
Adriatic Coastal Zone Under Pressure of the New Croatian Energy Policy

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Summary

The Croatian part of the Adriatic coastal belt and its hinterland are built of specific geomorphological material, karst. This is a highly sensitive system and basically marked by an extremely complex regime of peculiar karst circulation of water. 80% of Croatian capital is natural and only 20% man-made (anthropogenic). The particularly fast Croatian development, can use and even abuse natural capital without any concern for sustainability. Prevention of this type of development is possible with adequate laws and their enforcement. A list of legal provisions shows that they can guarantee sustainable development. The problems start with their implementation. The 1997 Strategy on Spatial Arrangement states that Croatia will direct its development by applying contemporary global principles of environmental protection. Adriatic coastal zone is proclaimed as a space of tourism which implies an increasing need for energy.

Croatia is without a real energy strategy that would reflect the concept of sustainable development. A detailed description of a certain number of national energy programs is given to show that they are in their initial phase. The dominant role of HEP is easy to detect in the arena of Croatian energy policy. The provisions from 10 national energy programs aimed at sustainability have not been included in the scenarios regarding the construction of new plants by energetics by 2010 and even less in the scenarios until 2030.

The short-term strong influence of HEP is noticeable in their effort to impose two new coal-power plant in the Adriatic zone: Plomin II and Lukovo Šugarje – the region that is one of Croatia's biggest natural assets. HEP policy represents a very heavy toll on the environment of the Adriatic zone, that might be heavier than this fragile karst area can bear.

1. Main features

The Republic of Croatia covers 56,538 sq. km and the territorial sea of ca. 31,000 sq. km and a possible economic zone of further demarcation of ca. 60-70,000 sq. km. Territorially, it comprises three main regions; the littoral one, the Pannonic one, and the mountainous one.

The littoral area is a relatively narrow coastal belt by the Adriatic Sea, deeply-cut into the European continent as a part of the Mediterranean between the Apennine Peninsula and the Balkan Peninsula. The indented seashore is 1,777 km long, whereas the indentations in the coastline, including 1,185 islands (66 inhabited) and islets, are 4,012 km long. The climate is characterized by hot and dry summers and a great many

clear and sunny days, as well as mild and rainy winters. One of the outstanding natural features is the transparent blue sea, as well as the littoral karst, the sub-Mediterranean and Mediterranean vegetation.

The sea by the shore is mostly shallow, separated from the high seas by numerous islands. The bulk of the Adriatic Sea is in the Southern and Central Adriatic (90% of the water mass). The Bay of Venice-Trieste-Istria is the shallowest part of the Adriatic (2% of the volume), but it is of great importance for the biological regeneration of the whole Adriatic, and – by the same token – the Mediterranean.

The quality of most of the volume of sea water (over 95%) is extremely well-preserved. It is only immediate aquatoriums of major sea ports that are endangered. An exception to such a good state of preservation is the Northern Adriatic, whose average depth is up to 20 m. The increasingly frequent and intensive manifestations of the upset natural equilibrium there point to the fact that, in addition to a continuing and improving long-standing sea monitoring in cooperation with the neighbouring states of Italy and Slovenia, practical rehabilitation interventions should be undertaken. Considerable activities that have been developing in Croatia in recent years, especially in the area of waste water treatment in all of the North-Adriatic coastal and insular regions will, undoubtedly, improve the state of the sea by the shore. Unfortunately, a breakthrough in this area involving the whole of the North-Adriatic aquatorium cannot be expected.

For the overall development of Croatia, very significant and highly valuable are those natural phenomena that are the result of specific geomorphology and geographical position. 329 nature's entities enjoy protection, among them seven regions that are natural parks. It has been proposed that another 127 entities be put under protection by the year 2000, so that an area of 8,165 sq. km, or 14.44 per cent of the territory of Croatia will be included.

The coastal belt and its hinterland are built of a specific geomorphological material, karst. The Dinaric karst, registered as a part of world natural heritage (*locus typicus*) is a highly sensitive system and, basically, marked by an extremely complex regime of the distinctive karstic circulation of water.

In this part of Croatia there are very well-preserved natural sites with rare and protected sorts of the flora and fauna of special significance for Europe and the wider Mediterranean region (the Lonja Plain, the Kopačevo Marshes). The Velebit mountain, the most important mountain in Croatia, from the relief and vegetation point of view – 415 km long, proclaimed a reserve of biosphere (UNESCO 1978), the nether part of the Neretva river, and the Krka National Park – the karst river with travertine cascades partly formed into lakes. The valley is mainly canyon-like.

2. Socio-political circumstances

The past prewar period of development was characterized by the following approach to the problems of the environment and development: the prevailing opinion was that effective environmental protection can only be achieved at a higher level of

economic development and that an endangered environment does not call into question the standard of living and overall future development.

Unfortunately, this approach has not been changed in the new Croatian state; the difficulties do not occur in accepting the new ideas as much as in abolishing the old ones. Like in other postcommunist or transitional countries, the decision-makers in Croatia also think that nature is irrelevant and technology is all-important. The concept of sustainable development is not applied but only used as pretext with a purpose of greenwashing. Croatian decision makers have been following the neoclassical economic models that are blind to the ecological structure and the function or to the carrying capacity of environment, defined as the maximum load that can safely be imposed on the environment by people. At a certain point in development, consumption of the economy exceeds the natural income, resulting in the continuous depletion of natural capital. Natural capital is a stock of natural assets that fields a flow of valuable goods and services into the future.

The sustainable harvest is a flow that is termed natural income. The stock that provides this sustainable flow is the natural capital. There are three classes of natural capital:

1. renewable natural capital: living resources, ecosystems, solar energy, photosynthesis. It is self-reproducing and self-maintaining, capable to provide marketable goods (wood, fibre, etc.) and a number of services (e.g. waste assimilation, climate regulation, etc.);
2. replenishable natural capital: e.g. ground water, or ozone layer driven by solar energy input;
3. non-renewable natural capital: fossil fuels, minerals, inventories – any use of which means liquidating part of the stock.

An analysis of natural capital shows that the first two classes, the renewable and replenishable, are essential for life support. These are, generally, non-substitutable, and more important for sustainability than the non-renewable class.

It is important to emphasize that according to the economic estimation, the highest part of Croatian capital is natural – about 80%, while only 20% of it is man made (anthropogenic). It is no wonder that the Croatian development, especially fast, could use and even abuse its natural capital without any concern for sustainability. Prevention of this type of development is possible with adequate laws and their strict enforcement.

3. Legal provisions

Law in Croatia as an instrument of environmental policy already contains enough provisions to guarantee sustainable development. Regarding the littoral zone in Article 52 of the 1990 Constitution of the Republic of Croatia, it is stated: “The sea, seashore and islands, waters, air space, mineral wealth and other natural resources, as well as land, forests, fauna and flora, other parts of nature, real estate and things of special cultural, historic, economic or ecological significance which are specified by law to be

of interest to the Republic, shall enjoy its special protection.” The 1992 Declaration on Environmental Protection in the Republic of Croatia says that “the Republic of Croatia, recognizable worldwide as a country abounding in a variety of natural values such as the littoral and the islands, fertile soil, waters and waterflowers, forests growing wild and numerous unique and internationally praised scenic beauties, is determined to realize sustainable development, based on subsisting agriculture and forestry, navigation and tourism, as well as the economy and industry with ecologically permissible technologies as their basis”. The Republic of Croatia, in connection with this value orientation, shall undertake many activities and measures among which are the measures for protecting the coastal and submarine parts of the Adriatic, in view of preventing its further pollution from land and from ships and preserving the riches of its flora and fauna with the purpose of their reinstatement into the submarine park projects; engage in the planned-out management of the tourist area of the coast and the islands to make a harmonious and effective development possible without decreasing the values and attractions of the Adriatic scenery.

To attain this goal the reception and accommodation possibilities of the Adriatic area will be identified and a set of rules determined for its users, including a strict control of marina development. All orientations concerning the protection of individual parts of the ecological system will be incorporated in the new physical planning documents of the Republic of Croatia, the objective of which is to acquire an optimum and rational space management.

The 1994 Law on Environmental Protection contains principle of preserving values of natural resources and bio-diversity. It is not permitted to decrease the value of natural resources, water, sea, soil, forest and indigenous values of karst (Art. 12). In the implementation of the Law on Spatial Arrangement (1994), the government is obliged to pass the regulation in order to settle and protect the coastal zone (Art. 45). This is very important because it is expected that the biggest part of all investment might be channelled into this region.

The 1997 Strategy on Spatial Arrangement states that Croatia will direct its development by applying contemporary international principles of environmental protection. In this document, the Adriatic coastal zone is declared the space of tourism as its dominant developmental orientation.

The strategic orientation toward the development of tourism in the Adriatic region includes an increasing need for energy in order to improve for tourists the quality of service. Here the energy policy takes over, and it has very little or even nothing in common with sustainability.

4. Energy

Croatia is without its real energy strategy that would reflect the concept of sustainable development, so one can often get impression that the energy policy is created and implemented on an *ad hoc* basis.

However, the Energy Institute “Hrvoje Požar” (established in 1994), has the mission to work on the system planning and the organized economy in the energy sector. The Institute is a non-profit organization owned by the Republic of Croatia (Ministry of Economy and Ministry of Science and Technology), HEP – public electric power supplier and INA – public gas and oil company.

According to the Energy Institute, the realisation of the energy policy of the Republic of Croatia is planned through a certain number of national energy sector development programs whose goals are, among others, to come to the most efficient consumption management and phased increase in the use of renewable energy sources. These programs comprise a number of legal, economic and promotional measures that could be pursued by the government, the counties and the cities, and other legal and natural persons concerned. In March 1997, a certain number of agreements were reached to meet the need for initializing and managing ten national energy programs, between government institutions, HEP, INA and other state owned companies on the one, and the Energy Institute “Hrvoje Požar” on the other side. The number of national energy programs is not limited, since the general intention is that additional programs, considering other important issues for energy sector in terms of environmental and efficiency benefits, could also be introduced.

The ten national energy programs with the Energy Institute “Hrvoje Požar” are:

1. PLINCRO – the gasification program for Croatia

This program’s objectives are to increase the share of gas consumption in the energy consumption structure as a whole as a prerequisite for the expansion of gas network into all until now non-gasified regions. The gas network has only been developed in the north-western part of Croatia, in the areas where gas has been exploited or in the region that traditionally use city gas. The gasification problem means: new sources of gas supply should be secure; all conditions should be fulfilled (from legal to organizational and institutional for the expansion of the gas network to all regions where gas never has been used); the promotion and education in terms of gas use benefits should be carried out; and a system of incentive measures for gas programs realization should be set. The counties’ cooperation and their active role is very important for the realization of this program.

2. KOGEN – Cogeneration program

The program objective is to realize all the preconditions and remove all the obstacles to increasing the cogeneration plants construction, anywhere where thermal energy and electricity are used in technological processes. Of course, it is necessary to assess the project’s economic feasibility and its cost efficiency. Judging by other countries’ experiences, a number of barriers are known, from legal and investment security to low level of information, as well as inactivity of corporate management. In program realization, an active role of the government and its expert institutions in providing the necessary conditions for large cogeneration plants construction is important.

3. MIEE – Industrial energy efficiency network

The network installing program objective is to ensure all institutional, organizational and expert prerequisites for increasing energy efficiency in industry, service sector and public sector. The model is based on experiences of developed countries, involving the sector's organization in economy and the public sector in order to gradually increase energy efficiency through companies' own expert teams and other experts' work, as well as through energy balances, companies comparing information, education and special projects.

4. MAHE – Small hydropower plants construction program

This program aims at providing all the conditions for the construction of a greater number of small plants. This program ought to eliminate all obstacles and work out all incentive measures and modes of future investors' assistance, as well as an information system and the program promotion. Formally, there are no barriers for small hydropower plants construction, but the reality supplies a range of obstacles that could discourage prospective investors. The Croatian power sector is ready, according to its Board of Directors' decision of 1994, to collect the total electricity produced in small hydropower plants (with the installed capacity up to 5 MW), against a price set as the percentage of average electricity sale prices. According to the Register of small hydropower plants, available energy potential of small hydropower plants in Croatia has been defined and these assessments show that Croatia has more than 100 MW of unused hydro-potential in terms of small power plants. Besides the provided buyout, it is necessary to provide for the perspective future investors simple legal regulatory processes for getting location licenses.

5. SUNEN – Solar energy use program

This program's objective is to provide all legal, incentive, promotional and other prerequisites for a significant solar energy use. Solar energy has particular importance among renewable energy sources and potentially is the single most important renewable energy source. This type of energy gives two energy outputs: thermal energy and electricity. At present, the technological level conversion into thermal energy is of particular interest. Ecologically it is a clean source of energy and, therefore, acceptable to households and service sector (tourism), especially in the Croatian island and coastal area.

6. BIOEN – Biomass use program

This program plans to use waste-wood, straw, bio-gas, and other waste, and the conversion from the biomass to the liquid fuel (ethanol, methanol) for traffic purposes or as a base in chemical industry. The amount of energy in dry biological material is around 15 MJ/kg. Therefore, the crop cultivation as an energy source competes with the crop cultivation as a food resource. Crop and animal wastes, as well as municipal sewage could be used as energy sources in agriculture, cattle breeding, and in urban areas.

7. ENWIND – Wind energy use program

In order to start this program it is necessary to assess the potentials and possible locations which will, except for the economic and energetic value and acceptability, also be environmentally acceptable because of the noise and the visual changes in the landscape. Besides, the institutional framework will be established as well as the funding policy and the incentive steps in using the wind energy.

8. GEOEN – Geothermal energy use program

In the Pannonic Plain the established geothermal gradients are higher than the European average, which could result in an economically acceptable generation of electricity. It is also possible to use this thermal potential in agriculture, sanatoriums, hotels, residential buildings, etc. This program should provide the framework for constructing and exploiting profitable objects.

9. KUENZgrada – Energy efficiency in building

The program of energy efficiency in building includes the changes of regulation in order to stimulate better thermal insulation and reconstruction of the existing residential buildings. With the technical and organizational steps that would be economically justified, it is possible to reduce the consumption of heating energy. The essential task is to increase public awareness over the issues, which includes informing and counseling public on the existing or projected objects, as well as creating a system of measures and activities, setting priorities in the reconstruction of the existing residential capacities.

10. KUENcts – Program of energy efficiency in the centralized thermal systems

A great number of thermal energy consumers in Zagreb and Osijek are using centralized heating systems. In future, it will be possible to apply such systems in other Croatian cities as well. Due to a lack of individual measuring devices with each consumer, as well as to overall interactions in the energy sector, energy efficiency is not very high and there is still room for essential improvements. The aim of the program is to define all conditions for energy efficiency increase, ranging from thermal consumption measuring to the overall situation in the energy sector in terms of ownership and economy.¹

It is important to mention that in one (last) described program KUENcts, it is stated: “The main feature of today's thermal energy generation and consumption, when compared to the modern criteria of the developed countries is that it has little or no consideration for positive ecological criteria and environmental protection, this being observable not only during generation, transportation and distribution but also in the relation to consumers. The generation, transportation and distribution are followed by non-rational fuel utilization and the emission of pollutants during combustion, major losses of hot water and steam and losses of operational and thermal energy. The house-

¹ *National Energy Programs*, Energetski institut “Hrvoje Požar”, Zagreb, May 1997.

hold energy consumption is also characterized by uneconomical use of energy resources resulting in considerable energy losses and bearing a direct negative influence on the environment.²

Although the concept of national energy programs was set up in order to rally on the one side, all state institutions that are somehow involved in program realization through their, in one way or another regular activities and all experts and scientific institutions following the lead of the Energy Institute “Hrvoje Požar” on the other side; although The Energy Institute is endorsed by government to coordinate all national energy programs – the dominant role of HEP is easy to detect.

In 1995 the Energy Institute published preliminary results of its project “Razvoj i organizacija hrvatskog energetskeg sektora” (Development and organization of Croatian energy sector) – called PROHES – with 5 scenarios related to the new electric power plants till the year 2010. The difference among them is worked out on the basis of the quantity of gas at the disposal for the production of electric power:

Structure of new power plants by energents

	Higher scenario 1		Higher scenario 2		Higher scenario 3	
	MW	%	MW	%	MW	%
Gas	572	51.7	752	58.5	392	30.7
Imported coal	350	31.7	350	27.2	700	54.9
Hydro	184	16.6	184	14.3	184	14.4
Total	1,106	100.0	1,286	100.0	1,276	100.0

	Lower scenario 1		Lower scenario 2 ³	
	MW	%	MW	%
Gas	352	41,8	532	79,2
Imported coal	350	41,6	–	–
Hydro	140	16,6	140	20,8
Total	842	100,0	672	100,0

The span of percentage from 27 to 55 for the new power plants on imported coal is very big and unacceptable even at the lowest level as it doesn't reflect sustainable energy policy at all.

² KUENets – Energy Supply Efficiency Program with Centralized Thermal Systems, Zagreb, 1997, p. 4.

³ *Razvoj i organizacija hrvatskog energetskeg sektora, (Development and organization of the Croatian energy sector)*, Energetski institut “Hrvoje Požar”, Zagreb, 1995, p. 73.

Three years later a draft on the Strategy of energy development of the Republic of Croatia has been published. It deals with 3 scenarios: S-421 – based on classic technologies without active state measures;

S-422 – based on new technologies and active state measures and S-423 – ecologically-based scenario implemented under the influence of redirected global economy.

According to the S-421 scenario, the role of coal power plants in the production of electric energy would increase dramatically from 3% in the year 1995 to 33% in 2010 and 39% in the year 2030. At the same time the use of gas would increase at a slower rate: from 7% in 1995 to 21% in 2010 and 36% in the year 2030.⁴

The S-422 scenario with new technologies and active state measures would produce almost no difference in the year 2030 – regarding the role of coal in the production of electric plants: 38%, but significantly lower in the year 2010 – 17%.⁵ It seems that according to this scenario the role of the government measures and the new technologies could produce more mid-term than long-term sustainability. One must wonder what the logic on which this scenario is based is.

Even less logical is the S-423 scenario, where the role of coal in the electric power plant is bigger than in the S-422 scenario – 41% in the year 2030, and the same – 17% in the year 2010. This scenario makes a mention of one 50 MW coal power plant built between the years 2010 and 2020 and one more also 500 MW between the years 2020 and 2030.⁶

While the Energy Institute is engaged in the elaboration of energy policy in the mid- and long-term period, the strong influence of HEP is visible in the short term period.

The main creator of the energy policy is HEP (Hrvatska elektroprivreda – Croatian Electric Power Utility). With its monopoly HEP is in the short-run imposing more or less successfully the concept of energy policy that is far away from the sustainable energy policy. This is very easily seen in HEP's effort to impose two new coal-power plants in the Adriatic zone with the imported coal from China.⁷ One of them, named Plomin II, will be located near the old coal-power plant – Plomin I. The experience with the old coal-power plant concerning environment and health was extremely negative, and it caused strong opposition by the local people and the local and regional authorities, but without results. HEP was supported by the Croatian government. Now it is certain that Plomin II will be built and used to produce energy. The pilot production will start on the 30th of June 1999, the general manager of HEP announced in December 1998. The environmental protection standards are significantly higher than in

⁴ *Strategija energetskeg razvitka Republike Hrvatske*, Zagreb, 1998, p. 97.

⁵ *Ibid.*, str. 109

⁶ *Ibid.*, str. 119.

⁷ HEP's monopoly position leads them to arrogance: they have spent 8 millions DM for the feasibility study related to the first underground hydro-power plant in the world, also located in the Adriatic (karst) zone – near Dubrovnik!

the case of Plomin I, but the question is whether they can ever be high enough when the coal-power plant is concerned.

HEP would like to build the second coal-power plant in Lukovo Šugarje, a settlement at the foot of Velebit – the mountain that is one of the biggest natural assets in Croatia – because of its biodiversity. In the Velebit mountain there is the Paklenica National park – the area that according to law must enjoy the highest level of protection and, last but not least, this is the area of karst, a very precious and sensitive area whose carrying capacity is low. Lukovo Šugarje, a new location in HEP's plan, has not passed the EIA procedure which is obligatory in the case of energy facilities.

HEP's intention to build a coal-power plant in Lukovo Šugarje provoked an outcry among the local population, that very soon spread through the wider region and finally throughout the whole Croatia. The SOS Velebit campaign was launched, under the guidance of one umbrella NGO – Hrvatski planinarski savez. More than 70,000 signatures against the coal-power plant in Lukovo Šugarje have been registered.

But HEP have not given up on the idea of building a coal-power plant in the coastal zone. For them, this is the best solution, and the alternative is no electricity in the Adriatic region.

The grand HEP's vision is no vision at all. It emerges from the concept that belongs to the sixties. In this concept, future needs are determined by the extrapolation of statistical trends: in the year 2010 the total energy consumption might be 491-511 PJ (three scenarios) compared with 459 PJ in 1988 (during the war, the consumption decreased for 34% in 1992 i.e. 303 PJ and then again increased 6,6% i.e. 318 PJ in 1995). This means new 1500 MW of power in 2010 and 600 MW more till the year 2020.⁸

Even if this forecast of future needs is correct, the structure of consumption has to be challenged. Croatia doesn't follow its natural resources endowment: it aims at increasing the share of imported coal. If Croatia must import, then it is better to import gas as environmentally the friendliest of all fossil-fuels. Instead of selling MW, HEP should sell NW (nega-W i.e. making profit by saving as opposite to selling energy). Energy efficiency should be among the energy-strategy measures. Renewable energies such as solar, wind and geothermic energy, as yet a mystery for HEP, but for Croatia promising alternative energy paths. If HEP will go on insisting on new coal-power plants, especially in the Adriatic zone – this should be interpreted as a direct defiance of the general principle of life preservation sustainability. In the Croatian case this behaviour is at the same time nonconstitutional and illegal. Nothing can be done without the law implementation and the law enforcement. In postcommunist countries it is not easy to achieve law implementation and law enforcement. Power holders may find their own interests in conflict with law.

⁸ 1995 Croatian consumption pattern: share of oil 45%, gas 30%, coal 10%, hydro 15%; energy import: 40% oil and 35% – gas. Production of electric energy system: 4 thermo-electric power plants with 935 MW installed; 3 other combining 315 MG of electric and 1610 MW of heating power; 51 MW diesel plants; 340 MW from industrial plants; 1,684 MW from 11 hydro-power plants (accumulation systems); 374 MW from smaller hydro-power systems and 332 MW from nuclear power plant.

The public, or common interest of Croatian citizens is not guiding their actions and decisions. On the other hand, traditional political culture produces citizens who are not actively involved in the decision making process, and expect authorities to do what is good for them.

Those 70,000 signatures against the coal-power plant in Lukovo Šugarje might be a break from the vicious circle of the traditional political culture which is incompatible with environmental protection, although HEP is not giving up the idea of a coal power plant in Lukovo Šugarje, justifying it with national importance and a need to locate it at the Adriatic Coast.⁹ The final answer belongs to the Croatian Government and its Parliament.

HEP's policy of new coal-power plants represents a heavy pressure on the environment of the Adriatic zone; the pressure that might be heavier than this fragile karst area can bear. It's well known that a damage to the karst soil is irreparable, and in the case of this power plant many dimensions of environment are endangered and some effects are transboundary. But even when they are not transboundary, there is total neglect of certain international conventions such as: UN Framework Convention on Climate Change, UN Convention on Biological Diversity, and the Barcelona Convention. It remains to be seen if the ultimate decision makers can ignore it.

Translated by the author

⁹ HEP press-conference, Novi list, December 18, 1998.