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The Role of Natural Gas in Croatian Energy Sector

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Key words: primary energy, natural gas

Abstract: In the global economy today energy certainly has a strategic importance. Almost 50 % of primary energy which Croatia needs is met by using natural gas. In the natural gas sector numerous organisational and structural changes have been occurring in the last few years.

Data about needs and future plans considering natural gas supply in Croatia will be presented in the paper.

1. Introduction

Natural gas is the cleanest and most hydrogen rich of all hydrocarbon energy sources, and it has high energy conversion efficiencies for power generation. Of more significance is that gas resources discovered but as yet untapped remain plentiful.

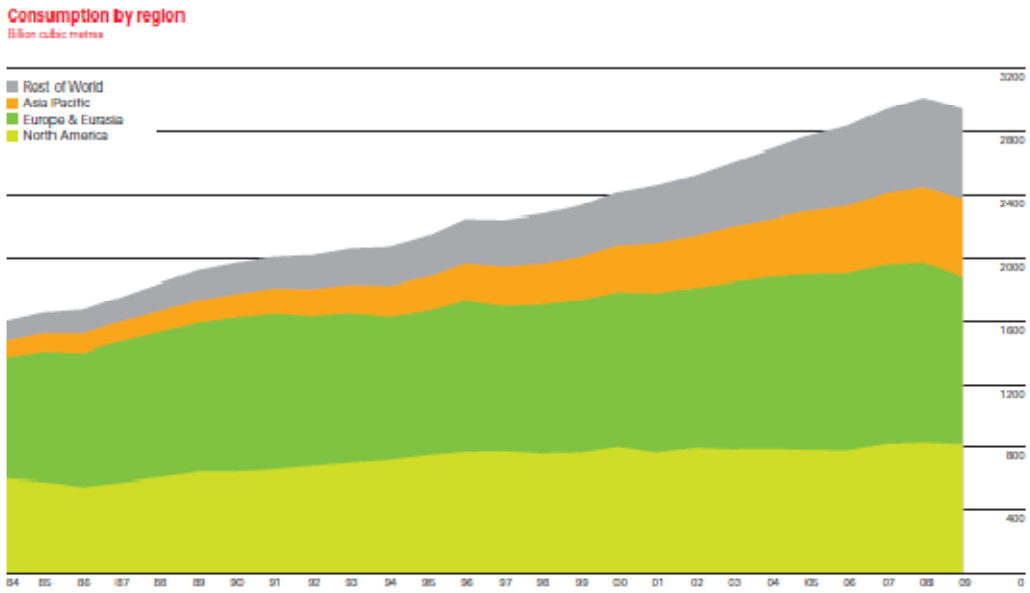

Fig. 1 *World consumption of natural gas [1].*

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The sector is poised for considerable growth over the next two decades, and some believe that it may even overtake oil as the prime fuel between 2020 and 2030. In 2009 natural gas accounted for about 23 % of the world energy demand (according to EIA, 2009). Large capital investments in infrastructure to enable increased gas consumption were made on both the demand and supply sides. Several gas producing countries embarked upon very ambitious plans for markedly increased gas output. Many new LNG facilities were built. Other gas conversion technologies, such as GTL and CNG have been attracting more serious attention, but energy efficiency, cost, and situation on world marked hindered the evolution and development of these promising alternatives. After long time world consumption of the natural gas was sharply decreased in 2009 (Fig. 1) and many planned projects are postponed. One of them is LNG receiving terminal planned to be built in Croatia which is currently postponed until 2013.

2. Natural Gas Sector in Croatia

Security of natural gas supply is nowadays one of the cornerstones of both the energy policy of a country and the economic and national security strategy. Domestic coverage of total primary energy needs in Croatia amounted to 65 % in 1988, 50 % in 2000, and 52 % in 2008. Judging by the diminishing production trend to date, it is anticipated that by 2030 the domestic share of total primary energy supply will be between 21 % and 23 %. In view of such forecasts, Croatia will be dependent on the imports of energy sources [2].

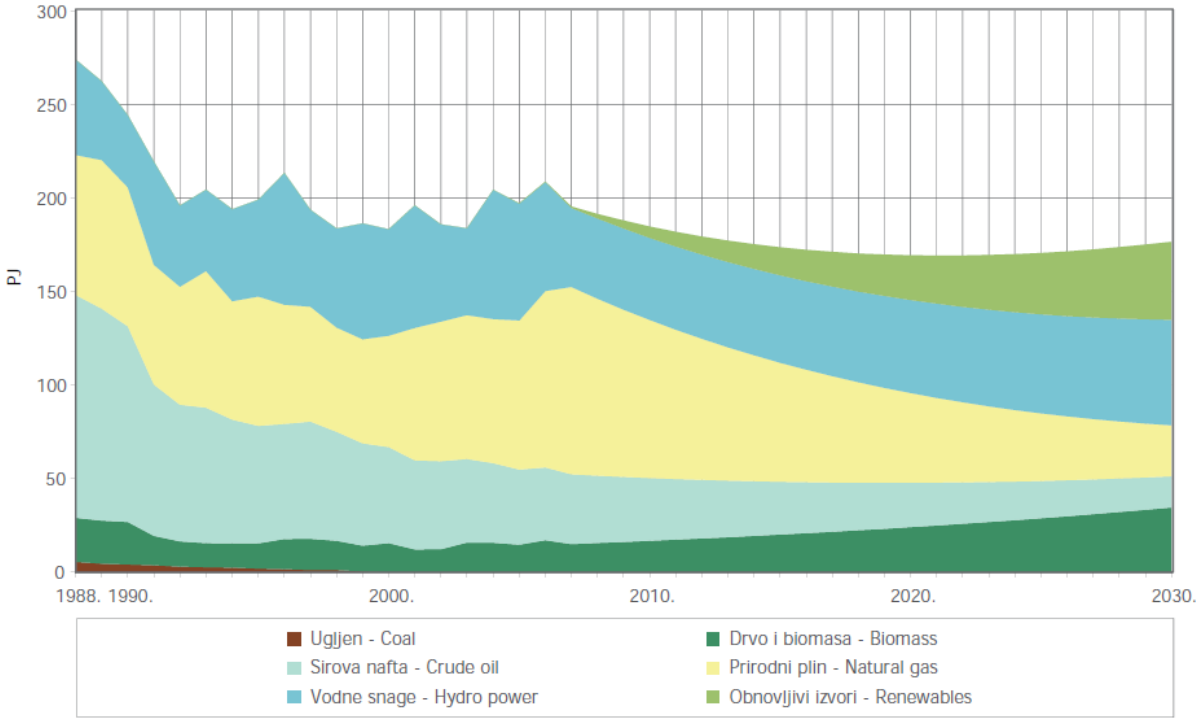

Fig. 2 *Developments and projections of primary energy production in Croatia.*

Figure 2 presents the developments in the primary energy production starting from 1988 as well as the projections of the future production trends until 2030. In the future, a gradual reducing of the fossil fuels production and an increase in energy generation from renewable sources is expected.

The shares of specific forms of energy in the total primary energy supply for the year 2008 and for the year 2030 are presented in Fig. 3.

Dependence on the imports of energy and energy resources poses a risk in terms of meeting total energy needs, due to market factors (instability and high world market prices), as well as non-market factors, such as changes in global geopolitical balance, natural disasters, risks of war conflicts and terrorist attacks, etc.

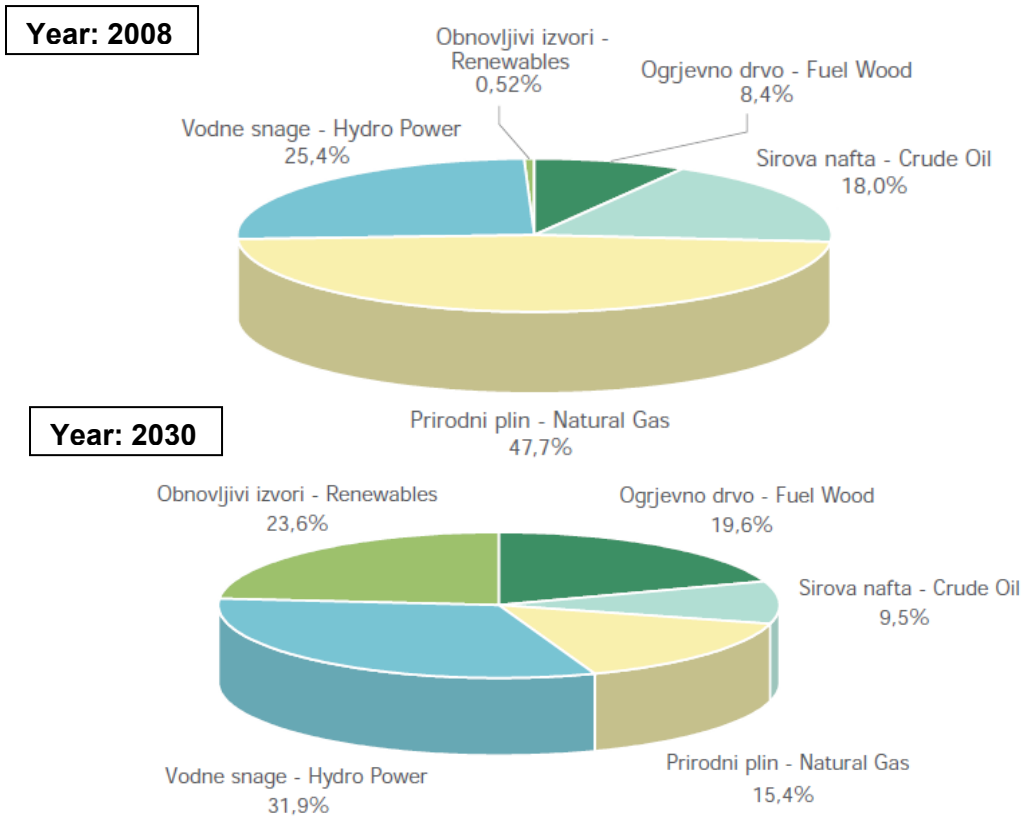

Fig. 3 *Shares of energy resources in total primary energy production in Croatia [2].*

3. Natural gas consumption and production in Croatia

At the start of the new century the share of natural gas in total energy consumption in Croatia stood at 25 %. Although natural gas consumption has been constantly increasing over the past twenty years, with the exception of the wartime nineties, natural gas consumption in Croatia is still by 34 % below the consumption average in the European Union [3]. Production and consumption data for natural gas are shown in table 1.

Tab. 1 *Production and consumption of natural gas in Croatia [2].*

	2003	2004	2005	2006	2007	2008	2008/07	2003-08
	Million cubic meters						%	
Production	2189,6	2198,1	2283,4	2713,5	2892,1	2729,4	-5,6	4,5
Import	1138,8	1053,6	1134,1	1126,5	1055,1	1226,8	16,3	1,5
Energy supplied	2884,4	3009,3	2909,9	2877,8	30306,7	3205,1	-3,1	2,1

In Croatia more than two thirds of natural gas consumption is currently covered by domestic production. The most important natural gas production takes place on the exploitation fields Molve, Kalinovac and Stari Gradac (exploitation fields in geologically called Deep Podravina region) and exploitation fields in northern Adriatic. The rest of the needs are covered by natural gas import from Russia via Rogatec border crossing point into the Croatian gas transport system.

Molve gas field was discovered in the second half of 1970's followed by the discovery of Kalinovac and Stari Gradac gas fields in the early 80's. The main characteristic of all the mentioned fields are extremely unfavourable reservoir conditions with reservoirs depth over 3000 m, high initial reservoir pressures (over 450 bar), temperatures (180°C) and significant share of CO_2, (10 – 54 %) H_2S (800 ppm) as well as some other nonhydrocarbon compounds like mercaptans (30 mg/m^3) and mercury (1000 - 1500 µg/m^3). On gas field Molve the Central Gas Station Molve I, II and III are built and used for processing of the produced natural gas [3]. Current natural gas production of the fields in Deep Podravina region is 975,056x10^6 m^3.

Considerable amount of natural gas has been produced from off-shore gas fields in northern Adriatic. The development of North Adriatic gas fields started in 1996, when INA entered a business

cooperation agreement with Italian company ENI and they set up the INAgip operating company to carry out the activities agreed on. The largest offshore gas field, Ivana, produced from 1999 and was followed by the development of Marica filed. In 2006, the development phase ended and production started on smaller satellite gas reservoirs, Ida and Ika. Production of natural gas is further increased after new fields began to produce -- Ana, Vesna, Irina and Annamaria - late last year and this year. The production platforms are interconnected by means of a submarine pipeline system, and a pipeline has also been laid for delivery to the onshore system of gas production and supply.

Croatia possesses only one underground natural gas storage (UGS) on Okoli gas field with storage capacity 550×10^6 m^3. Considering the future needs and the projected consumption, plus major seasonal differences in natural gas consumption, which will be particularly felt for the next ten years, it would be necessary to provide storage capacities at the level of 20 % of annual consumption. This would require the construction of new storage capacities.

4. Gas transportation

Natural gas transportation is a regulated energy activity performed as a public service and represents the primary activity of the company Plinacro Ltd., the owner and operator of the gas transport system. Plinacro is fully owned by the Republic of Croatia.

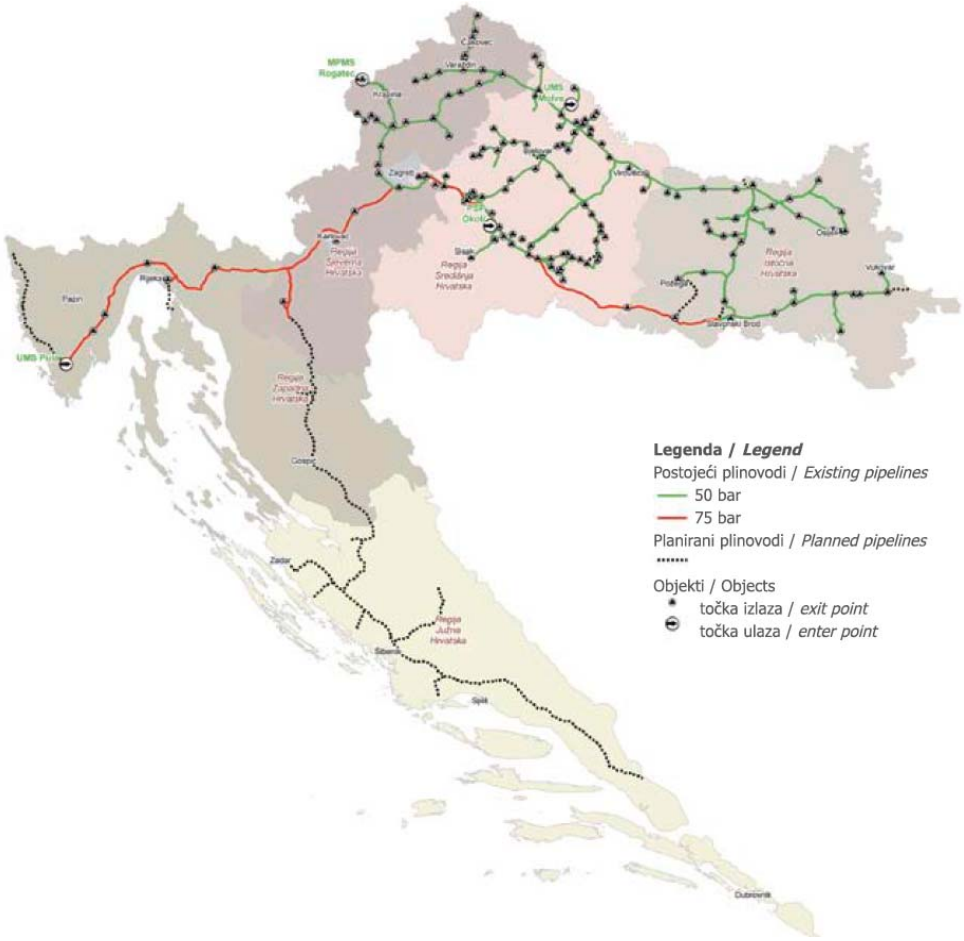

Fig. 4 *Transport system of natural gas in the Republic of Croatia [2].*

The natural gas transport system (Fig. 4) comprises 2 113 km of pipelines, 154 exit measuring-reduction stations with 257 measuring lines and 19 entry measuring stations.

The Bosiljevo-Split natural gas pipeline is already under construction, which will facilitate a link to the Adriatic-Ionian natural gas pipeline. Moreover, the Croatian and the Hungarian natural gas networks will soon be connected, which will make the transport of Russian gas cheaper.

Total natural gas distribution pipeline length amounts to 17 482 km. The main problems in natural gas distribution are too many company for gas distribution (42) with small number

of consumers and too many employees and high gas network losses (almost half distribution companies have network losses higher than 4 % - recommended value in Croatia).

5. Conclusion

The development of the energy market in Croatia was formally begun in July 2000 by delivering the Reform Programme of Energy Sector in the Republic of Croatia. A year later the Croatian Parliament passed a set of energy Acts - Energy Act, Electric Energy Market Act, Gas Market Act, Oil and Petroleum Products Market Act, The Act Regulating Energy Activities (Official Gazette, No. 68/2001), which helped the regulation of the relations on the Croatian energy market according to the EU guidelines for the field of power industry valid in that period. In the meantime new versions of named Acts are accepted and some completely new Acts were issued.

Uncertainties on global energy markets, occasional instabilities and crises, could be result in greater vulnerability of the energy markets of small countries like Croatia. This should be taken into consideration when planning future natural gas supply in Croatia. In October 2009 Croatian Parliament passed an Energy Sector Development Strategy, where important goals in natural gas sector are defined. In this moment, economic crisis make some projects realization questionable.

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