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## CROATIAN ENERGY STRATEGY AND NUCLEAR POWER PROGRAMME

By exclusion of the nuclear option from the energy strategy of the European Union the realization of the energy targets set forth by the Energy Roadmap 2050, i. e. achieving the low carbon economy becomes disputable. The IEA warns that the abandoning or the new moratorium on utilization of nuclear energy endangers the targets associated with reduction of greenhouse gases, and in particular the reduction of CO<sub>2</sub> emissions by 80–95% if compared with the basic year 1990.

The dependence on exported fossil fuels in the EU accounts currently for over 50% and will, as anticipated, exceed 70% by 2030, unless the measures are taken and the target 20–20–20 is accomplished. Apart from the economic indicators revealing the vast increase of expenses associated with financing of the energy sufficiency providing for sustainable growth without the nuclear power plants, the possibility of realization of such a scenario becomes technically disputable. That is, the electricity generated in nuclear power plants is currently the only predictable base load energy source without CO<sub>2</sub> emissions with the proven technology.

The future of sustainable energy system relies increasingly on energy efficiency, and consequently on efficient energy generation. The limited fossil resources required in other industry branches as well, particularly in petrochemical industry, the products of which are indispensable in contemporary life and in the future, will determine the method of utilization of the energy resources. Even now the oil combustion for the purpose of electricity generation is hardly acceptable. Although the gas will play a special role in the future with respect to conversion in electricity, it becomes cost-effective only in joint generation with the thermal energy, i. e. in cogeneration. This requires also the introducing of the CCS technologies both for coal energy plants and gas plants. The unpredictability of the RES, such as wind energy, hydropower potential, intermittency of solar energy, indicates the necessi-

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ty of technical upgrading of electricity networks, as well as the so called smart networks, smart cities and consumers.

The emerging market economies such as the market of the Republic of Croatia are even more sensitive and exposed to the energy prices fluctuations. The decision on selection of the appropriate energy mix become thus more complex and has more severe impacts. The Republic of Croatia is importer of primary energy. The current dependence on import accounts for 50% and is likely to increase unless the energy generation structure changes as well as the energy consumption structure. The goal of the Croatian energy strategy is to achieve at the national level the 20–20–20 common EU goals, maintaining at the same time the current percentage of RES in electricity generation accounting for 35% (Figure 1.)

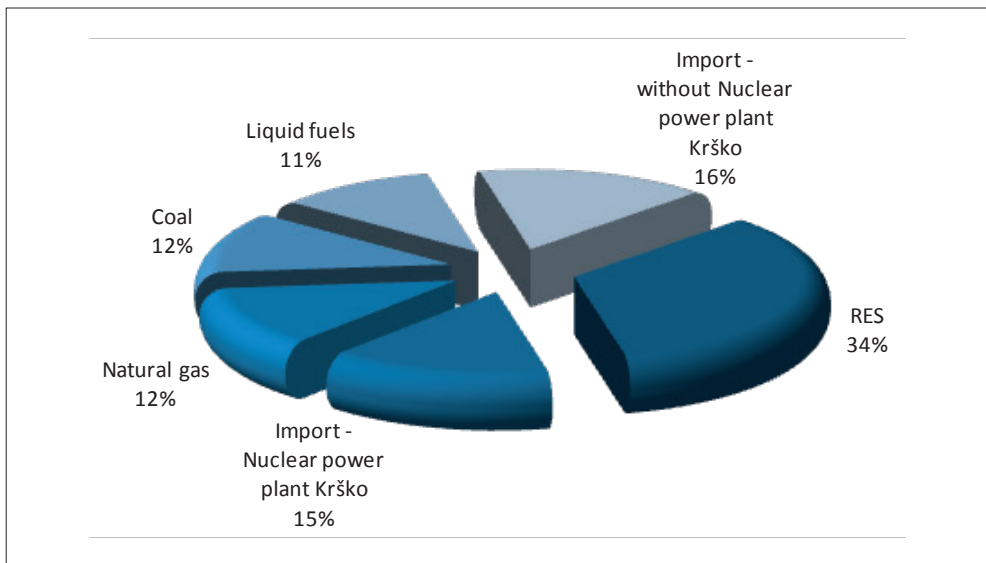


Figure 1: Electricity generation structure in 2006 (%) base year for energy strategy

Increasing of electricity consumption, shutting down the thermal power plants with no longer valid life time and a need to ensure reserve capacity in the system require for building the thermal power plants of total capacity not less than 2,400 MW in a period of 2009–2020.

The strategy has proposed the three possible scenarios of energy sector development and clearly indicated that the targets referring to reduction of CO<sub>2</sub> emissions will not be achieved without generation of electricity from nuclear power plants (Figure 3.).

These scenarios were analyzed and their features compared in relation to the fundamental energy development objectives: security of energy supply, competitiveness and sustainability. Lower electricity price from nuclear power plants shall

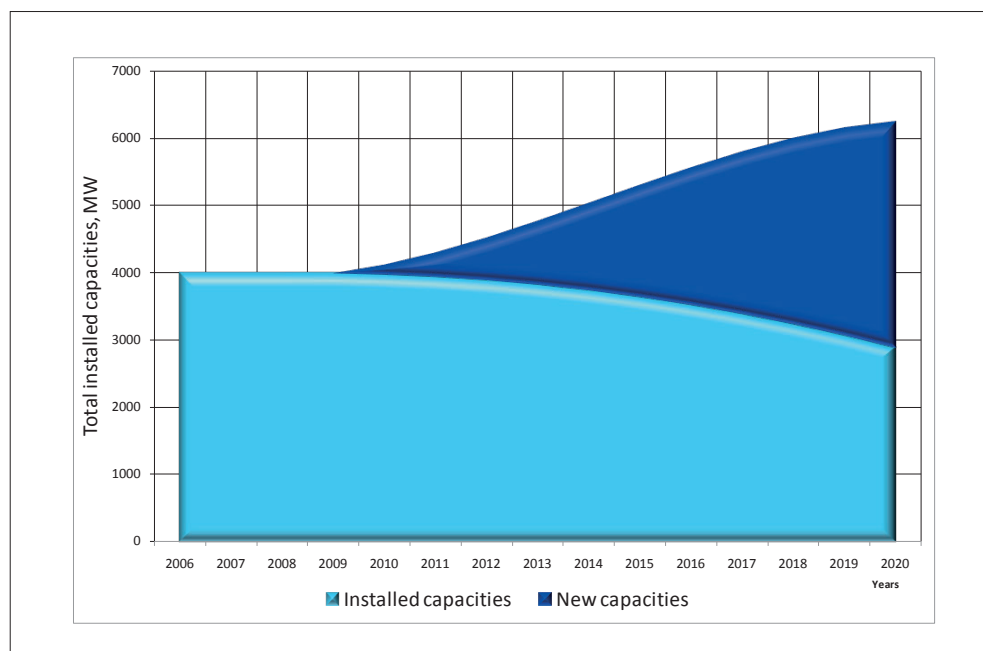


Figure 2. Installed capacity and starting up new plants

enable the construction of renewable energy sources power plants. If the construction of nuclear power plant fails, the electricity price will be too high for end users, so it will be questionable, and probably economically and socially unacceptable, to surcharge the compensation for renewable sources incentives, without which the required investments into these technologies would surely fail.

The structure of electricity generation imposed also by targets referring to transport, i. e. transfer to electrical vehicles and transport of goods predominantly by railway present additional challenge after 2020.

Taking into consideration all the above-mentioned elements, the launching of the Croatian Nuclear Energy Programme comprises two basic goals:

- providing for existence (co-existence) in immediate vicinity of two nuclear power plants and five nuclear reactors in Krško and Paks;
- providing for preconditions required for decision making and realization of nuclear power plant construction.

The fact that the Krško Nuclear Power Plant is located near the state border and the suburb of Zagreb is located within the circle of 25 km implies the commitment of the state administration bodies to prepare the legislative and regulatory framework providing for necessary safety procedures elements, i. e. monitoring the cross border impacts of operation of the said plants.

By a combination of historical circumstances the Krško Nuclear Power Plant is a good example of the former cooperation of the two electric-power industries, i. e.

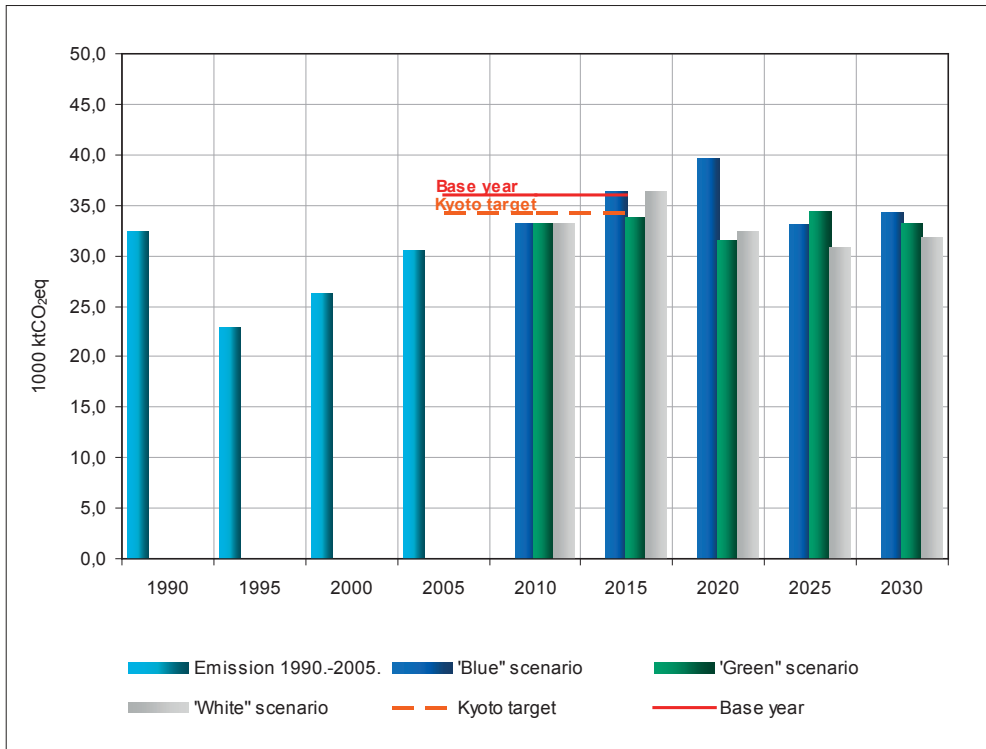


Figure 3. Total emission of greenhouse gases according to three possible scenarios: "Blue" scenario (natural gas, coal, RES); "Green" scenario (natural gas, nuclear, RES); "White" scenario (natural gas, coal, nuclear, RES)

Zagrebačka elektroprivreda from Croatia and Savske elektrarne from Slovenia. Today, it is a good example of intergovernmental cooperation of the two neighbouring countries, the Republic of Croatia and the Republic of Slovenia. The Agreement between the Government of the Republic of Slovenia and the Government of the Republic of Croatia on the Regulation of the Status and Other Legal Issues Regarding Investments in KNPP and its Exploitation and Decommissioning (Official Gazette – International Agreements, 9/02) in the Republic of Croatia has a force of law. This Agreement defines all the important issues and responsibilities during the operational time of the power plant, as well as after the termination of its work in the decommissioning phase. The two owners, Hrvatska elektroprivreda d. d. and Slovenian GEN Energija d. o. o., in compliance with their equity shares of 50% are sharing production, while the energy price is conditioned by operational costs of the safe, protected and efficient operating of the power plant. In this connection, each owner meets its own financial commitments related to RAO and decommissioning of the power plant by its payments into the national Funds established for this purpose. In this regard, the concern for the power plant's safety is common.

However, in compliance with the legislation related to nuclear facilities, the operating conditions have been regulated by the law of the country on the territory of which the nuclear facilities are located. Also, the regulatory body comes from the host-country. A neighbouring country has no obligations in this sense, or rights as well, remaining thus only the participating, through strategic evaluations of the cross-border impact on the environment before the construction of the power plant or nuclear facility. Therefore the launching of the Croatian Nuclear Energy Programme (CRONEP) is for the Republic of Croatia of paramount importance in order to preserve and develop knowledge acquired during projecting, construction and management of the power plant. In the conditions of life in the proximity of the nuclear power plant it is a necessity, as well as the regional cooperation's deepening, full transparency of the nuclear facilities' operating, quality systems of monitoring and informing.

We are witnesses of the nuclear accidents that have left deep wounds in the human history. Events in Chernobyl 25 years ago and this year's accident in the Fukushima power plant call for caution and review of nuclear facilities' safety and protection notions, and even more whether we are consistent in applying all the acquired knowledge.

The latest experiences point repeatedly to the necessity of monitoring continuously and of reviewing the safety of nuclear facilities, of the locations on which they are situated, conditions in which they operate. In the future a stronger role of the IAEA is expected, and that its opinions and conclusions from the peer review become binding. This includes a binding opinion related to approval of location selection for power plant construction or some other nuclear facility. In technological sense, the development of new types of power plants of medium power should be promoted. This type of facility is more adequate for smaller economies and is more favourable concerning safety issues and environmental impact (cooling). The historical experience shows us that nuclear facilities should not be the object of an extra profit realization but should be in service of safety of energy supply and global safety. The biggest unit capacity may be implemented in big economies or regionally. However, may be the time has come that good projects like Iris receive their place in the energy picture and nuclear future. The World in 2011 has received a strong and terrible warning that will for sure return it to the path of strict observance of the already adopted standards respecting necessity of further use of the energy generated in nuclear reactors.

