

## Pricing Mechanisms Development in the East Asian Gas Market

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### Abstract

The balance in international politics and economy is shifting to the East. Economic development requires energy resources; shifting balance requires new geopolitical approaches. One of the keys for that is gas market development – it can provide fuel for development and gives countries a geopolitical tool when responding to the challenges. The way these challenges are dealt with ultimately depends on the level of prices, which in its turn depends on the way the price is set.

One of the debated objectives in Asia Pacific is to develop a freer market for gas trade, and one of the ways is to set a gas-trading hub where gas prices would be determined on a competitive basis. The extent to which the Asia Pacific region will manage to switch to competitive pricing will determine the role of gas in the regional market.

The main focus of the paper is the possibility of a continued process of integration between the regional gas markets into a single world gas market, and the dynamics of gas pricing mechanisms development in different regions (and in Asia Pacific in particular) as an indicator of such integration. The paper overviews pricing mechanisms worldwide; assesses the perspectives for pricing in the APR. It concludes that the process of the change in gas pricing paradigm is a complicated one while the prospects of a regional hub in APR are rather doubtful due to the supply outlook (largely secured via long-term contracts in medium term); and there is a resulting uncertainty relating to the possibility of price signals transmission between the regional gas markets even in case of the start of new supplies, i.e. from North America.

Thus, the global gas market is postponed, once again.

### Keywords

Natural gas, market integration, gas pricing mechanisms, Asia Pacific

### Introduction

The balance in international politics and economy is shifting to the East. Economic development requires energy resources; shifting balance requires new geopolitical approaches. One of the keys for that is gas market development – it can provide fuel for development and gives countries a geopolitical tool when responding to the challenges. The way these challenges are dealt with ultimately depends on the level of prices, which in its turn depends on the way the price is set.

The pricing discussion is relevant in the context of gas markets due to several factors. Firstly, geography of world gas trade is transforming, thus there is a necessity to determine how the prices from the sources of supply / in the new markets will be set. Secondly, conditions in the regional markets are also changing, which means that sellers adapt their marketing policy and buyers have to adapt to suppliers' the marketing policy. Thirdly, price volatility leads to the necessity of justifying investment policy. Both buyers and sellers are ultimately interested in having respectively security of supply and demand.

The following analysis is based on the concept of gas market evolution (the process has a dimension of increased trade volumes as well as increase in competitiveness; which in turn leads to the use by the participants of different instruments at various stages of such evolution – often the process is referred to as integration); the ultimate goal of this process – not just gas or any other community market integration, but ultimately a movement to a freer trade regime – is to maximize benefits from trade (as opposed to self-reliance in supplies). The basic drivers behind this process can be divided into categories of market fundamentals (supply and demand) and existing market structure (regulatory framework, price competitiveness via pricing mechanism and contract structures); national energy strategies. Factors inherent to the market include infrastructure development (pipelines, LNG infrastructure, storage capacity) and regional processes (this category includes trading liquidity-targeted policies, transparency, environment-protection initiatives, taxes and subsidies etc.) External factors such as geopolitics, price developments (incl. other markets and alternative fuels), investment climate, technological development also have a strong impact on the process of market evolution.

As a result of an interplay of various factors, historically various gas markets have come through comparable stages. These stages can in general be seen as movement from less competitive to more competitive markets. Each stage involves a larger number of *instruments*, including long-term contracts, short-term contracts, spot deals and futures trading. Gas pricing mechanism is set within these contracts, and it is the mechanism, which determines to what extent the fundamentals are reflected in the price.

The gas trading hub is central to the market development, as it is a prerequisite for spot trade. Competitive pricing is

possible when there is a reasonable share of spot trade; and spot deals are much simplified by the existence of a hub. Competitive pricing (meaning not only competition between spot supplies but also supplies under the long-term contracts which are linked to spot prices) is one key feature of an integrated market. One of the debated objectives in Asia Pacific is to develop a freer market for gas trade, and one of the ways is to set a gas-trading hub where gas prices would be determined on a competitive basis. The extent to which the Asia Pacific region will manage to switch to competitive pricing will determine the role of gas in the regional market.

The main focus of the paper is the possibility of a continued process of integration between the regional gas markets into a single world gas market, and the dynamics of gas pricing mechanisms development in different regions (and in Asia Pacific in particular) as an indicator of such integration.

### Overview of the gas trade dynamics (fundamentals and structure of the market)

Currently the world gas market can be divided into three regional markets, which are international, and a range of national markets. The three international markets are: North American, European and Asian gas markets. Moreover, the levels of prices are different and are expected to remain at different levels until 2040. Figure 1 shows the results of baseline scenario calculations in the Russian and Global Energy Outlook Up to 2040 [3], which suggests that the divide of the world market into three regional will persist.

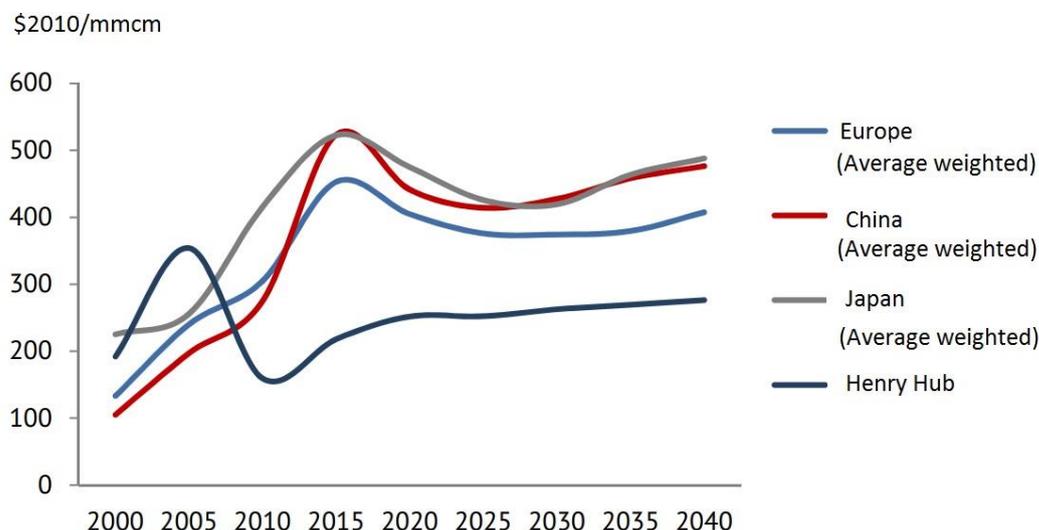


Figure 1. Forecast weighted average price\* of gas by regional market (Source: ERIRAS)

\* Weighted average price between the prices of long-term contracts linked to alternative fuels, and spot prices.

At the same time, gas markets worldwide are in the state of transition. The question that often arises is whether there is a movement toward a single world gas market. One explanation for this development is the trajectory of market development, with the increase of the mechanisms of integration between producer and consumer as the level of competition increases [2].

Markets, depending on their size and prevailing instruments, can be categorized into local markets, national markets, international markets and transcontinental markets, as shown in table 1 [9]. The watershed relevant for this paper is the border between international and transcontinental market. The characteristic features of international gas markets are the volume of trade of several hundred billion cubic meters (bcm), which are supplied through pipeline as well as in the form of liquefied natural gas (LNG).

	National market (pipeline gas)	International market (pipeline gas and LNG)	Transcontinental market (pipeline gas and LNG)
Volume of trade	Dozens-hundreds bcm	Several hundred bcm	More than 1000 bcm
Institutional structure	National vertically-integrated companies (monopolies)	Bilateral intergovernmental agreements, cooperation of two national monopolies	Supranational integrated gas markets Multilateral contracts Transnational vertically-

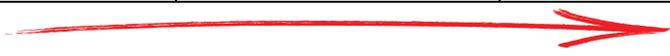
			integrated energy companies
Level of competition	Under certain conditions competition possible in the production segment	Competition between domestic production and imports	Competition between domestic production and numerous sources of import
Instruments for decreasing the transaction costs	National monopoly Direct state regulation of the energy industry and strategic planning Cost-plus pricing <b>Long-term contracts with take-or-pay clause</b>	National monopoly Direct state regulation of the energy industry and strategic planning <b>Netback pricing with oil products price indexation</b> <b>Long-term contracts with take-or-pay clause</b> Long-term bilateral intergovernmental agreements	Transnational <b>vertically-integrated</b> energy companies Multilateral international agreements <b>Netback pricing with alternative fuel price and spot price indexation</b> Exchanges of assets between the companies Consortia
Evolution			

Table 1. Gas markets evolution (Source: [9])

The market evolves through different stages. The increased trade volumes as well as increase in competitiveness accompany gas market evolution. Participants use different instruments at various stages of such evolution, one of the instruments is the pricing mechanism inherent to the gas sale contract. The basic drivers behind the process of market development can be divided into categories of market fundamentals (supply and demand) and existing market structure (regulatory framework, price competitiveness via pricing mechanism and contract structures); national energy strategies. Factors inherent to the market that can influence the pace of market development include infrastructure development (pipelines, LNG infrastructure, storage capacity) and regional processes (this category includes trading liquidity-targeted policies, transparency, environment-protection initiatives, taxes and subsidies etc.) External factors such as geopolitics, price developments (incl. other markets and alternative fuels), investment climate, technological development also have a strong impact on the process of market evolution.

Market integration is a matter of choice of the participants whose markets are involved. Their main motivators in favor of integration can be explained by international trade theory: trade in energy is important to allow diverging energy needs to be satisfied, as long as energy is freely traded and transported from one country to another. [1] The two essential aspects here are, firstly, physical infrastructure, and secondly, trade regulation (the rules of the game), both of which ideally should allow easier flows. At the same time, many considerations limit the ability of the market players to integrate – namely, considerations of political preference and independence and self-sufficiency. Moreover, gas is a network-bound commodity, and thus gas trade is associated with higher level of risks. The question is whether the development of infrastructure allows for gas to be less infrastructure-bound (more flexibility with LNG supplies). The volumes of LNG trade are expected to increase sharply after 2020, when new capacity comes on stream (expected to more than double compared to 2015 capacity). The role of LNG in linking the regions will remain key because although the share of pipeline supplies in international trade is higher than LNG, it is serving mostly intra-regional cross-border supplies. [3] Because risks are higher and have a political dimension, such forms of insurance as long-term contracts and asset exchanges are widely used for sales of both pipeline gas and LNG.

We can conclude at this point that there is no globally integrated gas market despite extensive interregional links. Looking at the projections, it also becomes evident that the regional dynamics will very much prevail. Integrated gas market means that prices are set competitively, and price signals are transmitted between the regions. Therefore, the price setting mechanism is really at the core of the gas market integration and is a fundamental instrument of balancing between producer and consumer (similarly to other instruments like long-term contracts, vertical integration, etc.) The extent to which LNG will be able to transform this situation will depend on how it is priced.

Preconditions for integration are there on the regional level (in terms of demand growth, supply availability, extension of trade links, energy policies), and even some fragments of instruments characteristic for a transcontinental markets are met (debate over the necessity to move to another pricing principle, asset exchanges between the companies, which, however, are still mostly national). One major obstacle is that the mechanism of interaction within the region is not determined.

## Overview of the pricing mechanisms worldwide

Pricing mechanism is ultimately a mechanism of interaction between producer and consumer; the format is determined by the historic development and trends on the first place. Asian market was developing based in the long-term contracts tied to the JCC – the Japanese oil products basket benchmark price. The idea came from a so-called Groningen-model – a long-term contract that had been developed in order to export gas from the Dutch Groningen field to the European countries.

Linking regional markets into one global market needs higher level of integration with competitive pricing and short-term (spot) trading.

Gas-on-gas competition does take the largest share in the international gas trade, but the increase in the share of competitive price formation mechanisms has slowed after 2010 (see Figure 3). However, what matters is the share of competitive pricing in international trade. Pipeline imports account for 19% of total consumption. Continued rise in gas-on-gas competition from 23% in 2005 to 39% in 2012, which has been at the expense of the oil price indexation category (primarily in Europe). The decline in oil price indexation has been partly offset by a switch from regulated pricing (CIS, Turkmenistan's supplies to China). At the same time, LNG imports make up only 9,5% of total world gas consumption. Gradual rise in competitive pricing for LNG from 13% in 2005 to 33% in 2012 (at the expense of the oil price indexation; growth in 2005-07 due to spot supplies to Asia) is still not sufficient to transform the international LNG markets into competitive. [8]

The core of consumption worldwide is domestically produced gas (72% of total consumption). General increase in gas-on-gas competition from 35% in 2005 to 43% was registered in 2010 (a small decline had followed in 2012 to 41,5%). [8] As can be seen from Figure 2, the world is not homogenous in the way the gas is priced.

These developments ultimately show that there is a limited basis for truly integrated global gas market. But since Asia will become increasingly important in terms of gas demand, would it be fair to expect this region to serve as the basis for global gas market integration?

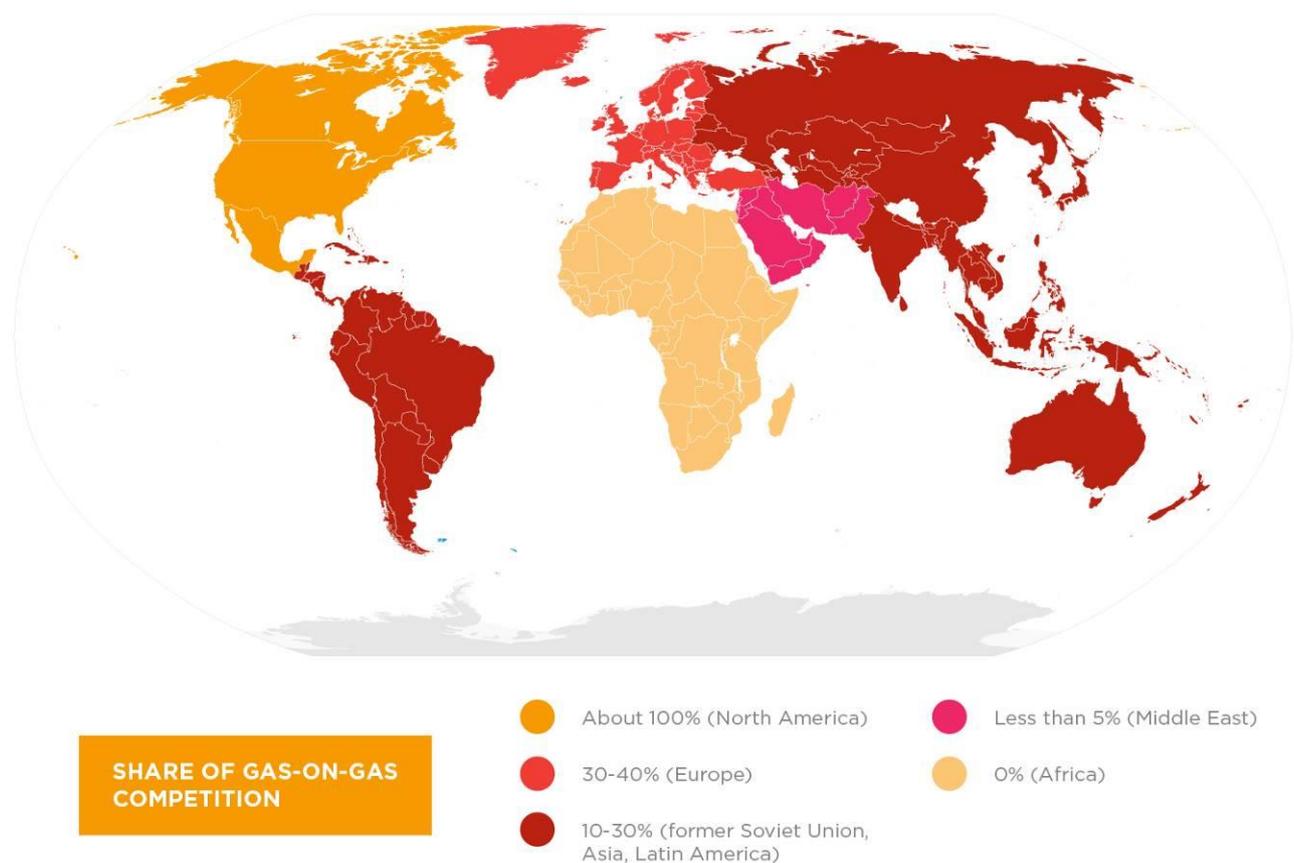


Figure 2. Share of gas-on-gas competition (Source: IGU, ERIRAS)

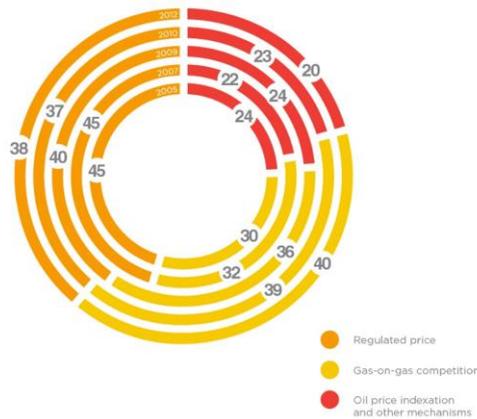


Figure 3. Overview of the pricing mechanisms worldwide, 2005-2012 (Source: IGU)

### Perspectives for pricing in Asia

Despite all expectations of increased interregional dynamics with the decrease in cost of LNG transport (‘LNG could link the regional markets’), the price developments have been divergent, as was already observed above. By 2040, however, considerable changes in the interregional dynamics are expected: many more supplies will be directed toward the Asia Pacific (including developed and developing Asia) while the role of the European market will decrease. Total primary energy consumption in developed and developing Asia is projected to increase from 5105 mtoe in 2010 to 8974 mtoe in 2040. Total world gas demand is projected to grow at 1,6% annually; this will allow it to remain the fastest growing out of all fossil fuels. Developing Asia will increase its gas demand by 4,2% annually in the period until 2040 (developed- only 0,6%). [3] What this means is that in terms of gas demand and gas trade, the market has a potential in turning into transcontinental.

In 2010 the largest market in terms of the volume of demand was Asia (developing and developed, see Figure 5), with major links served by means of LNG. Indigenous production to play the core role nevertheless (Figure 4). The largest additions in regasification capacity are expected in China and India. [6] New pipeline connections to Asia from the CIS will provide some 180 bcm of gas (which is more than current supplies from Russia to Europe, but sources of supply will of course include the Central Asian exports). [3] Asian demand will be met by increased imports of LNG from various regions and pipeline gas primarily from the CIS (Figure 6); the pipeline supplies will be handled under the long-term contracts (the two existing ones include Turkmenistan’s existing and Russia’s prospective supplies, both are indexed to oil product prices).

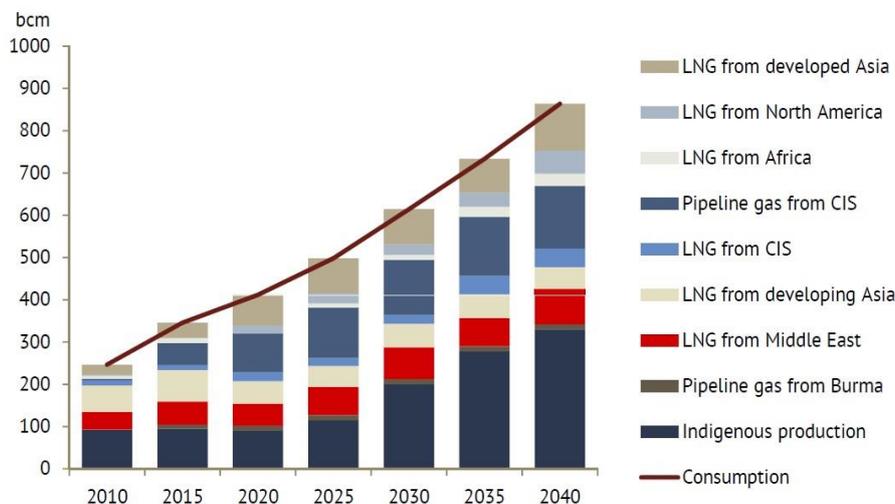


Figure 4. Gas balance in North-East Asia (Source: ERIRAS)

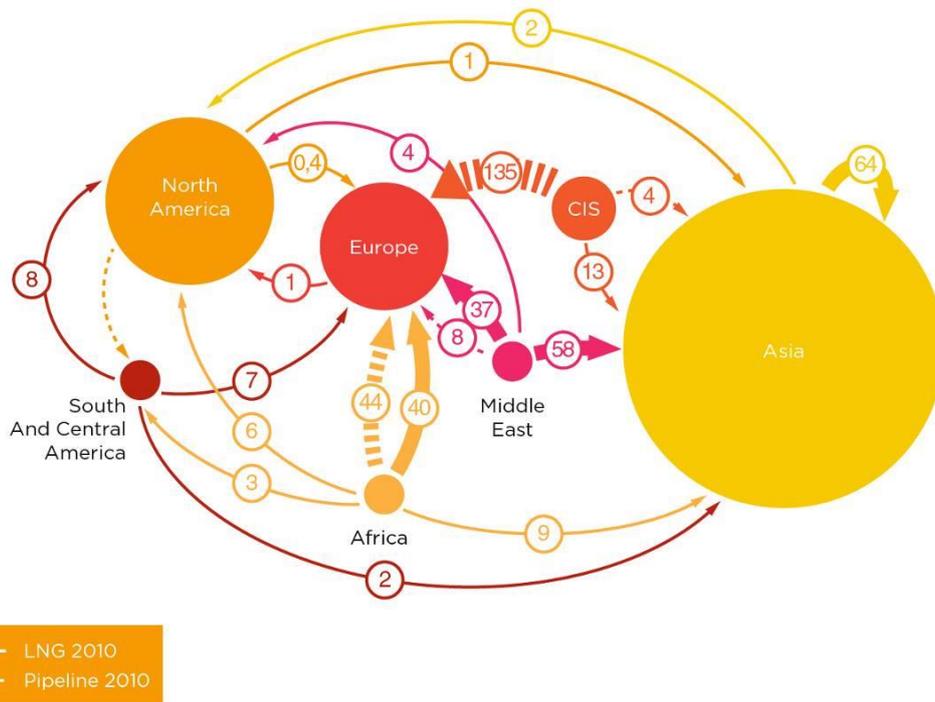


Figure 5. Interregional gas trade movements in 2010 (Source: ERIRAS)

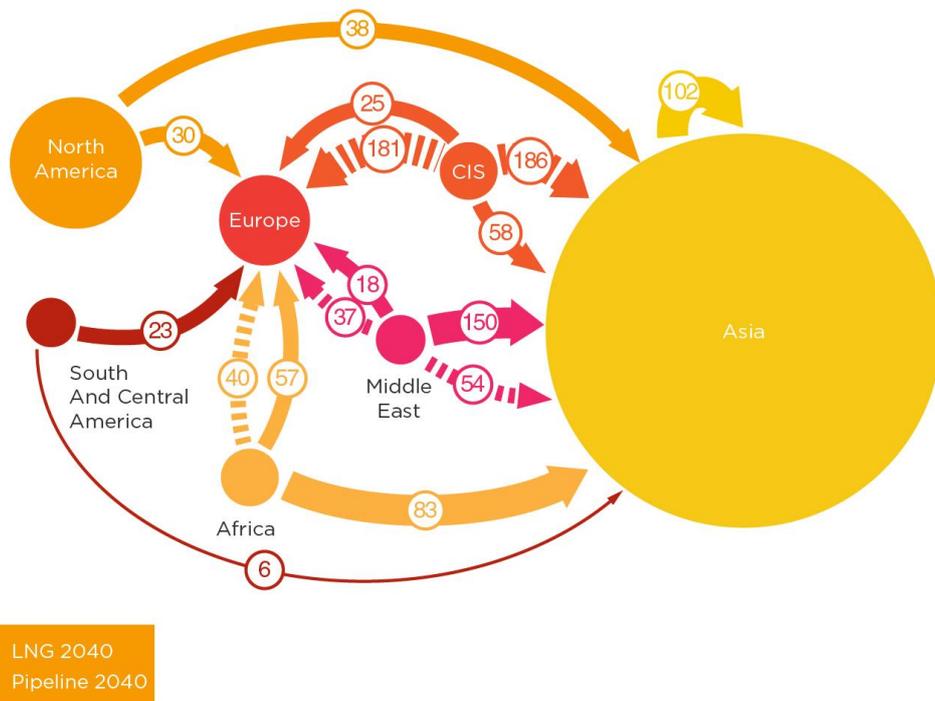


Figure 6. Interregional gas trade movements in 2040 (Source: ERIRAS)

This suggests that on the level of infrastructure, there is a possibility of further integration in the market in Asia. At the same time, in terms of market structure, it is not so clear how the trade mechanisms will evolve. The principle of

competition, which is the fundamental concept of the market, requires physical ability to arbitrage (a hub or a highly dense network of LNG supplies and flexible contract conditions). Both pipeline and LNG connections will be expanding in the region following the growth in demand and only limited ability to cover that growth with indigenous supplies. Although importantly, all new capacity – pipeline and LNG – is accompanied by long-term contracts, which as a matter of fact are indexed to traditional oil products basket. This fact alone postpones the horizon for higher share of competitive mechanisms for gas pricing in the Asia Pacific region further into medium-term.

For the global market this pretty much means that there will remain only limited possibility for price signal transmission between the regions. Indeed, according to the Russia and Global Energy Outlook Up to 2040, the divergence between the price levels in key regions will persist in the long-term (Figure 1). Therefore, the outlook for integration in the regional North-East Asian market, let alone the global gas market, remains limited even despite the fact that some instruments, which are characteristic for a transcontinental market, are already used in North-East Asia.

## Conclusion

The process of the change in gas pricing paradigm is a complicated one. Extensive change has taken place in the European market and there are expectations that Asia – the largest and the fastest growing gas market – will follow the direction of liberalization. However, the prospects of a regional hub in APR are rather doubtful due to the supply outlook (largely secured via long-term contracts in medium term); and there is a resulting uncertainty relating to the possibility of price signals transmission between the regional gas markets even in case of the start of new supplies, i.e. from North America.

The following factors are limiting the possibility for arbitrage:

- High transportation costs; different endowments with domestic gas resources; varying elasticity of gas demand prevent the consolidation of the single world gas price formation system.
- The growth in Asian demand will be supported largely by indigenous production.
- European demand will grow only marginally. With North America turning into a net exporter, the opportunity for linkage between the regions lessens compared to the 2000s.
- Supply secured via long-term contracts prevents spot trade from gaining a major role in short-to-medium term.

Although the factors for market integration are in place, the pricing mechanism is something that would not allow for a full-scale integration. Competitive pricing is one of the building blocks for the integrated market.

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