WORLD ENERGY RESOURCES: OIL, NATURAL GAS

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Abstract

Oil becomes the central topic of the commodity markets. How is it possible that its prices reached such a high level? Whether we like it or not, every price is given by the demand and supply, and oil is no exception to the rule. During the last years, the consumption of some of the developing economies has increased considerably, lead by China. That exceeds even Japan in the "black gold" consumption and become the second one on the world ladder behind the USA.

Key words: oil, natural gas, producers, consumers, world stocks

OIL

The war with the world terrorism is in full progress and oil can be without exaggeration compared to the developed economies blood. An attack at something as important as this can bring about considerable damages and that is precisely the aim of terrorists. Therefore, many countries including the USA and China decided to increase their strategic reserves for the case of the supply stoppage Interesting is that the present strong rate of the oil prices increase was started at the same time as the U.S. purchases for strategic reserves. Alas, the other countries do not publish their statistics. World demand for oil is growing notwithstanding the price development. While in 1996 it was slightly over 70 million barrels per day, this year the world demand should be, according to the estimates, 82 million barrels per day. Nobody expects any changes of this trend as yet.

All is centre around the fact that oil cannot be produced and that its stocks are limited. To get it becomes still more complicated and expensive. We can hear about the OPEC even if it supplies only about one third of the world supply to the market. Everybody hopes that the oil sheiks are the ones responsible for the high oil prices as they are not fully opening the taps. However, it is obvious that the oil mining proceeds at the full speed and the only country proclaiming that it still has reserves is the Saudi Arabia. However, the majority of the market actors do not believe it because if it were so the reserves would already be in use. Historically, the Saudi Arabia as an USA ally always created a balance between the Western and the Islamic world.

The oil price might seem high but it is not really so. In 1981, the average price was 31.77 USD per barrel and you could buy an average house for 83 ths USD. In 2003, the price of the house was already 246 300 USD, but the oil price was still on the level of 30 USD, while compared to the price of house it should be sold at the price of 95 USD. Therefore, we have to learn living with the high oil prices as it will probably never fall down to 20 USD again.

Moreover, some of the long-term forecast is warning that the historical end of oil mining is approaching – it is supposed to come in 2010. With this, there also correspond the warnings of the Saudi administration that the OPEC will not be able to cover the demand of the West after the next 10–15 years. The U.S. Energy information Agency (EIA) counts with the increase of demand by 2025 by 44 million barrels per day compared to the present level. From the OPEC, the EIA expects to cover the increased demand by more than half (i.e. by 25 million barrels per day). However, the numbers of the newly discovered oil reserves is decreasing (IEA/OECD 2004a, b).

Does it mean that the end of the oil age is coming to its end? The experts agree on the opposite opinion. The high prices motivate oil mining companies to invest into the extension of mining. New technologies allow for a higher yield from the existing sources and make cheaper the utilisation of the resources hitherto regarded as economically inefficient (EC 2004, IEA/OECD 2004c).

The immediate utilisation of these technologies is prevented by low investments into the research and building of new mining capacities in t he last decade when the oil prices were down at the level under 20 USD per barrel. According to the International Agency, the mining companies have to invest 3 000 billion US until 2030 to be able to cover the growing demand and to replace the sources at the end of their capacity.

At the high price expectations, these numbers need not be regarded as unreal. The oil concerns estimate that the oil prices should fluctuate around the level of 40 USD per barrel in future and the EIA forecast is that the common price in 2025 will be 51 USD per barrel.

Smaller companies and the state monopolies are rather more active in the new more expensive technologies utilisation; the international oil mining giants are rather more conservative. Certain exceptions are the Chevron Texaco and the Conovo Phillips which are, according to the International Agency estimates, going to increase their investments even by 15%.

This investment boom will reflect by an increased mining output only by the 2010. The Cambridge Energy Research Associates study counts with the fact that the

new oil fields could increase the present mining capacity by 15% up to the 101.1 million barrels per day. The supply would then exceed demand by 7 million barrels per day and the pressure on price increase should thus be weakened to a certain extent.

Nobody is yet able to estimate for how long this investment activity might last. The OECD studies on the oil prices development comment that the decisive role will probably be played by the behaviour of the Persian Gulf states and the OPEC. The Saudi Arabia, Kuwait and the Arab Emirates are hording the oil reserves which will be fully exploited after many decades. The interest of these states is according to the OECD to keep the oil price at such a level that their profits are sufficient and at the same time would not motivate the firms to invest into energy saving technologies or alternative energy production. On the contrary, the other cartel members prefer high prices and therefore high profits at present as their resources are about to be finished relatively soon. If the Persian Gulf trio is able to persuade the remaining OPEC members on the necessity to increase the production and decrease prices, this might curb the will of the private firms to invest high sums into the new fields. However, the OPEC can dissuade them also if it does not reach the agreement on the unified policy and the oil prices will therefore become unstable in the long term.

In finding and mining of new resources, the firms are supported by the accelerated development of new technologies, starting from computer programs enabling to better depict and analyse the conditions under the Earth surface and enabling the geologians to reveal the hidden oil reserves they had hitherto no idea about, up to the new mining technologies.

Basically, there are utilised two methods of oil mining: either the hot steam is pushed into the oil deposit, which thaws the solid oil and allows for its mining to the surface, or the sand is mined together with the oil, transported to the processing plants and there separated.

Namely with the steam method, it is necessary to estimate to where will the dissolved oil flow and create a lake suitable for drawing. There emerged a new program Intersect in the market which enables to forecast the flow of the raw material in the strata with a high level of probability. The mining firms hope this will further decrease the mining costs. These reached at the beginning of the Canadian oil sands utilisation at the beginning of the 70s 10–19 USD per barrel according to the locality and technology used. The Canadian government expects that by 2015, the mining in Alberta will thus increase from 600 ths barrels per day in 2000 to 2.2 million barrels.

A great progress in the oil mining history was represented by the sea mining. In 1978, the highest possible depth for mining bases was 300 metres beneath the sea surface. At present, the deepest supramarine drillings are at the depth of about 2 kilometres. The World Council for Energy estimates that during the next 5–10 years, new technologies will allow for drilling at the depth of 3 kilometres. Moreover, better techniques and technologies make the supramarine drilling still cheaper. The hitherto very costly drillings in the Mexico Gulf now produce oil at the costs of 10 USD per barrel.

New technologies also open for commercial utilisation also the non-conventional resources which hitherto were left in the margin of the oil mining companies' interest. The highest expectations are connected with the rich stocks in the so-called oil sands of the Canadian province Alberta. There, about 178 billion barrels of oil are still hidden, what makes Canada the country with the world second biggest stocks in the world. However, the oil from these stocks is too solid to be mined by the classical technologies.

Therefore, the experts agree that the oil stocks are sufficient and the dawn of its mining is not to be seen in the near future. The break might be brought about perhaps only by the unforeseen long term price growth. If the prices fluctuated above 85 USD per barrel in the long term, it might completely put both the production and consumption off the track Even then the alternative energy resources would come really forward. Such a price level is still very far away, however, and hardly anybody believes that such a situation would really occur in the near future.

At the end of the 90s of the 20 century, the Brent oil price per barrel was less than 10 USD – at present it is about six times higher and there are no signs that it should decrease again – just the opposite.

The price development has nothing to do with the oil reserves. Much more probably it is a delayed reflection of the oil crises of the 70s.

Fret the bitter experiences with the Arab countries embargo, the state as well as private companies from developed countries pumped investments into the research and mining – that is, with the exception of the main producer countries. Te consequence was overproduction and the price under the level ensuring the usual profits for both miners and processors, which did not support further investment.

These returns as a boomerang at present – the oil stocks are sufficient but the mining and processing capacities are missing. Even if there are new massive investments at present, their impact will be seen at the earliest in the horizon of 10–15 years.

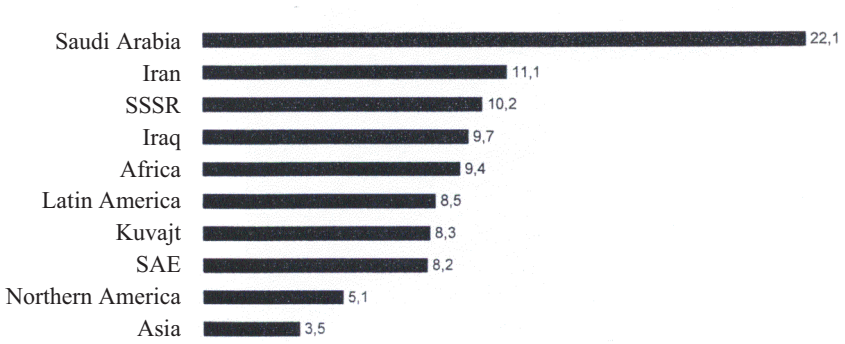
The present oil prices are influenced by the collusion of several circumstances which basically have little to do with the oil itself. First, it is the unstable political and security situation in the main producer countries, namely at the Near East.

The further reason is the fact that he North Sea oil is reaching the end of its stocks and the former producers, like Great Britain, become importers.

Third, and probably most important factor, is the growing consumption in the main developing economies, namely in China and India. China is only now creating its strategic reserves what draws further on the produced amounts. The USA themselves use about one quarter of the world production. However, the U.S.

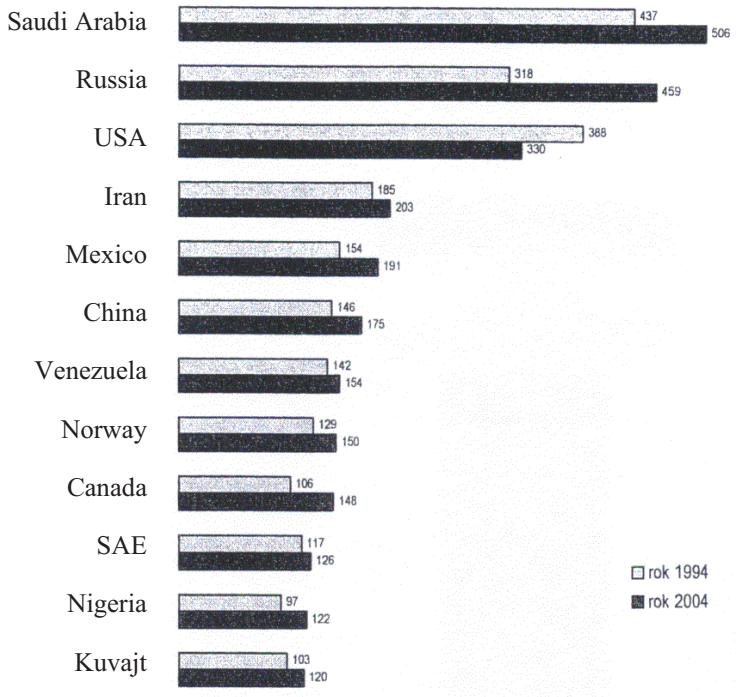
consumption grows by less than 2% yearly, while that of China by more than 15%.
In the EU, there can be seen rather the relative decrease of consumption. It is caused by the sowing-down economy, the development of energetically less demanding technologies as well as the fact that the West European firms corporatively moved the energy-demanding production to the "cheap" countries.
The oil stocks are finite, notwithstanding the fact how many new reserves might be discovered. The high prices will draw the miners into the deep ocean, to the depths of 6 kilometres even on the dry land. It is not yet efficient today – but then the mining from the oil sands was not regarded efficient not that long ago.
In the horizon of the next 15 years, however, the alternative energy resources will come forward. It might be hydrogen, or later the nuclear fusion. Regarding this, the high oil prices are positive as a high price is the best driver towards the progress aiming at new alternatives.

Figure 1: World oil market: shares of the regions in per cent in the stocks in 2004



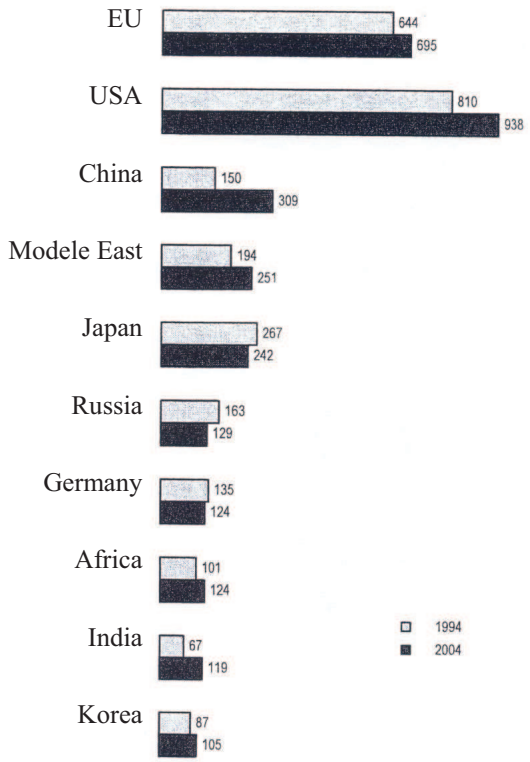
Source: BP

Figure 2: The biggest world oil producers (in mill. tons)



Source: BP

Figure 3: The biggest world oil consumers (in mill. tons)



Source: BP

NATURAL GAS

Compared to other types of fuels, the natural gas has many advantages. It is reliably to the consumers' disposals and offers a high level of consumer comfort.

Its distribution is not dependent on public communications or climatic conditions, it does not need a costly processing and, moreover, it his highly ecological (EC 2001).

Specific advantages of natural gas come forward namely in comparison with other fuels or energies. Natural gas in the only primary fuel which can be brought to the consumer without costly processing. Its transport and distribution system does not depend on climatic conditions or public communications as the distribution of electricity, coal or oil produced fuels. Moreover, it is to the consumer disposal without any time limit. The consumer is not obliged to build any equipment for its storage as in the case of solid or liquid fuels. Last but not least, it is necessary to consider also the simple management and regulation of gas appliances.

Natural gas belongs among the fuels with the high heat efficiency. Its advantage, which is also the consequence of a higher efficiently of gas appliances, is visible namely in comparison with those using solid or liquids fuels. One cubic meter of natural gas (i.e. 10.5 kWh) ban fully replace e.g. 3 kg of brown coal, 1.5 kg of black coal or 0.83 kg of burning oil. Besides this, natural gas is also a highly ecological fuel.

From the ecological viewpoint, natural gas has also other advantages compared to other fossil fuels: the building of the distribution system and other alliances is connected with only a minimum land use, and it is usually returned back to its original purpose in most cases, as the system is under the surface, so that it does not disturb the countryside.

However, the main advantages of natural gas are reflected during its utilisation. By its burning, there originates much less pollutants – the dust and sulphur oxide are included in the burning remains only in negligible quantities and also the carbon dioxide and other pollutants are produced on a considerably lower level, compared to other fuels.

If we then consider that natural gas is ecological and more advantageous, the question is whether the growing interest in its use will not bring the limits to its stocks soon.

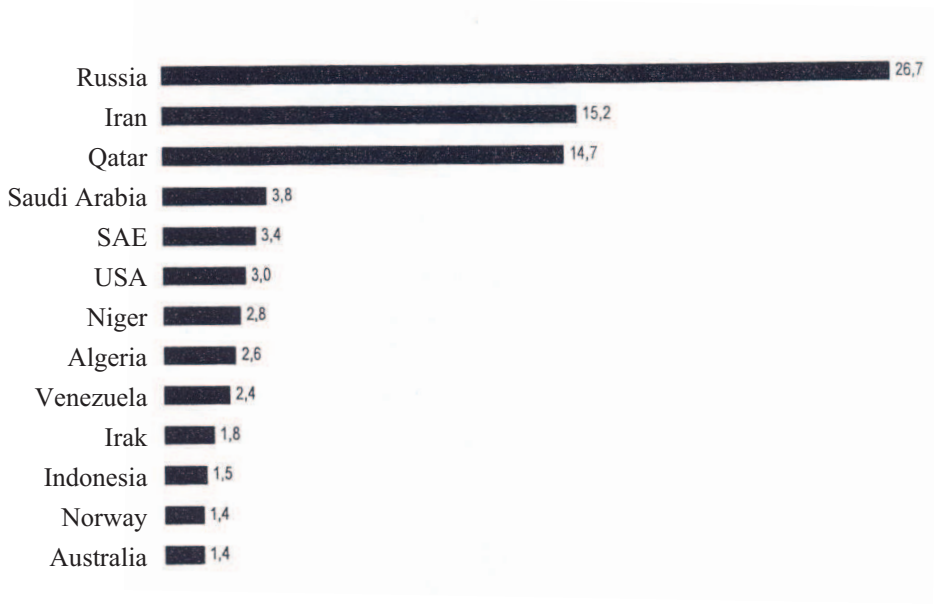
The known stocks of natural gas which are efficiently utilised at present are increasing. For example, between the years 1990 and 2000, the world stocks increased owing to the discovering of new reserves by more than 17%. Important for Europe then is that almost ¾ (over 70%) of the known world reserves are either on its area or in the geographical proximity.

The USA intend to reduce their considerable dependence on energy import, namely that of oil. Its yearly consumption increased by 16% up to almost 938 mill. tons. The dependence on import is nearly two thirds and both the experts and politicians regard it as dangerous. The more so that most of oil entering the American economy comes from the politically unstable Middle East. However, during the last years also the share in the American oil import increased and its share is about 15%.

Tab. 1: Comparison of the amount of pollutants from burning

	Brown coal	Coke	Heating oil	Natural gas
Ashes (mg/MJ)	608.4	309.2	50.4	0.6
SO2 (mg/MJ)	1129.4	398.9	426.7	0.3
CO (mg/MJ)	3416.9	1717.6	13.9	9.4
Carbohydrates (mg/MJ)	699.3	381.7	9.7	3.8

Source: RWE
Figure 4: Natural gas world stocks (in %)



Source: BP

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The president George Bush supported unanimously building of the new nuclear power plants, but also mentioned another alternative resource to oil, that is natural gas.

The Americans produce 543 bill. cubic meters per year, but consume 645 bill. cubic meters, therefore they depend on import from less than one fifth. However, bush wants to push trough building of the "ecologically clean" electricity power plants burning natural gas. The gas consumption would thus increase by almost 2/5 by 2025 at approximately 880 bill. cubic meters. The same problem as there exists regarding the dependence on oil imports might therefore occur also in future regarding natural gas. Its stocks in the USA represent less than 3% of the world stocks.

Almost all imported natural gas comes from the friendly and stabilised Canada, it will, however, hardly be able to increase the supply as Canada itself needs still more, among other because it is needed for oil mining in the province of Alberta.

The USA then will not have other choice than to turn to the overseas markets, where they will face the basic problem: rich stocks of natural gas are usually at the same places as oil, i.e. in the politically not stable areas. The problem can be mollified by a higher production and import of the liquidised gas (LNG) the share of which in the total U.S. energy consumption is at present only 2%.

The natural gas prices will remain high; therefore it is reasonable to participate in building of the LNG capacities also abroad. In 2004, about 177 bill. cubic meters of LNG were transported over the seas, i.e. about ¼ of the world gas trade. The biggest consumer is the Far East, namely Indonesia. Building of the LNG infrastructure is costly, the costs of the equipment and storage of 10 bill. Cubic meters of LNG are 3–5 bill. USD.

CONCLUSION

Energy import dependence became one of the key topics of the still strengthening debate of the political representatives, expert public and public in general. The growing demand for energy resources and the energy-demanding needs of the modern society are certainly a reason for the possible reprehensions.

The future development in the sector of energy will be the breaking point. We will have to look for new energy resources, and that not only because of the import dependency on the politically not stable stets, but also because of the limited stocks of the fossil fuels. One of the possibilities is to look for reserves on the consumption side; the society should re-evaluate its energy demands. However, the habits and energy comfort of the present society will be difficult to change.

Lowering of the risk of the energy imports dependence and the possible energy supply fluctuations have been successfully reached by forming of the strategic partnerships with the resource mining countries.

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Received for publication on November 10, 2008
Accepted for publication on January 12, 2009

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