gazunie which produced and exported gas from Groningen field and which was initially owned by 50% by the Dutch government and by 25% each by companies Royal-Dutch/Shell and Exxon.

been providing the financiers of the upstream gas investment projects with an opportunity to minimize the non-commercial risks and thus have been stipulating the development of such projects which usually lead to the increasing competitive gas supply[19].

Spread-over of Groningen LTGEC model and its modifications

Groningen model of LTGEC has established the contractual basis for forming European gas supply and transportation system in its current framework. It will not be an exaggeration to say that Groningen model has been the core element and major financial tool of creating this system. Despite this fact the European Commission during at least last decade has been rather negative in assessing LTGEC as if preventing competition within the EU market. The Second[20] and the Third[21] EU Gas Directives have finally agreed with the important role of the LTGEC in gas supply of the EU and its member-states, but put them in a rather wage and unclear manner in subordination of competition rules by repeatedly saying in both the Second and the Third Gas Directives[22] that "long-term contracts will continue to be an important part of the gas supply of Member States and should be maintained as an option for gas supply undertakings in so far as they do not undermine the objective of this Directive and are compatible with the Treaty (1958 Treaty of Rome – A.K.), including the competition rules."[23]

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[19] The conflict (economic contradiction) between increasing liberalization of the internal EU gas market which has been seen by the Commission as a driving force, the aim and the mean of European market development, on the one hand, and diminishing investment stimuli for new supplies under more and more liberalized market, on the other hand, is not a subject of this particular article. The author has expressed his views on these issues, in particular on the issue of "liberalization risks" in the EU market, in some of his publications and presentations since 2002-2003, which can be found at his web-site at www.konoplyanik.ru. One of the key points of this debate, related to contractual structure of the European gas market, is the following: LTGEC and their important element such as destination clauses have been for long the major economically proven instrument of minimizing non-commercial risks of financing new upstream investment projects and as such were requested by the financial community as a security for debt financing of upstream investment projects in energy, incl. gas, since LTGEC and destination clauses were safeguarding the stable and predictable flow of export revenues to pay-back project investments.

[20] Directive 2003/55/EC of the European Parliament and the Council of 26 June 2003 concerning common rules for internal market in natural gas and repealing Directive 98/30/EC, Official Journal of the European Union L 176/57 15.7.2003.

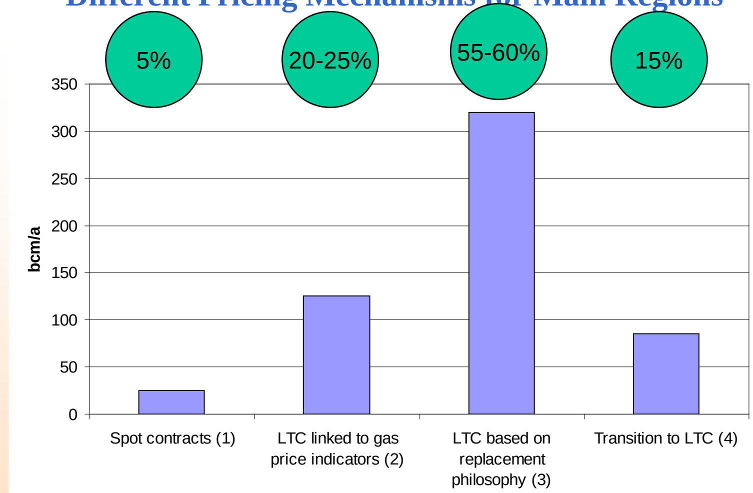
[21] Directive 2009/73/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC, Official Journal of the European Union L 211/94 14.8.2009.

[22] Paragraph 25 of Preamble of the Second Gas Directive (Directive 2003/55/EC…) and paragraph 42 of the Third Gas Directive (Directive 2009/73/EC…).

[23] Debate on the compatibility or non-compatibility of LTGEC with the EU competition rules and gas supply security is not the subject of this particular article. The author has shortly addressed this issue in some of his earlier publications and presentations available at www.konoplyanik.ru.

According to the estimates of the Energy Charter Secretariat as for the middle of this decade, more than 300 BCM has been imported annually in the Continental Europe within contractual structures based on Groningen LTGEC concept with pricing formulas. Another 120 BCM/year or so of pipeline gas has been exported worldwide within LTGEC structures at prices linked to spot and/or futures quotations, mostly within specific conditions of most liberal has markets of the USA and the UK[24]. About 100 BCM/year of has export within CIS was in transition to modified Groningen LTGEC with traditional pricing structure based on gas replacement values of the basket of replacing fuels (mostly oil products). Pure spot (both in duration and pricing) contractual structures in the international gas trade has covered few years ago just about 25 BCM/year (**Figure 7**).

Figure 7. Estimated International Gas Trade (2005): Different Pricing Mechanisms for Main Regions



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

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Of course in the most recent time this structure has changed due to oversupply of gas in Continental Europe. In 2008-2009 European gas demand has fallen due to financial and economic crisis. On the other hand, the growth in shale gas production in the US since 2007 has led to decline of American demand for LNG. Cargos of spot LNG destined for the US market were redirected to Europe where they have competed with pipeline gas sold at LTGEC with the TOP provisions and pricing formulas which linked the contractual gas price to oil quotations of the peak oil price period of the middle of 2008. This has diminished gas purchases within LTGEC contractual structures and has increased spot sales. But it is clear that within the long-term the dominant role of LTGEC in European gas supplies has been the basic historical trend.

[24] Specificity of the US and UK gas markets explaining their more/most liberal character is discussed in: "Putting the Price on Energy: International Pricing Mechanisms for Oil and Gas", Energy Charter Secretariat, 2007, chapters 4.1 - 4.3.

Soviet gas supplies to Western Europe have begun in 1968 – six years after Groningen model of LTGEC began to be implemented in practice in Europe. The first Soviet gas supplies was with Austrian OMV company with the delivery point at Baumgarten. First Soviet gas contract to Europe was a practical implementation of the contractual model developed for gas supplies within the politically homogenous Western Europe. This model, after few years of its practical adaptation and tuning in Western Europe, was taken as a basis for and adapted by the contractual parties (Soviet external trade association "Soyuzgasexport" as monopolistic gas supplier, and corresponding Western European gas companies as the buyers of Soviet gas) to the specific conditions of the then politically disunited Europe (see **Figure 2**) [25].

After dissolution of the COMECON and the USSR, the Soviet model of LTGEC faced some additional risks (especially in regard to gas transit issues) which stipulated to continue its adaptation – this time to the new realities of organization of post-Soviet space and of new internal organization of the EU[26].

So the Groningen model of LTGEC has been the constantly adapted instrument of organization of international trade in gas. At the same time, this model maintains its major characteristic features. Moreover, Groningen LTGEC model, including modifications of its pricing mechanisms, has been the fundamental basis of the international trade in gas and thus the guaranty of the stable and secure international gas supply.

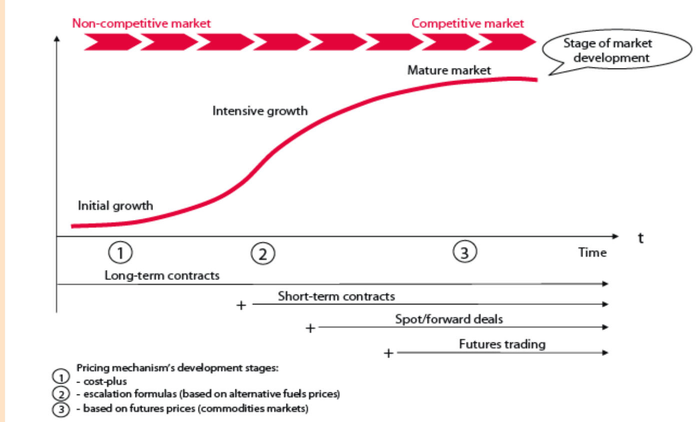
[25] For more details see, f.i.: A.Konoplyanik. Russian Gas to Europe: From Long-Term Contracts, On-Border Trade, Destination Clauses and Major Role of Transit to …? – *"Journal of Energy and Natural Resources Law"*, 2005, vol.23, N 3, p. 282-307; А.Конопляник. Российский газ для Европы: об эволюции контрактных структур (от долгосрочных контрактов, продаж на границе и оговорок о пунктах конечного назначения – к иным формам контрактных отношений?). – «Нефть, газ и право», 2005, № 3, с. 33-44; № 4, с. 3-12; он же. Эффект матрицы. – *«Нефтегазовая Вертикаль»,* 2005, № 7, с. 18-22.

[26] For more details see f.i.: A.Konoplyanik. Gas Transit in Eurasia: transit issues between Russia and the European Union and the role of the Energy Charter. – *"Journal of Energy and Natural Resources Law"*, vol. 27, #3, August 2009, p. 445-486; Ibid. A common Russia-EU energy space (The new EU-Russia Partnership Agreement, acquis communautaire, the Energy Charter and the new Russian initiative). - *"Oil, Gas and Energy Law" (OGEL), Special Issue on EU-Russia relations, vol.7, issue 2, May 2009;* А.Конопляник. Взаимоотношения России и Европейского союза в газовой сфере и роль Энергетической хартии. – в кн. «Нефтегаз, энергетика и законодательство (выпуск 7/2008). Информационно-правовое издание топливно-энергетического комплекса России и стран СНГ (ежегодник)». – Москва, «Нестор Экономик Паблишерз», 2008, с. 166-196.

Contractual structure of gas supplies and pricing patterns

Development of international gas markets has been evolving towards forming more and more diversified contractual structure within these markets (**Figure 8**) [27]. The new contractual forms have been added to and not instead of already existing contractual mechanisms. Usually more and more shorter-term structures have been appearing in the market in addition to already existing longer-term contracts. This reflects objective characteristic features since the duration of upstream investment projects generally becomes shorter and shorter (due to diminishment of unit volume of proved reserves of the developed fields and due to the development of transportation infrastructure which in total lead to diminishment of pay-back periods of respective investment projects).

Figure 8. Evolution of Gas Markets: Correlation of Development Stages, Contractual Structures and Pricing Mechanisms



Source: "Putting a Price on Energy: International Pricing Mechanisms for Oil & Gas", Energy Charter Secretariat, 2007

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[27] For more details see, f.i.: "Putting the Price on Energy: International Pricing Mechanisms for Oil and Gas", Energy Charter Secretariat, 2007, chapter 2; А.Конопляник. Россия на формирующемся Евроазиатском энергетическом пространстве: проблемы конкурентоспособности. – М.: «Нестор Академик Паблишерз», 2004, 655 с. (глава 2).

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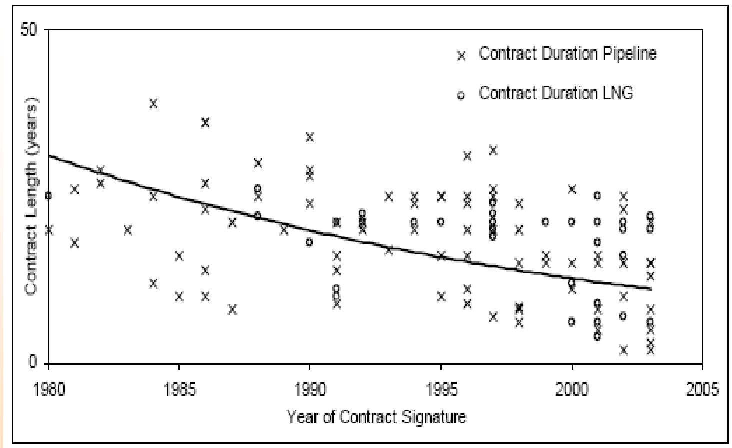
This is why, for instance, duration of LTGEC in Europe had diminished twice – from 30 to 15 years - during quarter of a century (from 1980 till 2003) according to C.Hirschhausen & A.Newmann (**Figure 9**)[28]. So the contractual structure of the market became more and more competitive, and each type of contracts has to prove its competitive niche within the evolving markets.

Figure 9. Distribution of Contracts struck in OECD Europe since 1980



Source: C.Hirschhausen & A.Newmann. Less Long-Term Gas to Europe? A Quantitative Analysis of European Long-Term Gas Supply Contracts. – "ZfE – Zeitschrift fur Energiewirtschaft" 28 (2004) 3, p.181 (reproduced in: OGEL, March 2005, vol.3, issue 1). Dr. A.Konoplyanik

That is why the most complex issue relates to the difficulties and risks associated with the transition to the new market structures: transition from gas supplies with several strong players (e.g. that typical of yesterday's and today's pipeline gas market in Continental Europe and/or the LNG market in Japan/Korea) to a system involving one or several highly liquid market places with multiple players (such as on the UK and/or the US gas markets or the global oil market). It should be noted that the risks relevant to the transition from one phase of energy market development to another are typical of all economy types (developed and developing, market and non-market economies). But it is precisely such risks of transition from less liquid to more and/or to the most liquid contractual structure of the market space (characteristic of spot trading, forward/futures/options deals) that are typical of industrialized states (developed market economies) of long standing rather than of traditional transition economies (moving from non-market to market-based forms of organization of domestic economic space) or developing countries. Such risks includes both the risks of supplying the markets per se experiencing such a transition and also the risks of investing in projects destined for such "transition" markets – that is the markets undergoing transition to their most liberal

[28] C.Hirschhausen & A.Newmann. Less Long-Term Gas to Europe? A Quantitative Analysis of European Long-Term Gas Supply Contracts. – "ZfE – Zeitschrift fur Energiewirtschaft" 28 (2004) 3, p.181 (reproduced in: OGEL, March 2005, vol.3, issue 1).

pattern based on the market-based system of economic development of a given country(ies) – usually, a major gas consumer(s) or a (net) gas importer(s).

For vertically integrated companies with gas production (both inside and outside such markets, e.g. the EU market) and supplies (to such markets, e.g. to the EU market) risks of supplying such markets are part of a broader variety of trade and investment risks, than for the companies engaged in trading only (traders). In the case of vertically integrated companies, the higher trading risks may be critical in terms of investment payback and thus for raising debt financing for projects relating to field development and transportation infrastructure to deliver production to the user. This statement holds good for both pipeline gas and LNG. This is precisely one of the characteristics of the "(economic) security of demand" that suppliers have to deal with, especially in the event of gas exports from countries other than developed market economies (e.g. outside the EU) to the countries that belongs to the category of developed market economies (e.g. inside the EU). In this context, the formation of a more liberal energy market in gas importing countries creates additional risks in exporting countries to the financing of investment projects destined for the markets in such importing countries. This deteriorates the "(economic) security of demand" in importing countries for exporting ones, which, in its turn, closes the circle, deteriorating "(economic) security of gas supply" from such exporting countries to the said importing states. [29]

A representative of a gas-producing company mentioned during a session of the Energy Charter's Industry Advisory Panel that "producers are interested and know how to supply their gas to a market with deep liquidity, or to a market with low liquidity but with strong players; however markets with low liquidity and weak players are difficult to supply".[30] According to the reputable consulting firm Cambridge Energy Research Associates, "infrastructure and major production investment decisions are very difficult to justify against sales into a market in transition to a liberalized and widely liquid state"[31].

As was shown above (see **Figure 7**), of about 550-560 BCMA of internationally traded gas, spot deals accounted for only 5% in the middle of current decade. These were spot LNG deliveries to the USA, UK and other countries, arbitrage deals in the Interconnector pipeline between the UK and Belgium. The remaining 95% falls on various modifications of LTGEC. The traditional replacement value based LTGEC account for 55-60%. This comprises the entire gas imports to Continental Europe including the new EU countries

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[29] For more information see the author's relevant publications and presentations on the subject at www.konoplyanik.ru, например: A.Konoplyanik. Energy Security: The Role of Business, Government, International Organisations and the International Legal framework. – "*International Energy Law & Taxation Review*", 2007, N 6, p. 85-93; А.Конопляник. Когда один договор стоит тысячи. - *«Нефть России»,* апрель 2007, № 4, с. 7-10, № 5, с. 10-13.

[30] "Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas", Energy Charter Secretariat, 2007, p.166.

[31] CERA Special Report "Securing the Future: Making Russian-European Gas Interdependence Work", 2007, p.13.

less the corresponding volumes of LNG spot deliveries. The LTGECs with pricing linked one way or another to gas hubs (developing gas market places) with their gas-to-gas competition account for another 20-25%. These include pipeline shipments from Canada to the USA pegged to the prices at Henry Hub (the gas spot trading centre in the US), deliveries to the UK through BBL and Langeled pipelines with prices linked to the NBP quotations, and new Dutch exports. About additional 15% comes within transitional contract patterns – transformers towards the traditional (modified Groningen-type) LTGEC structure. This includes all Russian exports to the CIS that are gradually shaped into Groningen-type LTGEC from quasi barter deals and political pricing[32].

In a nutshell, spot deals and exchange transactions with pricing based on gas-to-gas competition represent today a very insignificant faction of internationally traded gas though its portion has increased recently due to the reasons explained above. The share of spot market trading prior to the 2007-2008 financial & economic crisis corresponded to that of spot deals in international oil trade in the early 1970s (then ranging, by various estimates, from 3-5% to 5-7%). Spot deals and exchange trade yet hold a rather small segment of the gas market largely falling on the USA and to a lesser extent on the UK, with each having its own distinguishing features that enabled spot trading on the pipeline gas market [33]. Such business in international gas trade has not yet become representative (especially in the pipeline gas) and is, therefore, subject to serious occasional market fluctuations up to potential price-rigging. This is especially true of the UK market to which it is most often proposed to peg LTGES pricing.

It is obvious that the UK has a liquid – and volatile – market promptly responding to demand/supply pressures and bottlenecks. According to the reputable Gas Matters, "true markets are unpredictable at the best of times but as the NBP continues its transition from self sufficiency to import dependency, experience of the past no longer provides a clear basis for future predictions… What seems to be happening is that the NBP and its lesser siblings in Holland and Belgium are increasingly feeling the stresses and pressures of playing in an international market. The UK market is large and liquid but it is not so big that it is immune from nudges and kicks from large players. We have seen over several months how decisions made on Langeled flows have moved the market and we have been reminded that the UK is linked indirectly to the continent by the network of offshore Norwegian Pipelines. We can now see LNG terminals either ready and waiting for deliveries or imminently coming to fruition. Ebbs and flows in Norwegian pipeline supply have certainly tweaked gas prices but we will increasingly have to keep an eye on gas from further afield. LNG tankers from Snohvit will begin cruising past the UK this winter and may welcome the shorter voyage into Milford Haven or the Isle of Grain

[32] For more information see a series of presentations by the Energy Charter Secretariat made as part of bilateral seminars held in 2007-2008 by the ECS with ECT member states on international pricing mechanisms for oil and gas based on the relevant Secretariat's study "Putting a price on Energy" and, in particular, the author's sections on the evolution of pricing in the post-Soviet space (available at www.konoplyanik.ru)

[33] "Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas", Energy Charter Secretariat, 2007, Sections 4.1 - 4.3.

rather than heading for the US Gulf. LNG from Qatar may yet begin to usurp Langeled as the vehicle for volatility and stress"[34].

This author has already written[35] that stable and economically justified stimuli for diminishment of duration of long-term contracts and for forming a liquid gas market begins to appear when the volume of the latter multiply exceeds the scale of each new gas supply project destined for this market. In this case such new projects would not influence in a "stress" manner on the supply balance. Today the UK market does not present such market architecture yet, though relatively liquid market, as considered, is already created and has been functioning in this country[36] (see below).

A renowned gas expert Jonathan Stern sticks to a similar viewpoint: he believes that the problem with Continental spot market trading hubs (to whose quotations it is proposed to peg the LTGEC pricing) has also three dimensions (he describes then in a slightly different context): insufficient trading volumes, insufficient liquidity, and a risk of price-rigging by dominant national players. [37] Understandably, switching European LTGECs over to the prices of such an objectively volatile market would pose a threat to the security of energy supply to Continental Europe as a whole since it will not provide clear signals to the investors of the new upstream projects.

Market liquidity and prices

So, in regard to the proposed change of pricing model from replacement value-based LTGEC formulas to gas-to-gas competition (spot/futures quotations at the gas hubs), the key question is to what extent spot pricing presents a representative segment of the

[34] "Gas Matters", September 2007, p.38. As follows from the quotation and the article itself, large players mean there primarily individual gas projects whose scale of redirected supplies is comparable with the capacity of the UK market and may impact it considerably in price terms.

[35] See, f.i.: А.Конопляник. Развитие рынков газа, долгосрочные контракты и Договор к Энергетической Хартии. – *«Нефтегаз»,* 2002, № 4, с. 25-33.

[36] The creation of such relatively liquid market was enforced by administrative means and due to the specific features of gas supplies to the UK. At the beginning, in the 1960-ies, gas supplies to the UK were based on the development of the many small gas fields of the southern part of the North Sea. Later on – due to the supply of associated gas of the oil fields of the central part of the North Sea, bearing in mind that the so-called "gas factor" at these fields was the highest worldwide and exceeded 50%. After UK Government has banned flaring of associated gas (to enforce this the Government forbade to market oil produced if the associated gas produced is not fully utilized), even after its partial injection back into oil horizons to increase oil recovery big volumes of associated gas were available which producing companies were obliged to sell domestically in the UK in order to be allowed to market their oil produced. This artificially and quickly created excessive supply in the UK gas market and provided for development of liquid UK gas market (for more details see "Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas", Energy Charter Secretariat, 2007, chapter 4.3.4.1).

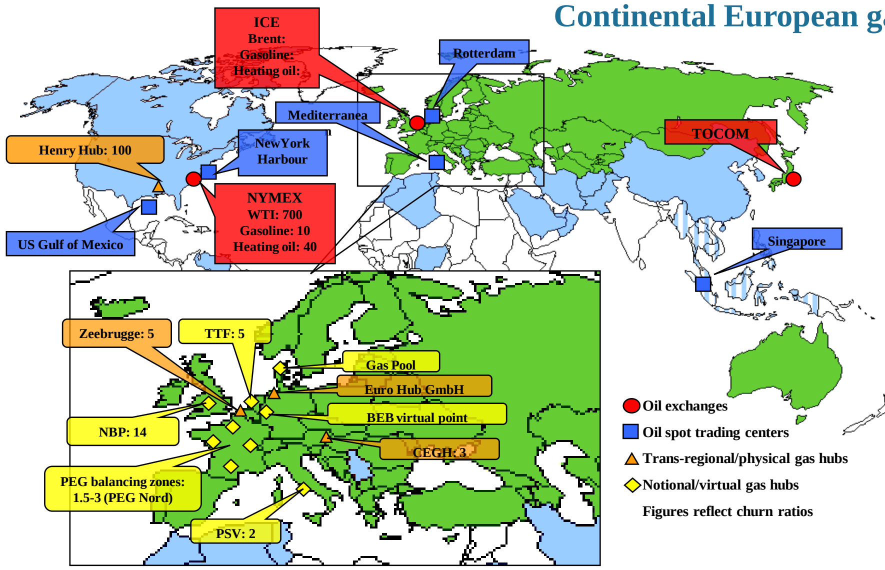
[37] J. Stern. Is There a Rationale for the Continuing Link to Oil Product Prices in Continental European Long-Term Gas Contracts? – OIES, NG 19, April 2007, p.17.

market, and how stable is this segment in Europe. The answer appear to be in the negative, at least nowadays. However, the proponents of spot deals as the basis of already today's pricing on the gas market usually refer to a high liquidity of the UK market and spot trading at large as compared to long term contracts. In their view, a high liquidity is a key characteristic of a competitive market and a recipe for low and/or falling gas prices. Is it really so?

The fact that spot and – the more so – exchange market trading is more liquid than LTGECs is beyond any doubt. Methodologically, however, this comparison is not correct because one may only compare homogeneous concepts and occurrences. Long term contracts, on the one hand, and spot and/or exchange trading, on the other hand, are completely different forms of organizing a market space (in addition to its third modification, which is vertical integration). By definition, a long-term contract envisions a long term linkage of a single buyer to a single supplier where the price risks are smoothly distributed between the LTGEC parties through special pricing formulas and the contractual provisions on price review and pricing formula revision. Therefore, the liquidity of spot and exchange gas trade in Europe should be compared with other (commodity and/or regional) markets dominated by spot and/or exchange trading rather than with LTGEC (whose liquidity always equals to 1).

The indicator for liquidity is called "churn" which is the ration between traded volumes (open positions) and volumes at the reference market place physically delivered. Therefore, its individual values may vary within a very large range. It is usually considered that liquid markets start with a weighted average churn of at least 15 and the higher is the churn ratio - the more liquid the market is. From this perspective, the European gas markets – both in the UK and – let alone – in Continental Europe – are not liquid yet. Especially if compared with the global oil market (**Figure 10**).

Figure 10. Comparative liquidity of marketplaces: worldwide oil vs. Continental European gas



(*) BEB hub = Bunde (Germany) at German/Dutch border, CEGH = Central European gas hub (Baumgarten, Austria), NBP = Notional Balancing Point (UK hub), PEGs = French hubs (GdF), PSV = Punto di Scambio Virtuale (Italian hub), TTF = Title Transfer Facility (Dutch hub); (**) churn figures for European hubs - 2008 average (J.Stern, September 2009, NG 34, p.7)

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The key spot markets or, rather, market places for crude oil trading are located in Rotterdam for Europe, Singapore for Asia and New York for the US. The spot oil markets have developed a full set of exchange pricing instruments, i.e. derivative financial instruments, including futures and options. The New York Mercantile Exchange (NYMEX) and the Intercontinental Exchange Futures (ICE Futures – better known by its previous name: International Petroleum Exchange (IPE)) [38] in London are the two key financial markets (market places) for oil. It is in these market places that world prices for oil are set. [39]

The most liquid of marketed hydrocarbon commodities is the West Texas Intermediate (WTI) oil blend quoted at the New York Mercantile Exchange. The WTI churn is a three-digit value and at the time **Figure 10** was being prepared (November, 2007) it equaled about 700. The churn for Brent, the second most important market, is also a three-digit number but smaller than that for WTI, with prices for Brent quoted at the Intercontinental Futures Exchange (the former International Petroleum Exchange) in London.

[38] Intercontinental Exchange Inc. (USA) bought the IPE in 2001 and changed its name to the ICE Futures in 2005.

[39] For more information see “Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas”, Energy Charter Secretariat, 2007, Ch. 3; А.Конопляник. Кто определяет цену нефти?, «Нефть России», 2009, № 3, с. 7-12, № 4, с. 7-11; он же. Россия на формирующемся Евроазиатском энергетическом пространстве: проблемы конкурентоспособности. – М.: «Нестор Академик Паблишерз», 2004, гл. 2.

However, the indicators for oil products quoted at exchanges are way lower, than for crude oil: the churn for fuel oil (gas oil) at the NYMEX is 40 and even less for gasoline – only 10 – i.e. even lower than the critical churn value of 15 for classifying a market as a liquid one. Therefore, even on the oil market which is regarded – for a reason – as the most liquid one, the high liquidity segments, in effect, only include the crude oil market and individual oil product markets.

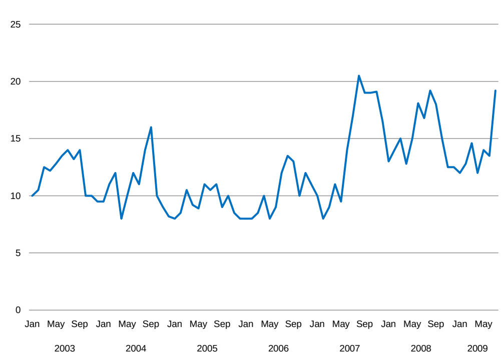
But as soon as we pass on to gas markets, the liquidity indicators there are much smaller than on the oil market.

The churn level at Henry Hub already in 2004-2006 averaged about 30, rising at some points in time to 100. Though this is few times lower level of liquidity compared to NYMEX WTI liquid market, Henry Hub has demonstrated stable contingency of the critical churn level of 15 (the latter considered to present a low margin for liquid markets) which rank this physical hub to really a liquid marketplace.

The level of liquidity of UK gas market is currently much lower than in the US. At best the UK gas market can be considered as formally approaching from below the benchmark level of churn which needs to be regularly surpassed in order to at least formally attribute the corresponding marketplace as a liquid one. This stable contingency of the critical churn level equal to 15 might happen in the UK NBP sometime in the future - but not yet.

The NPB churn in the UK fluctuated between 8 and 11 till mid-2007 with summer extremes up to 16 and 14 in 2004 and 2006 correspondingly. Summer extremes in 2007-2009 were slightly higher: 21, 19 and 20 correspondingly. But the mean level of NBP churn fluctuations was just around 15, i.e. at the low marginal level of what is to be considered a minimally liquid market (**Figure 11**). This means that for the period of statistical observations no stable contingency of churn level over 15 was evidenced which would have given at least formal argumentation to consider UK NBP as a liquid market place.

Figure 11. NBP churning factor, 2003-2009



Source: "Gas Matters" for corresponding years

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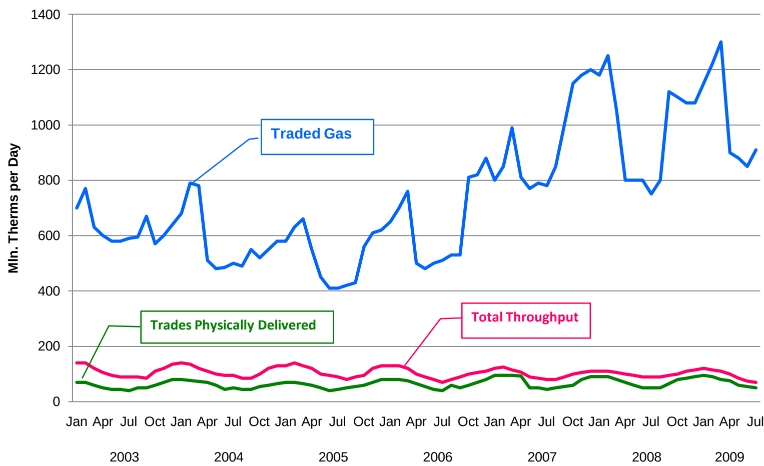
Another point should be mentioned as well. Numerator of a fraction which forms churn parameter is subject to much more volatile fluctuations than its denominator (**Figure 12**).

Behaviour of the denominator (physical supplies of gas) reflect developments at the physical gas market, while behaviour of the numerator does not tied up with the state of development of the market of physical gas but reflects the behaviour of the paper gas market, i.e. linked to behaviour of financial markets which are more volatile and are subject to more violent and unpredictable fluctuations which are based on perceptions of market players which stipulate inflows and outflows of liquid speculative capital. In recent years fluctuations of churn parameter are lying within plus-minus one-third of the marginal 15 level. Thus fluctuations of NBP churn – at this most liquid, as it considered to be, European gas market, - demonstrates, from my view, its instable behaviour at the marginal level of critically lowest liquidity.

Figure 12. NBP total throughput, trades and delivered trades, 2003-2009



Source: "Gas Matters" for corresponding years

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Spot trading centres in Continental Europe are characterized by both much lower trading volumes than at the NBP and much lower churn levels as well. Moreover, the gap between liquidity levels of NBP and gas hubs of continental Europe seems to increase, but – this is important – containing all European hubs within the zone of non liquid gas markets.

According to J.Stern's estimates based on IEA Natural Gas Market Review 2009[40], in 2008 traded volumes at the NBP of around 1000 BCM were twenty-one times as big as those in Zeebrugge[41] (Belgium) and 16 times as big as those in TTF (Title Transfer

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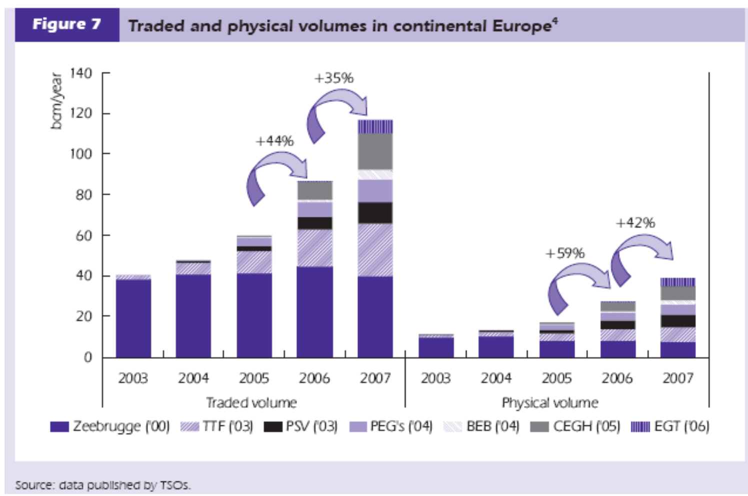
[40] J.Stern. Continental European Long-Term Gas Contracts: is a transition away from oil product-linked pricing inevitable and imminent? – OIEC, NG 34, September 2009.

[41] a physical centre of gas trade formed by the gas sector itself

Facility)[42] in the Netherlands. In 2007 Zeebruge was the second largest gas hub in continental Europe after NBP, and the TTF was the third one. In 2008 Zeebrugge and TTF has changed places. But their churn level of 5 is almost three times lower than marginal NBP churn (see **Figure 10**). Other European gas hubs are even smaller (with traded volumes of about 10-15 BCMA) and less liquid, usually equaling with their churn level just to 2-3, which is five and more times lower than the critical level to classify a given spot trading hub as at least formally liquid. Cumulative total figures for continental Europe bring churn ratio just to the level of 3 for 2007 (**Figure 13**).

Figure 13. Traded and physical volumes in continental Europe



Source: IEA. Natural Gas Market Review 2008, p.32

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This means that today's proposals to move LTGEC from gas pricing formulas with pegging to crude and product prices and/or to other gas substituting energies to pricing based on gas-to-gas competition at European hubs would peg gas prices to a market segment with low and insufficient liquidity and thus with unstable and unpredictable pricing and prices.

Architects of the European gas policy expected that with the introduction of liberalized and competitive markets Continental Europe would quickly move to gas pricing pegged not to oil product prices but to the gas prices set by trading in one or several spot trading centres (hubs) and quoted at one or several exchanges. The best known examples taken as a basis include the prices at Henry Hub (USA), the physical centre of spot trading, which are quoted at the New York Mercantile Exchange where gas prices for all of North America are set, and the prices at the National Balancing Point (UK), the virtual centre of

[42] a notional hub for the entire system of Dutch gas supplies that was formed with regulatory support from the national government

spot trading, that are quoted at the Intercontinental Futures Exchange in London. However, this has not and, obviously, could not happen in continental Europe. Moreover, are there any legitimate reasons for bringing the price fluctuations of the very specific UK market over to the entire energy space of “Greater” Europe which includes not only the gas consuming countries of the EU, but also all the countries along the cross-border gas supply chains, interconnected via pipelines and LNG supplies with the EU, counting in the exporting countries and gas fields in Europe, Asia and Africa?

It should be noted that the assumptions made in the energy policies of many energy importing countries to the effect that the higher liquidity and competition the lower the prices are not confirmed in practice in a great variety of cases. The most typical example is the price trends on the world oil market. Since the late 1980’s, this market has operated as a global commodities market. However, its prices do not go down at all and since the late 1990’s have steadily been on the rise with particularly rapid increases since 2004 and especially in 2007-2008 when they have rapidly reached their historical maximum of up to 150 USD/bbl and then have fallen sharply almost five-fold to the levels preceding beginning of growth.

From my view, the reason for high oil prices relates to the fact that today, with high liquidity of global oil market within the globalization trends, the oil price is defined not so much within the oil market itself (either within its “physical” or “paper” segments), but mostly outside the oil market per se – within even more liquid global financial market. The value of the latter in sum-total of all its segments (forex, stocks, bonds, other commodities, etc.) is many times bigger compared to overall turnovers of both segments of the oil market. Following the earlier ban in this decade of prohibition for the major US institutional investors (pension funds, insurance companies) to operate with high-risk instruments, oil (more precisely – oil financial derivatives) became for the global institutional/financial investors within the global financial market just one of the partial though high-yielding elements of their investment portfolios with the aim to increase the general level of profitability of the whole investment portfolio which is formed within the whole global integrity of all financial markets.

This is why oil prices today reflect not so much the real oil economy (which is the result of activities of strategic investors within the oil market) and/or not so much the virtual oil economy (which is the result of activities of the financial oil investors – in other words, the performance of oil speculators at the oil market), but they present the result of global tendencies at the financial market outside its oil segment, i.e. result of performances of primarily non-oil financial investors at the global financial market[43].

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[43] In more details about mechanisms of recent growth and fall of oil prices see the following author’s presentations and publications (all available at www.konoplyanik.ru): “Oil and Gas Pricing Mechanisms: Past, Current and Future Trends”. - Presentation at the session “Oil and Gas Pricing Mechanisms: Past, Current and Future Trends”, XIX International Economic Forum, Crynica, Poland, 9-12 September 2009; “Pricing mechanisms at the global oil market: defaults of Anglo-Saxon model & possible ways for improvements”. - International Oil Conference, Moscow, President-Hotel, 27 October 2009; Нефтяной рынок необходимо реформировать, «*Время новостей*», 12 декабря 2008 г.**;** О причинах взлета и падения нефтяных цен, «Нефть и газ» *(Украина)*, 2009, № 2, с. 2-4, 6-8, 10-11; О ценах на нефть и нефтяных деривативах, «*Экономические стратегии*», 2009, № 2, с. 2-9; Кто определяет цену

Another example is the UK gas market. Before the elimination of monopoly of Centrica, British Gas's marketing spin-off, on residential gas sales and the settlement of take-or-pay obligations between Centrica and gas producers, the spot prices for gas sold to third-party customers significantly undercut the "weighted average cost of gas" (WACOG) that Centrica had to pay due to its legacy of take-or-pay contracts. At the early stage of gas market liberalisation, spot prices remained at that relatively low level (competition owing to the sector liberalisation, but, chiefly, a result of the gas surpluses created by a marked increase in associated gas production in the Central North Sea on a must sell basis). After exports to the Continent via the Interconnector peaked in 2000 and then began to decline, spot prices began to strengthen. Such price developments continued into the current decade and in recent years have exceeded the WACOG under Centrica/British Gas long term contracts, which existed before 1998.[44]

When and how can LTGEC gas pricing mechanism change?

Thus, we have come to the conclusion that that the way proposing to peg the gas prices in EU-oriented LTGECs to gas prices set as a result of gas-to-gas competition at the European spot trading hubs, in particular, at the UK's National Balancing Point, rather than to the basket of gas substitutes based on their replacement value is not a valid one - at least today and in the foreseeable future. This way creates many additional risks for both consumers and, especially, producers outside the EU. The European gas market is not prepared (and should it be?) to switch over to gas-to-gas competition as the key pricing mechanism.

When and how can the LTGEC gas pricing mechanism change?

The polls of the European gas community taken at annual FLAME conferences (probably the most reputable European gas forum) about the prospects for keeping the linkage of gas prices to oil quotations showed that (the polls were taken at the 2004-2006 Conferences and covered 200-300 participants annually):
- in 2004-2005 a quarter of those polled said that gas prices in European long term contracts would never be decoupled from oil product prices and would not be based on spot and/or futures quotations; 15-30% believed that that would happen beyond 2015; 23-36% beyond 2010; and only 17-24% by the end of 2010. Thus, three quarters of those polled in 2004-2006 believed that it would happen by the end of 2015 or would not happen at all;

нефти?, *«Нефть России»*, 2009, № 3, с. 7-12, № 4, с. 7-11; see also: В.Фейгин. Конец эры «бумажной нефти», «Россия в глобальной политике», т.7, № 1, январь-февраль 2009, с. 135-146.

[44] For more information see "Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas", Energy Charter Secretariat, 2007, Section 4.3.4 and Fig. 37-38.

- in 2006, only 4% of those polled believed that by 2010 spot pricing on the gas market would replace the oil price pegging formulas very considerably; 28% just considerably; 44% to some extent; 23% insignificantly; and 1% in no way at all[45];
- in 2008-2009, about 29-32% said “never”, 43-44% said “later than 2015”, 22-20% said “before 2015” and 9% in 2008 and 4% in 2009 expected it to happen before end-2010.[46]

Understandably, the adjustment of gas pricing mechanisms in Europe to the changing environment of gas sector operations, will inevitably continue. This process is an objective tendency of energy markets development and of gas market in particular (**Figure 8**). But this process (correction or revision of existing pricing mechanisms) can not be fast considering the sector persistence and the existing system of long term legal obligations of the parties to a gas supply contractual relationship. It appears that during this long-lasting process there will not and cannot be revolutionary switches of pricing mechanisms over to gas-to-gas competition as prevailing universally.

The LTGEC pricing formulas will continue to be gradually adjusted to the new environment of gas market operations through:
- a broader range of gas substitutes, including (where appropriate) gas-to-gas competition as one of the formula ingredients besides coal, primary energy and other energies in addition to the now prevailing residual fuel oil (HFO) and gas oil/diesel fuel (LFO) (**Figures 3-6**). This adjustment element would reflect the greater multiplicity of competition among goods/products on the gas market;
- reduction of all time intervals used in the gas price formula for its review – frequency of price reviews, duration of the reference periods and time lags between the date of revision and the reference period. This adjustment element will reflect the greater intensity and the range of price fluctuations for gas substitutes in the present conditions where their majority present exchange commodities with futures/option pricing with its high and continuously increasing price volatility.

This is why, from my view, the LTGEC pricing basket of major gas exporters to Europe would drift towards more complicated structure of pricing formula, similar to current gas price structure at the UK market (see **Figure 6**).

Such gradual transformation of gas pricing mechanisms has been continued in different countries and within different segments of their gas markets, for instance, in Germany where the traditional gas price system – and not only in Germany – was built on the principle of “Anlegbarkeit”, where prices in the different sectors (residential, industrial, power generation) were set in relation to the prices of competing fuels: gas oil in the residential sector; gas oil and fuel oil in the industrial sector; gas oil, fuel oil and coal in the power sector. Contracts in domestic markets were linked to these fuels and the

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[45] See Table 2 in: А.Конопляник. «Российско-украинский газовый спор: размышления по итогам Соглашения от 4 января 2006 г. (в свете формирования цен и тарифов, экономической теории и ДЭХ)». – *«Нефть, газ и право»*, 2006, № 4, с.47.

[46] J.Stern. Continental European Long-Term Gas Contracts: is a transition away from oil product-linked pricing inevitable and imminent? – OIEC, NG 34, September 2009, p.5.

indexation passed through the delivery chain up to the importation contracts and defines the competitive price level within LTGEC.

Since recently the mechanism called “portfolio management” became more and more popular for gas pricing within the distribution contracts at the German domestic market[47]. This describes a strategy of switching from the traditional procurement contract – in the case of distribution companies mainly linked to German gas oil quotations and sometimes, to a small extent, to German fuel oil quotations – to a portfolio of different products. This includes standard traded products, flexible bilateral procurement contracts, storage and day to day trading on the OTC market or EEX, the German energy exchange. This current trend (which is similar to complication of the pricing formula in the LTGEC) does not mean that oil-linked prices will disappear but that there is a shift from the principle of “Anlegbarkeit” to market-based pricing, where prices are evaluated in relation to the prices at the German OTC market. In the end the question, whether prices within Germany will be linked to oil products or to gas market prices, will be a matter of the risk appetite of buyers and sellers. For some German customers this development is not good news. “Anlegbarkeit” currently guarantees large industrial customers and power plant operators prices much below current market prices. This advantage will vanish and prices for the different sectors will converge. Representatives of industrial customers are expressing their concern about this development in informal talks. The major German incumbents still defend the oil link for prices in the large long-term importation contracts[48].

It seems that as in the oil market, pegging of prices for real deliveries of the physical goods to the quotations of different financial instruments (derivatives) is most profitable firstly to traders and speculators and not to producers and consumers of real goods.

Multidirectional effect for different categories of gas consumers of gas pricing mechanism transformation is another argument for the gradual adaptation of such mechanism to the new realities of energy markets. This adaptation all the more need not be implemented by extortive administrative methods on the assumption of “more liquidity, more competition, more of the market”. It is most probable that it would be the gas business itself, which manage to adequately assess the risks and the rewards, which could most effectively, gradually and with reasonable adequacy adapt gas pricing mechanism, within the changing competitive environment of its everyday practical activities, to the most rationale structure of price formation for the whole interdependent community of the cross-border gas supply process.

[47] “Germany starts to move from oil-linked gas prices towards portfolio management”, “Gas Matters”, May 2008, p.14-15.

[48] Ibid.