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New Trends of Petroleum Exploration in Central and Eastern Europe

The area reviewed in this presentation includes the territory of Hungary, Slovakia, Poland, Ukraine, Romania, Serbia and Croatia. All of these countries were either “satellites” of the former Soviet Union or were part of it before the dramatic political changes in the early 1990s.

Geologically speaking, the area under consideration includes the Pannonian back-arc basin, the surrounding Carpathian-Dinaric mountain arc and the European foreland. The European foreland is divided into two major sub-units by the Trans-European Suture Zone, which is a 2000 km long feature transversing Europe obliquely from the Black Sea to the North Sea. These sub-units are called the West-European Platform and the East-European Craton.

The Carpathian arc is a remarkable feature as it is the most prolific petroleum-bearing orogenic arc per unit length in the world, considering the cumulative production and known reserves. There is a consensus that future exploration will be successful only if the structural and stratigraphic conditions of reservoirs/seals and the extent and maturation history of the source rocks are better understood, and the most advanced drilling, logging and well completion technology are applied.

The West-European Platform in Poland is made up of a Permian through Mesozoic sedimentary cover unconformably overlying the Variscan basement. There is a major possibility of finding natural gas. Prospect analyses suggest undiscovered reserves of 14 to 26 TCF of gas.

The East-European Craton in Ukraine is of remarkable exploration interest because of the presence of the Dnieper-Donets rift system, which is nearly 2000 km long. The rift was active during the Late

Devonian and was followed by the accumulation of an extremely thick post-rift series dominated by Carboniferous strata. Two major phases of uplift and erosion occurred at the end of Permian and Cretaceous times. This is a huge hydrocarbon province with the occurrence of both oil and gas. Undiscovered reserves are estimated as 1.3 to 1.5 BB oil and 20 to 25 TCF gas.

The Pannonian basin of Hungary, Slovakia, Romania, Serbia and Croatia is a mature exploration area with undiscovered resources of about 1.2 BB oil and 8 TCF gas. It is generally accepted that most of these reserves could be found in the substrata of the Neogene basin, which is an Alpine thrust-fold belt composed of Upper Paleozoic and Mesozoic rocks. Obviously, acquisition of modern 3D seismic surveys, better interpretations and new play concepts are required for significant exploration success in this basin. Figure 1 shows the annual gas and oil production versus consumption for central and eastern Europe. Table 1 presents a compilation of proven oil and gas reserves, annual production rates and imports in these countries.

It is clear that the domestic hydrocarbon production can not fulfill the consumption and that massive import is required in each of these countries. It is an unfortunate heritage from the previous political regime that imports of hydrocarbons still come dominantly from Russia. Therefore, it is not too surprising that the current energy strategy in Central and Eastern European countries is to move away from dependence on Russian oil and gas.

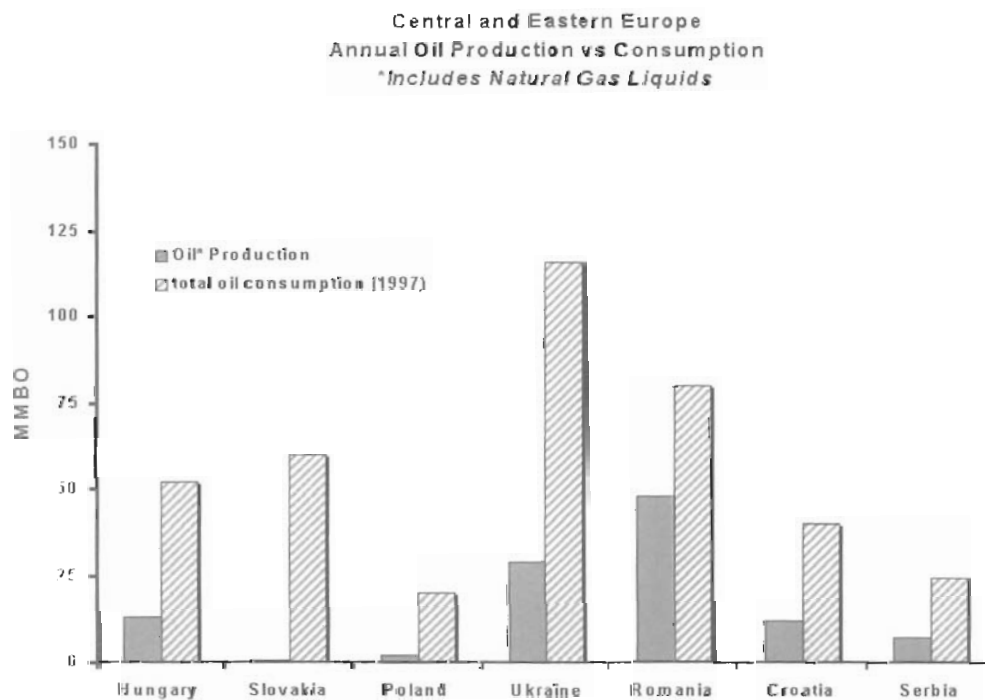
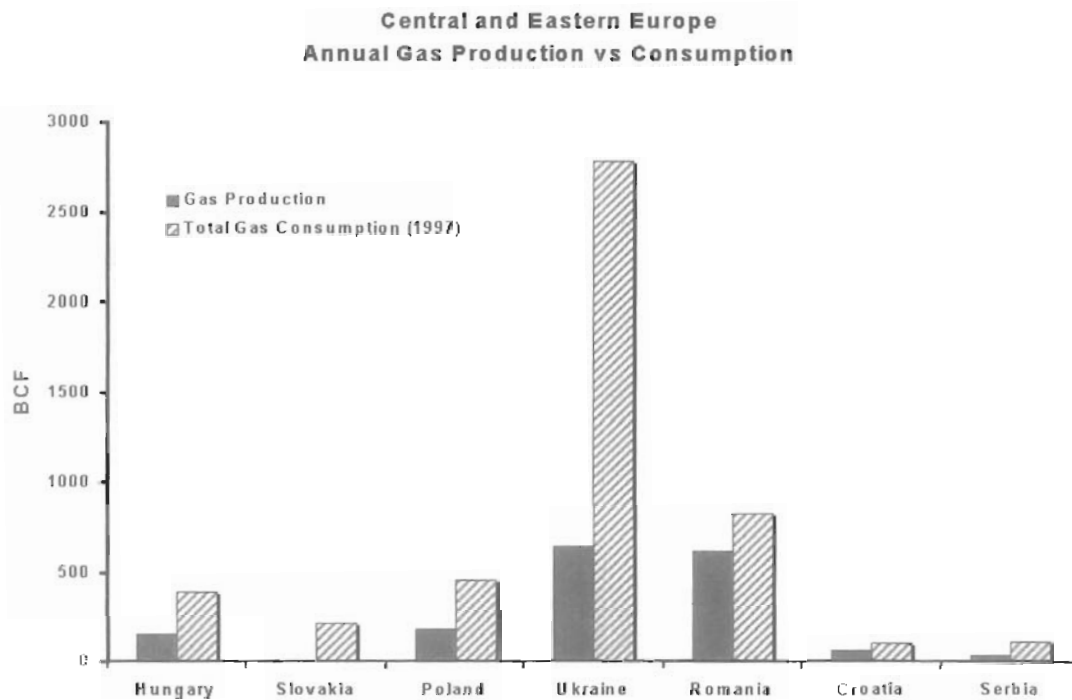


Figure 1. Gas production versus consumption.

In the case of Ukraine, for example, the amount of imported gas is about 2.5 TCF a year, which makes Ukraine one of the largest gas markets in the world. Another extreme is Slovakia, where the domestic production is so small that practically all the country's consumption is from imports. Seemingly, Romania is in the best position, because national production can cover 60% and 75% of the consumption of oil and gas, respectively.

It is generally accepted that the rate of economic growth in the countries of Central and Eastern Europe largely depends on the success of petroleum exploration and production, either by national companies or foreign new ventures.

The general trend of petroleum exploration in Central and Eastern Europe is to diminish the technological gap relative to the

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| Country | Proven Reserves | | Annual Production | | Import (Percent of total annual consumption) | |
|----------|-----------------|--------------|-------------------|--------------|---|-----|
| | Oil* (MMB) | Gas (BCF) | Oil* (MMB) | Gas (BCF) | Oil | Gas |
| Hungary | 131 | 3100 | 13 | 155 | 75% | 60% |
| Slovakia | 14 | 150 | 0.6 | 8.5 | 99% | 96% |
| Poland | 115 | 5800 | 2.2 | 180 | 89% | 60% |
| Ukraine | 395 | 41000 | 29 | 640 | 75% | 77% |
| Romania | 1442 | 13000 | 48 | 615 | 40% | 25% |
| Croatia | 99 | 1100 | 12 | 57 | 70% | 42% |
| Serbia | ~70 | ~1200 | 7.3 | 32 | 70% | 70% |

Table 1. Proven hydrocarbon reserves, annual production rates, and imports relative to the national consumption (in the year of 1997) for countries of Central and Eastern Europe. *Oil includes natural gas liquids.

western world, which requires time and money. Profitable investment by western companies can be achieved only if they have both. At the same time it is a national responsibility to implement a stable legal and fiscal environment and fully guarantee international business standards in each of the countries. Apart from Poland and Hungary, there is still a lot to do in the region to arrive at a favorable business environment.

Biographical Sketch

DR. FERENC (FRANK) HORVATH is a full Professor and Head of the Geophysical Department at Eotvos University, 1083 Budapest, Ludovika ter 2, Hungary. His main fields of research include

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Scientific Awards:

1987 Honorary Fellow of the European Union of Geosciences
 1991 Member of Academia Europeae
 1995 Honorary Fellow of the Geological Society of America
 1997 Commendation Award of the American Association of Petroleum Geologists. □

