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GLOBAL TRADE PROSPECTS IN NATURAL GAS

ABSTRACT

The author gives a survey on the prospects of the natural gas trade on the basis of international databases. Not only the production and the consumption data of natural gas are presented but the global export import and reserves data as well. The P/R ratio at natural gas longer then sixty years so the natural gas will play a significant role in energetics in the decades coming.

INTRODUCTION

It is obvious both for professionals and the general public that the leading energy source of the 21st century is natural gas. Statistical databases of the international natural gas industry have been used as a basis for investigating the prospects for widening the global trade in natural gas.

This paper presents the natural gas supplies and demands known and predicted, figures of natural gas production and consumption, the location of continents, regions, and countries producing and using natural gas as well as details of natural gas exports and imports.

The following sources were used to obtain data and information:

International Energy Agency - Natural Gas Information 2000

British Petrol Statistical Review of World Energy, June 2001

International Association of Energy Economics, 2000 2001

NATURAL GAS PRODUCTION AND CONSUMPTION

The International Energy Agency publishes its statistics annually, including data for the year preceding the year of publication. When this paper was researched, the report on the year 2000 was available, therefore the last data and figures in the tables and diagrams are for the year 1999. It has to be mentioned that as far as we are aware - there has been no considerable re-arrangement in the global natural gas trade.

The IEA compiled its global data according to continents and regions significant for natural gas. For the purpose of interpreting the data, the IEA listed the countries in the different groups according to the following (**Table 1**)

Table 1.**Groups of countries by IEA**

OECD NORTH AMERICA Canada, Mexico, United States
OECD EUROPE Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom
OECD PACIFIC Australia, Japan, Korea, New Zealand
SOUTH AND CENTRAL AMERICA (LATIN AMERICA) Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, El Salvador, Ecuador, Guatemala, Haiti, Honduras, Jamaica, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela, other Latin America
NON-OECD Europe Albania, Bulgaria, Cyprus, Gibraltar, Malta, Slovak Republic, Romania, Former Yugoslavia (Bosnia-Herzegovina, Croatia, Macedonia, Slovenia, Serbia, Montenegro)
FORMER USSR Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
AFRICA Algeria, Angola, Benin, Cameroon, Congo, Egypt, Ethiopia, Eritrea, Gabon, Ghana, Cote d'Ivoire, Kenya, Libya, Morocco, Mozambique, Nigeria, Senegal, South Africa, Sudan, United Republic of Tanzania, Tunisia, Democratic Republic of Congo, Zambia, Zimbabwe, other Africa
MIDDLE EAST Bahrain, Islamic Republic of Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen
ASIA Bangladesh, Brunei, India, Indonesia, Malaysia, Myanmar, Nepal, North Korea, Pakistan, Philippines, Singapore, Sri Lanka, Chinese Taipei, Thailand, Vietnam, other Asia
CHINA People's Republic of China, Hong Kong

The first two tables present the figures for natural gas production and consumption in the world in 1971, then in the years of the two oil crises, 1973 and 1978, and finally in the last five years (**Table 2**).

Table 2.

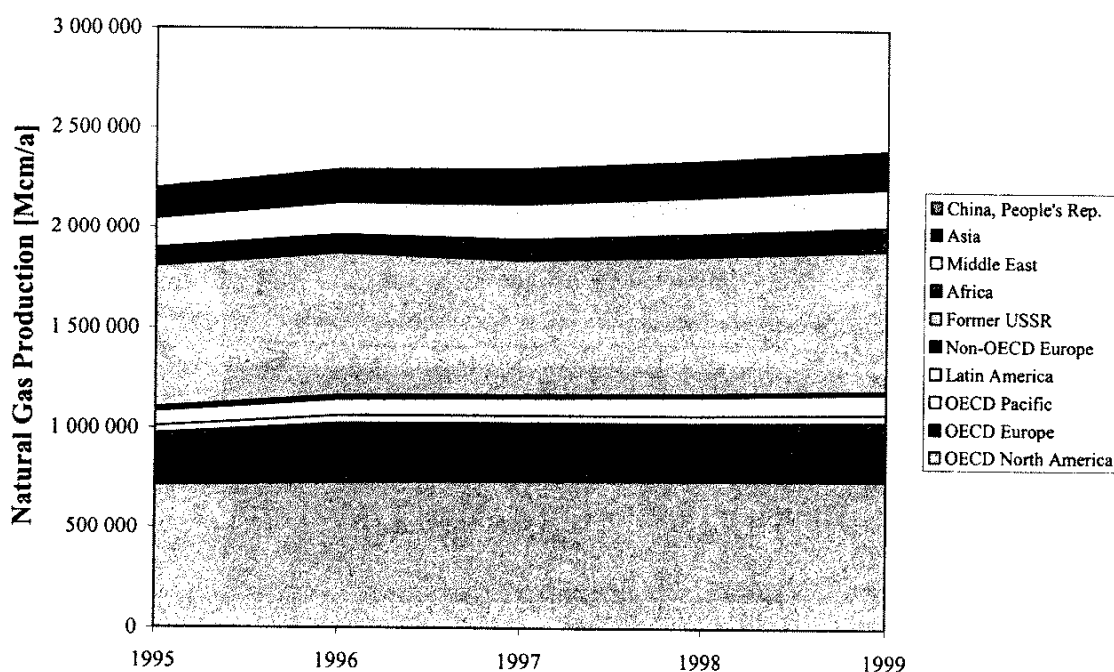
Natural gas production in the world

	Unit: Mcm/a							
	1971	1973	1978	1995	1996	1997	1998	1999
OECD North America	685 482	702 854	633 733	716 405	730 864	739 567	741 748	744 293
OECD Europe	115 411	165 178	214 180	256 588	293 654	288 971	287 484	294 067
OECD Pacific	4 758	7 124	12 068	36 168	37 698	37 837	38 339	39 301
Latin America	20 854	25 215	30 227	73 027	80 644	86 121	92 830	101 583
Non-OECD Europe	30 014	32 529	42 280	21 355	20 098	17 724	16 619	16 060
Former USSR	216 867	241 183	379 919	703 292	708 276	669 172	685 311	696 824
Africa	4 824	9 941	19 296	85 856	91 095	101 957	107 725	116 807
Middle East	25 690	32 660	42 167	151 086	163 306	179 614	190 207	196 311
Asia	8 416	11 382	31 409	151 610	166 375	177 975	180 712	190 086
China, People's Rep.	3 365	5 380	12 331	17 947	20 114	22 703	23 279	25 376
World Totals	1 115 681	1 233 446	1 417 610	2 213 334	2 312 124	2 321 641	2 364 254	2 420 708

Source: IEA 2000.

In the period under examination, natural gas production increased steadily, with the exception of the group of non-OECD European countries. Several countries in the group are candidate countries for European Union membership. Their membership – whenever it becomes reality – will further increase the import dependence of the European Union in energy. The total natural gas production of the European OECD countries in the past five years does not give much reason for optimism as regards import dependence. Speaking of our region it is also noteworthy that the former Soviet Union had increased its natural gas production more than three times by 1995, however, between 1995 and 1999 it was not able to increase its performance. As for the LNG supply of Europe, it is expedient to monitor the development of production in Africa, the Near East and Asia.

Natural gas production in the past years is shown in Figure 1.



Source: IEA 2000

Fig. 1. Natural gas production in the world

Let us have now a look at the use of natural gas in the same regions (Table 3).

Table 3.

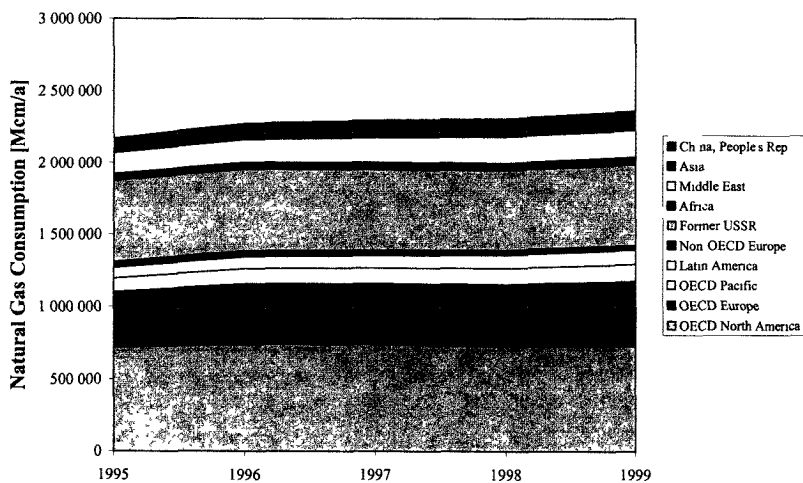
Natural gas consumption in the world

	1971	1973	1978	1995	1996	1997	1998	1999
OECD North America	662 833	679 853	622 908	719 035	737 267	739 757	720 195	724 640
OECD Europe	119 875	174 309	248 598	379 371	417 419	416 782	430 622	449 147
OECD Pacific	6 581	11 097	28 368	96 550	105 547	109 890	111 959	119 138
Latin America	20 713	24 701	29 752	72 897	80 986	85 230	91 577	99 439
Non-OECD Europe	30 855	33 824	49 431	41 006	43 656	39 426	36 445	34 460
Former USSR	233 900	255 746	341 532	566 394	568 727	561 298	555 208	562 125
Africa	2 861	3 743	8 395	45 818	47 276	49 785	51 256	52 811
Middle East	20 707	24 606	32 665	147 518	160 871	172 995	183 059	185 346
Asia	5 901	7 274	16 039	101 570	109 658	119 631	123 612	131 509
China, People's Rep	3 365	5 380	12 331	17 822	20 549	23 187	23 826	25 740
World Totals	1 107 591	1 220 533	1 390 019	2 187 981	2 291 956	2 317 981	2 327 759	2 384 355

Source IEA 2000

Natural gas consumption in the world is in general characterized by a tendency of steady increase, although natural gas consumption in non-OECD European countries suffering from political and economic crises has decreased year to year since 1996! Since 1971 Africa, the Near East and China have been using an order of magnitude more natural gas, while the OECD Pacific Ocean and Asian countries have been using two orders of magnitude more (!) natural gas annually. It is to be highlighted that the largest absolute user, the region of the OECD North America, is followed by the former Soviet Union, which has more than doubled its use, and OECD Europe, which has increased its consumption nearly four times.

Natural gas consumption in the past years is shown in Figure 2.



Source IEA 2000

Fig. 2. Natural gas consumption in the world

THE RATIOS OF PRODUCTION AND CONSUMPTION

The IEA data were used to compute the ratios of production and consumption for the individual continents and regions, that is the index of their „natural gas self-sufficiency”, and at the same time the source and consumption sides of the global trade in natural gas. The results can be seen in **Table 4** and **Figure 3**.

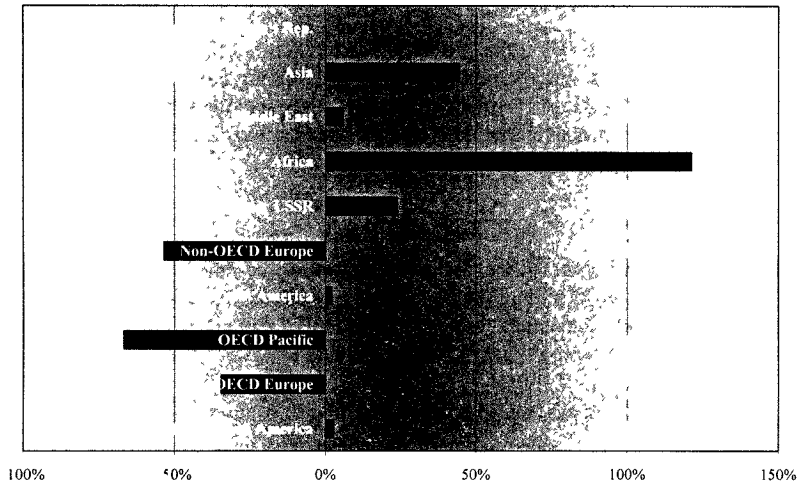
Table 4.

The ratios of production and consumption in different regions

	1995	1996	1997	1998	1999
OECD North America	100%	99%	100%	103%	103%
OECD Europe	68%	70%	69%	67%	65%
OECD Pacific	37%	36%	34%	34%	33%
Latin America	100%	100%	101%	101%	102%
Non OECD Europe	52%	46%	45%	46%	47%
Former USSR	124%	125%	119%	123%	124%
Africa	187%	193%	205%	210%	221%
Middle East	102%	102%	104%	104%	106%
Asia	149%	152%	149%	146%	145%
China, People's Rep.	0%	0%	0%	0%	0%

Source IEA 2000

The largest rate of „surplus” was shown in Africa, Asia and the former Soviet Union.

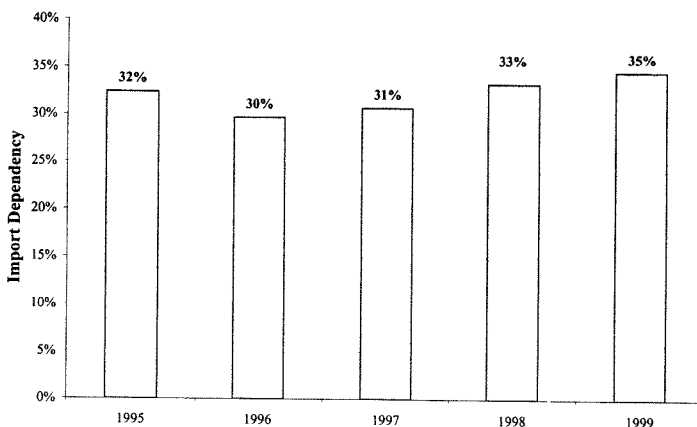


Source IEA 2000

Fig. 3. The ratios of production and consumption in 1999

The greatest need for natural gas imports was experienced by the OECD Pacific Ocean countries with dynamically developing economies, the non-OECD European countries presenting a weak economic performance in general, and the group of OECD European countries.

The index most important for us is the decrease in the self-sufficiency of OECD Europe. According to IEA data, import dependence reached 35% already in 1999 (Figure 4), and as it can be predicted, this dependence will further increase in the future.



Source IEA 2000

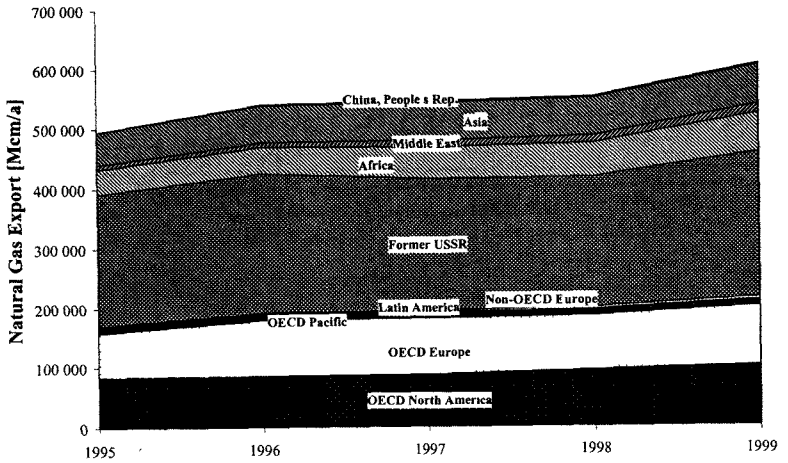
Fig. 4. Import dependence of OECD Europe

Between 1995 and 1999, the production and consumption in North America, South America and in the Near East were nearly balanced. Among them the increase in the natural gas consumption in the Near East with its hot climate is the one that is thought provoking (it can only be rendered probable that its underlying reason may be the prevalence of electrical energy generation and air conditioning based on natural gas).

NATURAL GAS EXPORT AND IMPORT

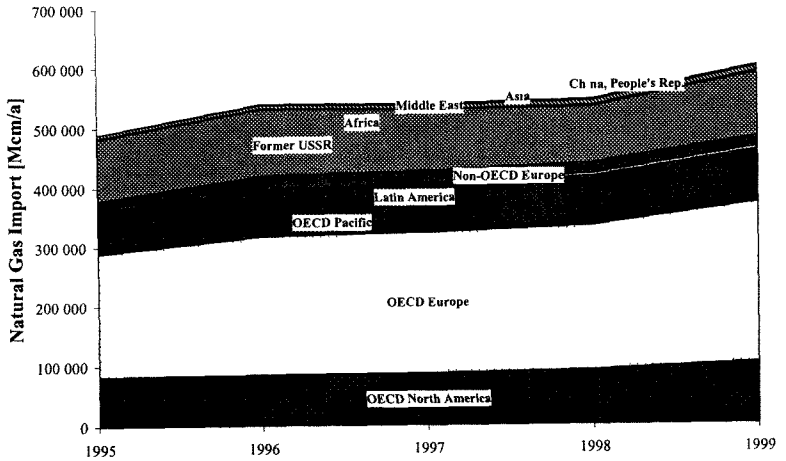
Finally, the IEA yearbook data are used to present the development of the global turn-over in natural gas exports and imports without any comments (Figure 5 and 6).

Only about 18% of the annually marketed amount of natural gas was accounted for in the global natural gas trade until the late 1990s.



Source IEA 2000

Fig. 5. Global natural gas exports



Source IEA 2000

Fig. 6. Global natural gas imports

Table 5 shows a comparison between the figures by the International Energy Agency - Natural Gas Information 2000 and the British Petrol Statistical Review of World Energy, June 2001.

Table 5.

Comparison of the figures by the International Energy Agency and British Petrol

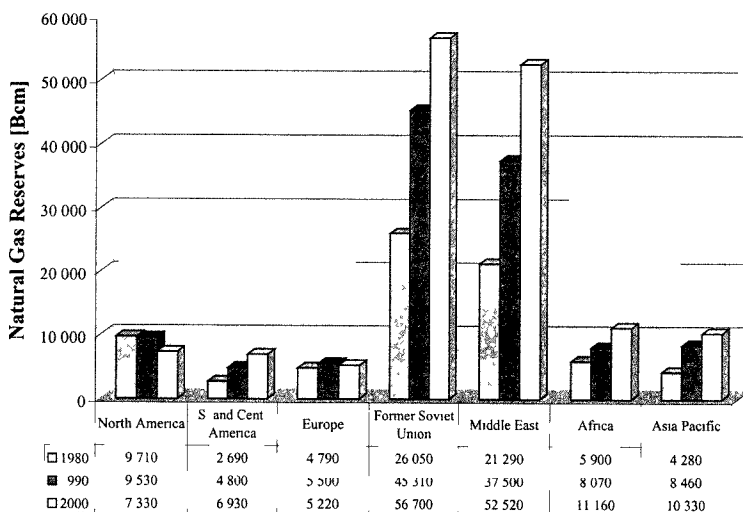
Natural Gas Production [Bcm/a]	1995	1996	1997	1998	1999
International Energy Agency	2213	2312	2322	2364	2421
British Petrol	2136	2233	2234	2276	2324
<i>IEA/BP</i>	<i>104%</i>	<i>104%</i>	<i>104%</i>	<i>104%</i>	<i>104%</i>
Natural Gas Consumption [Bcm/a]	1995	1996	1997	1998	1999
International Energy Agency	2188	2292	2318	2328	2384
British Petrol	2126	2228	2214	2240	2295
<i>IEA/BP</i>	<i>103%</i>	<i>103%</i>	<i>105%</i>	<i>104%</i>	<i>104%</i>

The IEA data are higher both in the production and the consumption of natural gas, although the difference in percentage is not significant

NATURAL GAS RESERVES

In addition to the data on production and consumption in the past years, the proved and probable natural gas reserves of the world are the figures that provide the background for the global trade in natural gas.

As a result of technical development and geological research, the proved, certain natural gas reserves of the world have shown the following changes in the past 20 years according to British Petrol (**Figure 7 and Table 6**):



Source BP 2001

Fig. 7. Global natural gas reserves

Table 6.

Distribution of global natural gas reserves

	1980	1990	2000
North America	13%	8%	5%
South and Cent. America	4%	4%	5%
Europe	6%	5%	3%
Former Soviet Union	35%	38%	38%
Middle East	28%	31%	35%
Africa	8%	7%	7%
Asia Pacific	6%	7%	7%
World Totals	100%	100%	100%

At the turn of the millennium more than 70% of the known natural gas reserves of the world is to be found in the countries of the former Soviet Union and the Near East. The necessity of the diversification of the sources and of positive political and economic relations with the production (and transit) countries sets the directions for diplomatic activities of the natural gas import dependent countries unambiguously in energetics.

The figures on reserves and production by British Petrol for the year 2000 were used to calculate the “reserves/production ratio” used as R/P Ratio in the professional literature. This shows for how many years the demands could be supplied under unchanged conditions according to the figures for the year in question (**Table 7**).

Table 7.

Ratio of natural gas reserves and production

	Reserves [Bcm]	Production [Bcm/a]	R/P Ratios [a]
North America	7 330	759	10
South and Cent. America	6 930	96	72
Europe	5 220	288	18
Former Soviet Union	56 700	674	84
Middle East	52 520	210	250
Africa	11 160	130	86
Asia Pacific	10 330	265	39
World Totals	150 190	2422	62

The last figure in the table is the most important one: according to figures for the year 2000 there are safe natural gas reserves for at least sixty years under unchanged conditions on Earth. This period is reassuringly long at a first glance and the reserves are large. However, like other fossil fuels, the natural gas reserves are not inexhaustible either, their geographical distribution is non proportionate. Therefore it is easy to understand and is justified that primarily the “user” countries and regions today address global trade in natural gas providing long-term safety of supply as a priority strategic issue.

CONCLUSIONS

As a conclusion of the topic, the latest estimate by the *US Geological Survey* is presented here on the natural gas reserves in the world that are today undiscovered but can be prospected by today's technology. This estimate was originally published by the *International Association of Energy Economics* in 2000. The analysis covering both petroleum and natural gas reserves demarcates up to 1000 regions in the world with promising hydrocarbon reserves, out of which only 406 are production areas today. According to our calculations, 76 out of all areas are of top priority, with a likelihood of holding 95% (!) of the petroleum and natural gas reserves, and a further 52 areas are considered to be promising. It is also worth highlighting that the findings of a similar analysis in 1994 show a difference of less than 10% from today's calculations. Although the undiscovered „pure” amount of natural gas is 10% less than the previous estimate (the difference is attributed to data of the former Soviet Union), formations containing light hydrocarbons, on the other hand, are significantly larger than the previous estimates.

ACKNOWLEDGMENT

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