Natural Gas and its Status in the Energy Security of the European Union[1]

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Abstract

The paper analyses the status and importance of natural gas for the overall development of the world economy with application to the EU. It acknowledges that rapid depletion of all other energy sources represents a significant alternative, the disposable reserves of which might considerably contribute to satisfaction of energy needs in the EU. Authors examine major features determining economic utility of gas: structure and volume of extraction and consumption, specificities of its sales and pricing policy. They emphasize idiosyncrasies in crude oil trading as well as its ever stronger position in energy and heat production while regarding coordination of energy policy and strengthening the negotiating potential vis-à-vis major natural gas suppliers as the most effective way of satisfying the Union's energy needs.

Keywords: *energy market, energy security, European Union, globalization, governance and responsibility, industrial policy, natural gas*

JEL Classification: B30, D24, E22, F23

Introduction

History of the World economy development has been firmly associated with energy in all its forms and types. Its consumption has been constantly expanding and while previously linear, currently, especially in the last three years, the costs of its acquisition rise in a geometric series. Many theorists argue about its price saying: "There used to be enough of it and it used to be cheap; however, neither the first, nor the latter is and shall ever be true." The World Energy Council published

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a study about the world energy sector, in which it quantified at least 17 billion USD to be spent on its renovation and construction by 2030. Need for new capacities until such deadline is just in the EU estimated at 100,000 MW assuming impact on the environment should continually fall and GDP is meant to reach more than a double.

Unprecedented economic growth since the beginning of this millennium resulting in a price hike of energy sources demonstrated to what extent the world economy is tied to prices and security of supplies. In 2008 the price for a barrel of crude oil hit the level of USD 150, which was nearly four times more compared with 2003. Such trend "pulled" prices of other energy carriers, metals and agricultural commodities, too. Subsequently, along with the breakout of the mortgage crisis in the USA, the financial crisis in the eurozone as well as in Asia, and extensive dropouts in natural gas exports from Russia to the EU that followed, such trend decelerated. Forecasts of experts even envisage that overall economic recession with severe consequences may be expected in the coming 2 – 3 years even in the case of the Union's energy security.

Economic theories primarily focus on the impact of price discrepancies on the main macroeconomic indicators, such as inflation, employment or economic growth as a whole, when examining influence of energy media on the world economy development or progress of individual countries (Lisý a kol., 2005). A large body of research suggests that oil price fluctuations have considerable spread consequences on economic activities and the consequences of such fluctuations are to be different in countries importing or exporting such media. In order to put it simply: an oil or gas prices increase should be considered "good news for its net exporters and bad news for net importers". The reverse should be expected when the price decreases. The transmission mechanism, through which energy prices impact on economic activities, includes both, demand and supply channels. The supply-side effects are related to the fact that oil is a basic input in the major part of the production chain and consequently, an increase its price leads to a rise in total production costs. This may lead to a production decrease as such, too. Price changes also entail demand-side effects – mainly on consumption and investment. While consumption is affected indirectly through its positive relation to brutto income, the magnitude of this effect is, in turn, greater the more the price shock is perceived to be long lasting.

1. Position of Natural Gas in Energy Basket

Natural gas represents significant, but also an exhaustible energy source. Even though it will not take the lead among energy sources in the short run, it has increasingly become a competitive medium especially for petroleum extensively

enlarging the range of resources assuring energy sufficiency. Experts highlight that owing to its positive environmental characteristics as well as the currently estimated lifetime of its stock – for about two centuries – it stands for the most prospective and the relatively cheapest energy source up now. Its technological advantage rests mainly on the fact that it contains minimum of sulphur additions and has higher energy efficiency than crude oil or coal. Thus, less carbon dioxide is emitted in the burning process, which leads to considerably less solid waste or an extensive volume of produced emissions.[2] Currently, this makes it the most ideal source for electricity generation with a perspective in the transport sector, too. Advancing Earth warming initiated by the growing volume of emissions alike related consequences for the atmosphere, soil and water has already provided impetus for coordinated counter measures against the threat in question jeopardising the mankind (Cihelková, 2003).

Contrary to direct electricity generation from primary or alternative energy sources, natural gas may be stored and in terms of consumption flexibly adjusted to changing delivery requests. Moreover, its technological characteristics remain essentially unchanged during storage, so its distribution to final consumers does not incur higher-than-usual costs. Its additional favourable technological and utility-related characteristics are also important. Heat efficiency of gas appliances is 10 – 30% above the one of other fuels; alike, measuring its consumption is easy and accurate. This also enables its consumers to economize its use by measuring consumption Natural gas is mostly available on world markets in the form of a compressed (CNG – compressed natural gas)[3] or a liquid (LNG – liquid natural gas) medium. The fact that it is one of the most environment-friendly fuels having the most positive environmental impact in the burning process is further boosted by cogeneration.[4]

An important fact is that it is the gas-related part of the world energy market, which has seen the biggest growth. As demonstrated by IEA, global consumption of gas exceeded 2.7 billion m^3 in 2005 and is expected to go beyond a double by 2025. In line with its scenario, average energy consumption per year will grow by about 1.5 – 2% in the period above; yet, gas will outdo it by additional

[2] Burning of natural gas produces less than 50% of CO_2 compared with coal while maintaining equivalent energy output.

[3] CNG is used mainly in city buses and taxi cabs. No mechanical dust or smell and up to 80% less of harmful substances are produced during its exploitation. Vehicles concerned register a longer period of service and better operational parameters.

[4] It represents a progressive technology of heat and electricity generation based on the principle of combined production in a single technological process. Its central feature is a combustion engine with an electrical generator and an interchanger. This set-up facilitates parallel heat and electricity generation and ensures up to 40% of primary fuel savings while producing considerably fewer emissions in comparison with coal- or mazut-based production.

around 0.5 – 1.0% (IEA, 2007). There are several reasons for such accelerated growth; primarily, perhaps, the fact that shrinking petroleum stock invoking ever higher costs of maintaining the currently high level of extraction are naturally reflected in increasing production as well as consumption of all alternative types of fossil fuels. This is also mirrored in dislocation of new investments in the industrial segment in question. The majority of newly constructed European distribution networks is intended for gas transportation. As estimated lifetime of natural gas stock is three or four times higher than the one of crude oil, this fact is reasonable. Alike, serviceability of natural gas and crude oil pipelines – 50 – 80 years – determines also economic justification of their construction and real return of invested financial means. Share of individual countries on the production, consumption and proven stock of natural gas is in detail documented in Table 1. It determines that the structure of its producers and consumers is roughly similar, but – except for Russia – rather differentiated as far as its reserves are concerned.

T a b l e 1

Share of Certain Countries on Production, Reserves and Consumption of Natural Gas (2007, in %)

Nat. gas	Production		Reserves		Consumption	
1	Russia	20.6	Russia	25.2	USA	22.6
2	USA	18.8	Iran	15.7	Russia	15.0
3	Canada	6.2	Qatar	14.4	Iran	3.8
4	Iran	3.8	Saudi Arabia	4.0	Canada	3.2
5	Norway	3.0	UAE	3.4	Great Britain	3.1
6	Algeria	2.8	USA	3.4	Japan	3.1
7	Saudi Arabia	2.6	Nigeria	3.0	Germany	2.8
8	Great Britain	2.5	Venezuela	2.9	Italy	2.7
9	China	2.4	Algeria	2.5	Saudi Arabia	2.6
10	Indonesia	2.3	Iraq	1.8	China	2.3
1 – 5		**65.0**		**76.3**		**61.2**

Source: Adapted from BP Statistical Review of World Energy (2008).

2. Natural Gas Market Developments

Natural gas became increasingly important in energy balances internationally owing to the rocketing crude oil price during the 1973 – 1974 and 1978 – 1979 oil shocks. This led to rapidly growing demand for all alternative sources including natural gas. Therefore, revenues from sales of natural gas rose at a faster pace than the one of costs associated with its acquisition and transportation all over the period concerned (practically until 1986). This enabled it to bridge long distances efficiently and "networking" of new locations fostered construction of additional intercontinental natural gas pipelines. However, such heading remained limited essentially merely to the USA, the EU and former CMEA countries since 3/4 of natural gas consumers were located in these regions until mid-1980s. Ten

countries represented the market for 85% of world gas consumption. Even though large sites of natural gas concentration were not exploited for many years due to high transportation costs from remote locations, in economic terms it was rational for gas-producing countries with a functioning natural gas market to focus intensively on filling their own gas reserves. In this respect, it was proceeded with extraction from locations situated in extreme depths or in geologically complex structures or tough climatic conditions.

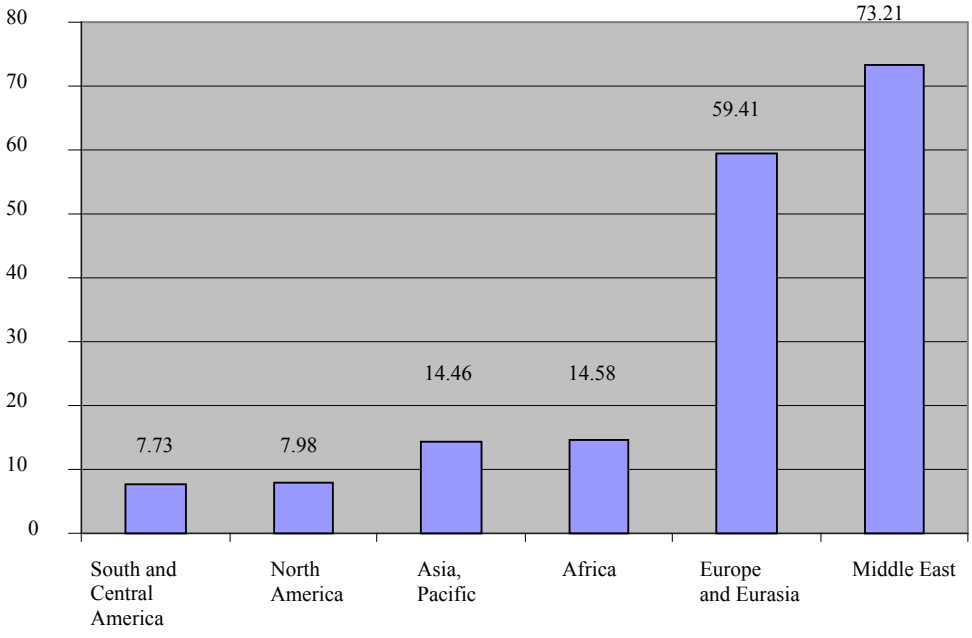
After 1985, the natural gas sector progressively reached a critical point of its development: energy markets were sufficiently saturated and crude oil prices saw a gradual – yet a fast – downward trend. It is obvious that natural gas markets and prices ended up under strong competitive pressure. Simultaneously, construction of projected intercontinental natural gas pipelines intended for natural gas supplies to other countries was delayed to a certain degree also owing to political developments, a call of producing countries for higher revenues alike soaring investments as a result of a longer period necessary for implementation of such projects. With respect to high transportation and distribution costs compared with crude oil it is evident that so far most natural gas has been exploited only on local markets of countries, in which it is produced and merely 15% are internationally traded, too. Considering the dramatic natural gas consumption increase from 6.5% per year to over 20% of the aggregate energy consumption between 1960 – 1980, it proved that it was not dependent from the upward trend of identified reserves dislocated close to potential markets at all. It originated in the generally higher energy demand in the period in question as well as in attractive prices vis-à-vis other energy carriers.

Position of natural gas in the world energy sector did not improve till the end of the last Millennium. It was the new one, which enhanced its position gradually again, particularly in line with the publication of several forecasts indicating limited lifetime of other energy sources. Apart from exceptional cases, experts agreed in discussions on the so-called Oil-Peak theory mentioned that the era of relatively cheap petroleum definitively terminated and covering demand by more expensive crude oil supplies from new oil fields will be temporary, too. Therefore, the key question this resource is confronted with is not the capacity of its reserves – many of them being distant from major markets – but whether they may be extracted to an adequate degree at affordable prices and for markets, on which it is competitive among other energy carriers in terms of price. It is primarily linked to a development strategy of Russia based on the intensifying dependence of the EU from its natural gas and crude oil supplies, construction of alternative transport corridors lowering transit revenues of many countries as well as the level and stability of its sales prices.

3. Natural Gas Reserves

Natural gas is one of the key energy phenomena and it increasingly becomes the "driving force" behind development of the entire world economy at the same time. Its irreplaceable nature earned it strategic importance for further development with regard to most countries in the world, particularly the developed industrialised countries (DICs). Its exclusive status ranks it prior to other energy sources because – contrary to others – it is the technically most environment-friendly catalyst of economic boom in territories with stock of this scarce commodity available. In spite of the oil shocks its share on world consumption remained at or below 15% for many years; yet, already in 1998 it participated in primary world energy sources by up to 24% growing further permanently. It is estimated that it reached the share of almost 28% in 2006 (Obadi, 2006).

F i g u r e 1
Proved Natural Gas Reserves – Regional Dislocation (2007, in trillion m^3)



Source: Adapted from BP Statistical Review of World Energy (2008).

World proven natural gas stock more than doubled during the past twenty years (1985 – 2005) even though data on its volume vary significantly. Out of such estimates of approx. 500 trillion m^3 of natural gas less than half of it is

economically exploitable, i.e. its extraction and transportation do not represent any technical obstacle, with its volume and lifetime rising year by year. While its static lifetime was around 38 years in 1970 and already 66 years in 1996, many experts claimed in late 2005 that despite accelerated natural gas consumption the volume of its economically exploitable stock is estimated for 180 – 220 years considering current consumption (Grosmann, 2001). This is also due to the fact that soaring crude oil prices facilitated lifting of the cost level considerably, so that extraction profitability went up even in those locations, in which it was deemed to be inefficient, while sparking interest of energy companies to search for additional sites of its concentration even in tough climatic or geological conditions. Major part of known natural gas locations is situated on the territory of the former Soviet Union (currently CIS) and in the Middle East. These two regions dispose of roughly two-thirds of natural gas stock. A special feature of natural gas extraction is also represented by the fact that only about four-fifths of produced natural gas is sold, and just around one-fourth out of it is exported. This is because a considerable part is re-injected, used for technological purposes or is subject to operational losses. Nevertheless, costs associated with the share of such extracted and consumed gas as a loss with no commercial effect need to be covered by the final price for gas sold as such. On the one hand, natural gas consumption is covered by own production in the respective regions subject to exceptions; on the other hand, however, it has a significant impact on countries lagging behind in economic terms, which are not able to compensate its shortage by higher efficiency of own economic development.

As one of the leading commodities of the aggregate world trade, it shapes extensively economic development of individual countries as well as that of the world economy as such. It may influence its dynamic progress, but also its unavoidable collapse or a crisis with long-lasting effects. On the one hand, it stands for a crucial export commodity; on the other hand, it intensifies energy dependence of countries importing it. Natural gas extraction and distribution have belonged to the most prestigious industrial branches so far even in spite of certain failures related to post-1985 fuel price drops. Yet, activities are rather concentrated as 70% of world production is controlled by merely eight major transnational corporations, out of which each reaches an annual turnover of over 100 billion USD. The U.S. has traditionally been the No. 1 consumer with its share of roughly one-quarter. In Europe, on the contrary, more natural gas is consumed than produced – except for the former Soviet Union (CIS), which has seen the opposite trend.

It is impossible to assess the importance of natural gas on the energy market and its future perspectives in the rapidly globalising world economy without a consideration of its stock as an integral part of the energy gas chain. It is decisive

for a long-term perspective of the gas industry as such. In the late 1960s, a view of natural gas merely in the position of a transitional energy source with anticipated fast depletion of its stock dominated; nonetheless, it may be assumed with a probability approaching certainty that natural gas may, indeed, become the fuel of the century. The main justification reasoning this statement is represented by proven natural gas reserves depicted more in detail in Table 2.

T a b l e 2

Dislocation of Estimated and Proven Natural Gas Sources in the World (trillion m^3, 2000)

	Estimated Natural Gas Reserves	Proven Natural Gas Reserves
North America	81.5	6.7
South America	9.6	8.2
Europe	7.4	8.2
Africa	7.4	11.8
Middle East	83.3	58.7
CIS	101	56
Asia/Australia	56.8	15
Total	**347**	**164.4**

Source: Adapted from <http://zemniplyn.cz/zasoby>; CEDIGAZ, 2001.

4. Natural Gas Pricing

Relatively high natural gas prices reflect the reality that business in the sector concerned is capital-intensive and also rather risky. Considerable initial costs associated with doing business in the sector in question and availability of funds derived from a guarantee of natural gas pipeline exploitation for at least 25 – 30 years are efficient only if long-term contracts with major consumers as well as exclusive rights of natural gas supplies from its producers are ensured. Substantial capital intensity naturally led to high monopolisation of the sector concerned in the long run. Merely such enterprises were able to make adequate profit continuously and, in doing so, to cover high initial costs – mostly provided that consumer markets lacked regulation, which enabled them to pursue higher final prices than those charged on a regulated market. Many economies absorbed these higher prices ensuring higher profit to the entire gas industry in the long run since consumer countries, thus, gained an obvious advantage owing to diversification of energy supplies and, subsequently, fostered their energy security. This often had a favourable impact not just on expansion of business activities including FDI inflow, but, ultimately, also e.g. overall atmosphere in the society. For many years lower tax rates applied to natural gas consumption were in place so as to boost the status of natural gas, etc.

Worldwide substantial proportion of natural gas is traditionally used for heating and in the case of the USA for air conditioning and ice production, too. This fact determines high dependence of its consumption on atmospheric temperature and its annual tendencies. Reservoirs facilitate ongoing balance and they play an important role in terms of natural gas price level stabilisation on world markets. Because there are not enough of such reservoirs on average – or they are asymmetrically dislocated and are not available in major natural gas consumption centres – its producers seeking balanced consumption attempt to achieve it through a pricing policy. Natural gas price will be either fixed on the world market or it will be derived from the level agreed-upon in long-term contracts and agreements in the end; yet, it may differ from the market price, which logically ultimately more or less reflects the costs associated with its commercial use. The "take or pay" pricing policy mentioned earlier has been applied on the European market in the long run as an integral part of most long-term contracts. Regarding a breakdown of costs, transportation (up to 60%) and processing of extracted natural gas (up to 30%) stand for the biggest costs involved. Such ratio is clearly just informative since e.g. in the cases of extraction from the seabed it may be the opposite.

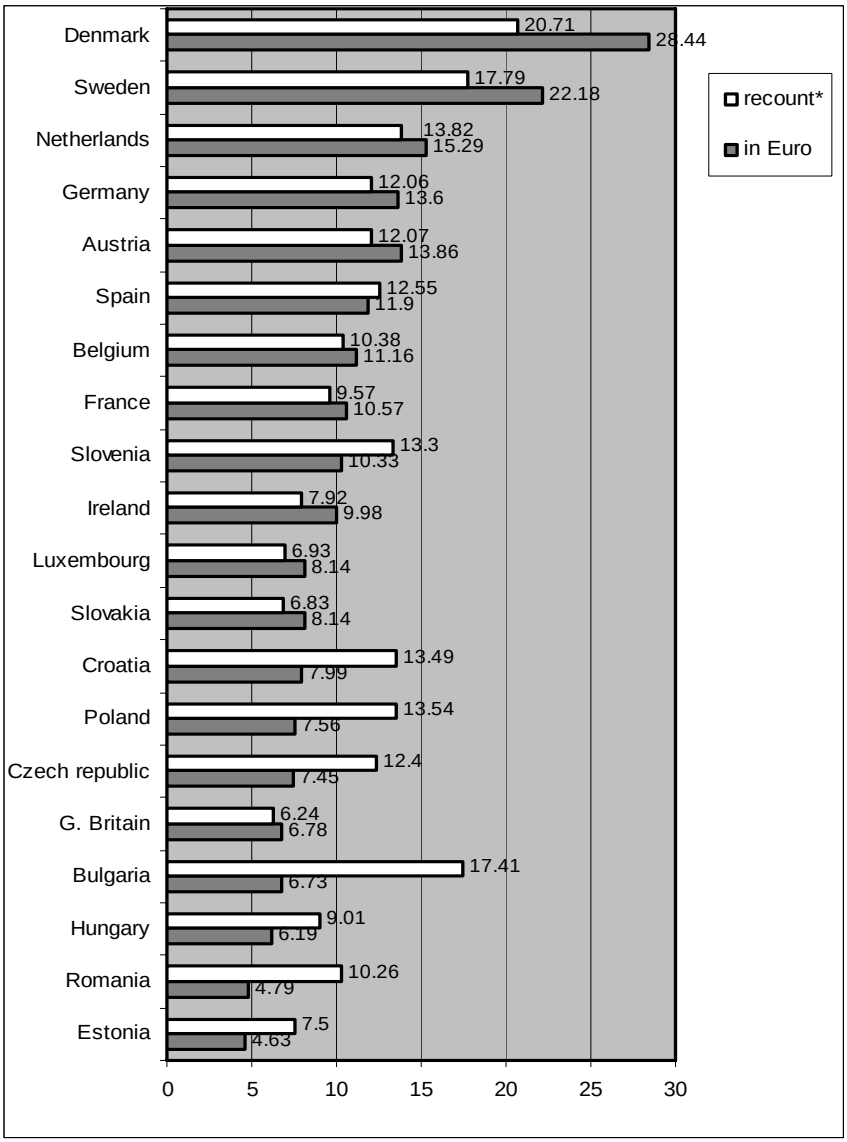
There are basically two approaches to natural gas pricing with respect to consumer prices:

- The "cost plus" system, where the cost-based price is adjusted in line with market developments; and
- The "market replacement value"/netback system, where market value resulting from replacement of a different energy source by natural gas is to be determined. In doing so, effects related to natural gas (i.e. price-dependent effects such as efficiency and those price-independent ones like lower investment and operational costs) are added to the price of a competitive fuel. In principle, certain proportion of the price of lighter or heavier coal used for heating was incorporated into the initial price so as to ensure a link to prices of other fuels.

In order to maintain the real price level with regard to natural gas sales even in the case of long-term contracts, prices are subject to the so-called escalation. Hence, escalation pricing is applied, facilitating simple economic and trade-related interpretation if natural gas prices are connected with prices of competitive fuels. Pricing parameters shape the degree of absolute price change vis-à-vis competitive energy; such approach considers inflation, too.[5] Natural gas prices are usually linked to price quotation of lighter and heavier furnace oils. In Europe prices are quoted in Amsterdam, London and Wiesbaden.

[5] In principle, at certain point of time initial price was calculated as an aggregate of the base price (P_0) + 0.6 (price of light fired oil) + 0.4 (price of heavy fired oil). In some countries even average coal price (the Czech Republic), etc. was incorporated into the formula above (author's comment).

F i g u r e 2
Gas Prices in the EU (2006, in Euro/Gigajoul of energy, the prices charged for households with consumption up to 83,70 GJ/year)



Note: *Recount on PPS unit based on purchasing power parity. Observing different prices in particular countries, used for comparison of particular states. For instance – Austrian consumers pay for natural gas 13,36 Euro and the Czech 7,49 Euro. Concerning different prices and incomes in both countries, Austrian pay less than the Czech ones.

Source: Eurostat (2006): Gas Prices by Type of User. Available at: <http://epp.eurostat.ec.europa.eu>.

Ultimately, price resulting either from long-term contracts or based on the one available on the natural gas spot market is applied with regard to natural gas sales. Spot market for natural gas is formed in Europe already in several virtual

trading centres, in which prices of short physical or the so-called virtual deals are quoted, such as the National balancing point (NBP) in Great Britain and Zeerbrugge (ZBP) in continental Belgium. Share of deals concluded in the centres above represents merely a small proportion of aggregate natural gas trading in Europe because e.g. natural gas prices were up to 400% higher in 2006 compared with the so-called long-term contracts due to acute shortage of natural gas on the British market. Despite that both BNP and ZBP are of major importance as it is permanently possible to monitor market developments, to shape its volatility or to refer to them in benchmark analyses, etc.

Developments in the world economy in the coming decade will most likely proceed towards attempts to sustain high rates of economic growth, which will continue to be fostered by accelerated activities of industrialising countries headed by China and India. It is anticipated that also the pace of growing energy consumption is to advance by about 5 – 7% per year in the group of industrialised countries under otherwise unchanged conditions; still, simultaneously increased coverage of the consumption in question using appropriate domestic sources mainly in China will be registered, too. Even though most of DICs permanently lower their unit consumption of practically all energy types, this process lags behind GDP growth. Therefore, if energy price and its availability are maintained on current level, aggregate energy consumption will rise further in this territory, too.

Overall consumption trends on the world energy market will be affected by several traditional as well as new factors. Fuel prices reflecting the ever increasing level of standardised acquisition costs and the level of risk initiated by several external factors with impact on continuity and availability of energy sources will continue to enjoy their dominant position. In addition, individual strategic approaches pursued by major energy consumers and fluctuations on world commodity exchanges are at stake. Final price continues to be an important factor related to expected developments on the energy market. As seen in 2007, the world market was able to absorb energy prices applied to the crude oil equivalent below the level of 90 – 110 USD with no major problems (Baláž, 2008). This may be justified by the fact that production in DICs is increasingly oriented on mass production with high added value and declining energy consumption. Moreover, income of the population in the countries concerned facilitates coverage of even such high energy prices free of any major political or economic problems. Currently applied total tax rate of approx. 50 – 60% in the EU with regard to sales of petrol, kerosene and diesel, which constitute more than half of fuel consumption, enable the existing fiscal system to refund energy costs even to low-income groups and, hence, maintain certain social consensus or political reconciliation.

Additionally, more developed countries – particularly DICs – began to lower their production of consumer as well as other energy-intensive goods at a fast pace as a result of own deep-rooted structural changes and to import them from countries, which are in the position to reduce or completely eliminate domestic energy-related expenditures (electrical engineering, services) due to their application of own comparative costs (predominantly cheap labour force) instead. Such imports originate in fast-industrialising countries – chiefly China and India referred to earlier – which finance extensive purchases of new technologies on the basis of their incredible self-motivation and fast-growing export of produce with lower added value; in doing so, they increasingly succeed in upgrading towards higher "levels" of technological development. It is technological development that makes it possible for them to proceed to ever higher added value and to eliminate risks associated with high prices of energy inputs to a great extent (Cihelková, 2003; Obadi, 2006).

Predictions of developments on world natural gas markets (and generally energy markets as such) indicate that high energy prices are most likely to persist forever. This will, nevertheless, mean that even regional classification of countries will be rather oriented on the fact if they are able to finance relevant energy prices (and, thus, sustain their economic growth or not) instead of which group of economic development they belong to. Such choice will probably become definite (provided no breakthrough discoveries in the field of alternative energy sources occur) and opportunities for "shifts" between the two groups will be rather limited.

5. Energy Strategy of EU and the Perspectives of the Natural Gas

In general, there are several reasons why it is natural gas that should play a bigger role in energy strategy of EU. Utility-related and ecological qualities facilitate its universal use for heat and energy generation from minor output up to major industrial resources. Natural gas enjoys exceptional status among fossil fuels as it is the most environment-friendly primary source, which may be transported directly to the final consumer free of any technological adjustments, modifications or cleansing and it is available in a relatively sufficient volume. This predetermines natural gas for universal use just like for replacement of petroleum after 2010 owing to declining crude oil extraction, unfavourable petroleum price developments and acceleration of technology related to engines powered by natural gas in road and inland water transport. Currently rather high costs associated with natural gas transportation (particularly as LNG) will be more efficient than in the case of crude oil in the future since the lifetime of sites of

natural gas concentration – unlike crude oil fields – will be considerably longer than the average period of service of transport corridors and fuel prices will continue to rise (USGS, 2005).

Several analyses show that natural gas consumption is to double and reach almost 5 billion m^3 by 2030 in consequence of the reasons above. Coverage of such high demand will incur additional immense investment assessed by e.g. the IEA up to nearly 100 billion. USD/year. It is estimated that natural gas will be made use of in case of over one-third of electricity generated worldwide (compared with 15% in 2002) (World Energy Council, 2005). Developments on world energy markets demonstrate that the status of natural gas has not reflected its economic prerequisites and qualities of technical and technological nature appropriately yet. This is chiefly due to the fact that while the biggest share of crude oil is transported along traditional routing to previously built networks of refineries, a more extensive use of natural gas mostly incurs high costs associated with new investments. It may be seen that also the "algorithm" of changes on world natural gas markets is rather complex and rests on many different links from its extraction, through its transportation to its final consumption. On the one hand, dislocation of extraction from new fields, which is not identical with its main consumption centres as in the case of crude oil, results in endeavours of several countries to diversify available energy sources and minimise their dependence from its imports; on the other hand, long-term economic growth in the world – even though differentiated in terms of geography and rate – continues to be subject to availability of energy sources with less negative impact on the environment and lower risk associated with their exploitation.

T a b l e 3

Future Fuel Consumption in the EU (as % of Total Energy Consumption)

Energy Carriers	% of Total Consumption	
	2000	2030
Renewable sources	5.8	12.2
Nuclear	14.4	11.1
Solid fuel	18.5	15.5
Natural gas	**22.8**	**27.3**
Oil	38.4	33.8

Source: Baláž (2008), p. 225.

In 2006, natural gas participated by less than 30% on world energy consumption; nonetheless, its major part was allocated in countries, where it is extracted or it was possible to transport it through continental product pipelines. The fact that approximately 2/3 of its stock is located in Eastern Russia, Iran and Qatar, i.e. in locations remote from its main consumption centres, makes transportation

of liquid gas the most accessible. This will, however, require additional construction of new export LNG terminals in countries situated in principle in areas of fragile political stability; acquisition of specialised transport tankers; and, subsequently, building of re-gasification terminals aimed at re-gasification of LNG as well as its transportation through a network of standard natural gas pipelines to the destination of final consumption. There are about ten such terminals in the EU and ten in the USA and they have been adjusted particularly to imports mainly from Qatar, Algeria and Libya, but also from Indonesia and Malaysia.

Decisions concerning perspectives and exploitation of nuclear energy in the EU energy policy will become an integral part of the natural gas issue, too. Both, nuclear energy and natural gas are the most ecological energy sources and locations as well as production of fuel for nuclear power plants are mostly situated in politically more stable countries. Additionally, in terms of their technology their operation leads to the lowest energy price, machinery and equipment are manufactured prevailingly in Russia, France and the USA and fuel supplies do not entail such risks (price- or delivery-related) as in the case of natural gas. Yet, eventual activation of "nucleus" exploitation will in no case lead to considerably shrinking importance of natural gas also because natural gas turbines are two- to four-times cheaper and – contrary to nuclear power plants – may serve efficiently as standby sources of the so-called peak energy; hence, they are in a tightly complementary relation with respect to their operation. Its significance is also derived from the fact that efficient exploitation depends on dislocation of its fields and routing and only if such effects are not available, possibilities of nuclear energy use are searched for. The reality that almost 4/5 of natural gas from new locations are used for electricity generation and, concurrently, a pressure for a more efficient exploitation of coal will initiate a conversion of coal-fired existing thermal power stations to burning of natural gas predominantly in EU. This will be one of the ways for the community to be able to "comply" with its international ecological commitments.

Definitely not a minor role will be played by natural gas power stations also in line with exploitation of certain alternative energy sources, e.g. solar power plants or wind turbines will be able to generate some electricity; still, reliability of such supplies will depend not only on the season of the year or interval of the day, but also on trends in climatic conditions, etc. This largely intensifies the risks stemming from "networking" of such sources into the standard energy structure as the guarantee of such supplies depends on various external factors. Also in this case natural gas turbines will symbolise the single backup source able to cushion such dropouts probably for a long time even though incurred costs will certain exceed those related to other long-term energy sources.

Conclusion

The developments in the world economy underwent fundamental changes with escalating intensity during the past three decades. Globalisation tendencies underestimated particularly on the European continent for a long time are their key medium and they promptly penetrate all aspects of business activity. Simultaneously, they foster endeavour of individual countries or their groups aimed at ensuring own competitiveness. This is, in principle, in economic terms feasible merely at the expense of own competitors. The entire globalisation process namely constantly accelerates while the room for manoeuvring as well as time needed for successful adaptation keeps shrinking. In this context, a few traditional and new factors gain momentum. Firstly, energy with all its attributes and links connecting it with the business world as well as the existing social, political and framework setting in individual national economies as such remains decisive. In this context experts often point out at occurrence of a "decompression in terms of time and space", which intensifies the imperative related to quality and timeliness of adaptation processes of business entities and national economies striving to sustain or boost own competitiveness in the international arena fundamentally (Seba, 1998; Workie a kol., 2006).

European energy policy is currently extraordinarily influenced by global political and economic tendencies and fulfilment of ambitions of individual Member States. Strategic energy stock is namely concentrated in a few countries and dependence on imports strengthens more and more. If the EU is not in the position to ensure sufficient quantity of energy from domestic sources and to reinforce its competitiveness in terms of price, it will need to cover roughly three-quarters of its energy demand from imports over the following two to three decades. It is not just energy demand, which grows worldwide, but also its price – particularly in the case of crude oil and natural gas. It may be seen that the process in question will probably become permanent so that it may necessitate drafting alternative programmes of energy acquisition soon and accelerated construction of new investment projects in this sphere as well (EC Green Paper, 2000).

Apart from economic and ecological issues, uneven regional distribution of sources of fuels and their differentiated consumption trigger far-reaching geopolitical threats. A realistic approach to their appeasement may not omit any individual opportunity provided by location of each country, its own sources, available technology or the ability to save some of them. There is no solution without respecting factors shaping real environment for efficient exploitation of all alternative energy sources either. In the Central European region an approach respecting an appropriate mix of coal- and nucleus-based sources with natural gas, reasonable support to renewable sources and a universal focus on saving energy as well as materials may prove to be the most efficient one. Adoption of a new

energy-related doctrine that the Union has focused on over a longer period with its subsequent incorporation into national strategic plans is, still, merely an initial measure, which will just minimise, but not eliminate, strengthening risks. No other feasible solution seems to be available in the EU, which is not and will not be self-sufficient in terms of energy supplies, considering the current compendium of knowledge and mastering energy-producing technologies.

The European energy strategy – even though not definitely formulated and, thus, not pursued as a jointly adopted doctrine yet – is in a rather unfavourable "starting position". Therefore, its heading will be also complicated because it will need to provide such conditions for uniting opinions across EU-27, which are essential to be observed not only within the Community, but also externally mainly on the side of key suppliers of energy media. Sources of petroleum and most own fossil fuels will be depleted by 2050 at the latest so that it will depend much more on a prompt identification of new alternatives. Moreover, the remaining sources will be probably so expensive that even their most efficient exploitation possible will exceed current prices of natural gas or black coal by far. Estimates acknowledge that in 2005 energy consumption was by 20% higher than it was economically justifiable. Hence, there is a considerable potential resting on local savings. Their absolute value is estimated to reach 5 – 10 billion. Euro on a yearly basis and its exploitation is equivalent to over 200 mil. tonnes of petroleum (HN, 2006).

Having adopted an action plan at the end of 2006, besides the generally pursued target to accomplish energy savings of 20% in the EU by 2020 the European Commission (EC) outlined a road map indicating what measures it aims to implement year by year in order to meet this objective. Total savings potential was determined e.g. in housing at 27%; in non-residential premises at 30%; and in industrial production at 25%. In addition, it claims a share of 25% on renewable sources even without reflecting differentiated conditions and real possibilities of individual Member States to meet such goal (Geussová, 2007; Grossman, 2001). The European energy market, however, disposes of additional internal potential reserves. New directives of the European Commission foster development of a mechanism targeted at abolishing barriers impeding overall progress of a functioning and competitive market with energy-saving measures. Initially, certain form of subsidies and government programmes is anticipated before commercial principles are in place. Liberalisation of the energy market, energy audits, technical and technological measures and energy-oriented management might result in annual savings of at least 1% and of at least 1.5% per year in the public sector.

Dynamic growth of the world economy and its major territorial segments lasting for nearly a decade experienced initial noticeable economic disturbances since the second half of 2007; a little less than a year later they gained momentum.

Initially more or less isolated critical symptoms were accompanied by a series of bankrupts and since September of 2008, insolvency of U.S. investment markets and gradually the slow-down of the euro zone economic growth, too. It is likely that the world energy sector – regardless of the fact whether the financial crisis will come to an end swiftly or will last longer – will experience colossal changes in the coming decades. Perhaps, many of them will not seem rational at the first glance and their efficiency will be hardly comparable with traditional alternatives. What matters, however, is the end effect, i.e. the ability to ensure sufficient energy for this planet under terms, which will not destroy the atmosphere and trigger an economic catastrophe as a secondary effect.

Currently, there are several scenarios concerning how developments on the European energy markets will be shaped. The question which one will ultimately materialise is a challenge for experts and national governments. Paradoxically, it may be stated that low prices of oil and gas will not help the world economy and at least in the short run they will be a sign of its weakness and limited success in coping with the impact of the financial crisis alike. They also bring about some changes that seem positive at first glance. As a matter of fact, e.g. the price of oil dropped to 30 % of its July 2008 level. The prices of the gas are dropping more slowly, because of accepting the different system of price creating. It might seem logical that the reduction of transport costs and fuel prices for consumers will provide an additional impetus for demand and revitalize certain elements of the world economy "lagging behind". Nonetheless, it appears that even despite this fact that it is not only consumption, which plummets, but also sales of all kinds of means of transport and other industrial production, too.

The critical challenge for present times is where to start. D. Yergin emphasizes: "First, we have to find a common vocabulary for energy security. This nation has radically different meaning for different people. For Americans it is a geopolitical question. For the Europeans right now it is very much focused on the dependence on imported natural gas." (Yergin, 2006) The so called "gas crisis" which erupted because of transport conflict between Ukraine a Russia in January 2009 disturbed the export of the gas to the traditional European partners, including Slovakia. However the conflict was closed, it was an important example of the risk position and increasing interdependency of EU on import these row materials from Russian resources. This situation evocates one reason more for the very serious discussion about the Future of the European energy security system.

It is likely that the world energy sector will experience colossal changes in the coming decades. It will be important how successful will be the globalised world economy by the liquidation of the consequences from the present economic crisis. Perhaps, many of the changes will not seem rational at the first glance and their

efficiency will be hardly comparable with traditional alternatives. What matters, however, is the end effect, i.e. the ability to ensure sufficient energy for this planet under terms, which will not destroy the atmosphere and trigger an economic catastrophe as a secondary effect. The critical challenge for present times is where to start. D. Yergin emphasizes: "First, we have to find a common vocabulary for energy security. This nation has radically different meaning for different people. For Americans it is a geopolitical question. For the Europeans right now it is very much focused on the dependence on imported natural gas." (Yergin, 2006)

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