

NUCLEAR ENERGY AND ENVIRONMENTAL PROTECTION

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ABSTRACT: *In this paper are analyzed prospects for nuclear energy utilization in the future paying special attention to the protection of environment.*

Shadow of global crisis appeared over all of us during these days. The most important story in media in 2009. in all countries of the world was economic crisis, with fight against terorism, as well as the protection of the Planet Earth. More and more energy is needed, but as the branch of economy, energy is the greatest pollutant of environment. Environmental safety represents the very important factor of functioning of different technological systems all over the world, as pollution does not recognize borders of countries.

Today, energy is priority and there are 56 energetic nuclear reactors in construction in the world and the most of them 21 in China, then six in South Korea and five in India.

Law on energy¹ was adopted in Serbia in 2004. These days on nuclear energy utilization discuss those who oppose to the construction of nuclear power plants in Serbia and those who support this idea. It is necessary that we in Serbia become harmonious builders of possible dreams!

KEYWORDS: *energy, environment, protection, pollution*

JEL CLASSIFICATION: *K 00, K 32*

Introduction

World financial crisis developed into world economic crisis and that has every day more implications on bussines and economy in Serbia (on the economic activity and of course, employment, less working places and projects, revival of the black market).

The most important story in media in 2009 in all countries of the world was economic crisis, with fight against terorism, as well as the protection of the Planet Earth. More and more energy is needed, but as the branch of economy, energy is the greatest pollutant of environment. Environmental safety represents the very important factor of functioning of different technological systems all over the world, as pollution does not recognize borders of countries.

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¹ »Official Gazzette RS«, no.84/2004.

The atomic energy by itself is not evil or good. Its role of »evil giant or Prometheus in the history of the mankind« will depend on the purpose the people give it, the aims they dedicate it to.

In spite of the increasing actuality of the problems related to nuclear law today, nuclear energy produces one-sixth of the world's electricity and could produce far more. But it is also necessary to mention the accidents occurring during the production, processing, storing, transport and disposal of the nuclear material.

In this paper are analyzed prospects for nuclear energy utilization in the future paying special attention to the protection of environment.

Crisis and nuclear energy

Shadow of global crisis appeared over all of us during these days. Development of nuclear sciences became for some people the symbol of progress and instrument of overcoming of backwardness, while for others still represents the symbol of power and force, being one of the instruments of economic domination.

Greece for example, met New 2010. Year with the new »crisis budget« which anticipates restriction, savings and renunciations in order to partially reduce the deficit of 12,7% higher than permitted in European Union. And Serbia is much more vulnerable than developed countries because Serbia is a small country on 88.361 square kilometers and with 7,5 million inhabitants in existing 29 districts and 194 municipalities, occupies 2,1% of areas of Europe.

Crisis became the first-class alibi for all mistakes and irresponsibility and corresponds to apathy which developed.

Although the efforts of lawyers to make up-to-date and closer to reality regulations are evident, the problem represents the absence of coordination between law and technology development. Technology is always one step in advance referring legal regulations. Sometimes that step means a real problem. The legal regulations on control and sanctions must be based on practical experiences in order to work efficiently and not to interfere with the further nuclear science and technology development.

The number one radiation protection rule is the ALARA² concept, which means that any dose of radiation should yield the lowest amount possible with the highest degree of radiation protection available.

Law on energy³ was adopted in Serbia in 2004. These days on nuclear energy utilization discuss those who oppose to the construction of nuclear power plants in Serbia and those who support this idea.⁴ It is necessary that we in Serbia become harmonious builders of possible dreams!

The argumentation of first is that in Serbia there is no solid scientific study on national needs for electrical energy in the next few decades, what coincides with the period of utilization of one nuclear power plant. This study should encircle also the other possible sources of energy, as well as measures for reduction of irrational utilization of energy. Others consider that, having in mind the current global policy, but also the

² ALARA means As Low as Reasonably Achievable.

³ »Official Gazzette RS«, no.84/2004.

⁴ Compare: "Politika", 7 February 2010, p. 12 and 13.

negative climate changes on the Planet, unless it does not desire to fall behind the developed part of the world, Serbia has to decide to produce and use this type of energy.

While first consider that the fact of living in the politically unstable region, in the world of organized terrorism in which the diversion on nuclear power plant may cause unforeseeable consequences, represents sufficient reason against construction of nuclear power plants in Serbia, others point out that every 30 years the number of inhabitants of the Planet doubles, and that 21st century is the one in which the decision is made on the future of the mankind, so there is no time for waiting, when the construction of nuclear power plants is being discussed.

Experts are split up also in the matter of supply with nuclear fuel of these plants, because first consider that only one nuclear power plant would lead Serbia to economic and political dependence, taking into consideration that we are not able neither to make nuclear fuel, nor to process used fuel, while particular problem would represent the disposal of nuclear waste because of danger for our environment.

On the contrary, others consider that this problem does not exist, because acknowledged producers of nuclear fuel deliver fuel for utilization on commercial prices and take over the responsibility to accept that used fuel on reprocessing and storage after expiration of the deadline.

Opponents to construction of nuclear power plants in Serbia notice as problem the shortage of expert cadre which might operate and work in nuclear power plants, and especially taking in consideration the fact of high flowing of young specialists abroad, as well as shutting down of Department for technical physics on the Faculty for Electrical Engineering in Belgrade where our experts from this area were educated. As our weakest point they cite the absence of necessary morality and responsibility for undertaking the risky step in the domain of nuclear energy.

Those who plead for construction of nuclear power plants in Serbia remind us that when renewable sources of energy, as Sun, wind, water are being discussed, we speak about very expensive, for some inaccessible technology of exploitation, because for example, one kilowatt hour of the energy of Sun costs from 10-100 times more than nuclear. They call our attention to the fact that oil slowly disappears, that in 100 years the coal will be also spent and that there is enough natural uranium for the future, and because of that nuclear power plants have an advantage. Those who plead for construction of nuclear power plant consider that there are still experts and that it is not late for their engagement and that in certain time period the new generation will be educated, believing that investment in nuclear power plant, because of the profit it makes is worthwhile already in 4, 5 years.

More and more energy is needed all over the world, but energy is the greatest pollutant of environment. In article 4. of the Law on energy⁵ it is emphasized among other things, that the energy policy of the Republic of Serbia encircles measures and activities for realization of long-term objectives in the area of energy and especially the advancement of environment.

⁵ »Official Gazette RS«, no. 84/2004.

Really, Serbia poorly uses the biomass⁶, i.e. the state of sector of renewable sources of energy is evaluated as very bad, although we have good potentials for development of that field of energy. Energy sector of Serbia is marked along with cited insufficient share of renewable sources of energy also with irrational use of electrical energy, and in addition its unrealistic price and old-fashioned technology. It is a well known fact that the nuclear reactor in Vinča in Serbia has been out of commission since August 1984.

Therefore our country supports energy cooperation in the region and the Minister for mining and energy underlined the importance of interceding in favor of advancement of safety of supplying with fuels in the region, improvement of the state of environment, increasing of energy efficiency, utilization of renewable sources of energy and finally development of competitive energy market.

Serbia, for its position on the geographic borderline between the East and West, it is very often referred to as a gateway of Europe. Also, two very important pan-European corridors, VII - River Danube and X – highway and railroad, intersect on Serbian ground providing excellent logistic connections with Western Europe and the Middle East. Thus, Serbia offers a great transport potential and has an extraordinary potential to become the logistic hub of the Southeastern Europe.

Surrounded by nuclear plants (19 in section and 4 in construction) in the neighborhood, Republic of Serbia resists and hesitates.

Serbia is one of few countries that in 1989. voted for moratorium on construction of nuclear facilities.

World experiences

Nuclear renaissance is an important characteristic of the new energy order.

In June 1954. in Obnonsk in Russia the first atomic kilowatts began to flow, and at the end of XXI century China should have 2.800 nuclear reactors, India 2.750, United States of America 1.200, Brasil 330 and Rusia 200.

»Science for a better life« was the theme of the 2008 Euroscience Open Forum, during which the future of nuclear power and the importance of research in the nuclear field was debated. Some scientists emphasized the need for smaller nuclear plants which are cheaper and flexible to develop as a way to address nuclear's weak points, i. e. high capital costs and lengthy construction times. Also Russian plans for a floating nuclear power station and the Pebble Bed Modular reactor being developed in South Africa are two examples of nuclear research going in the right direction.

Today, in 2010. United States of America come back to construction of nuclear power plants, as the source of »clean energy«, abandoned 30 years ago, more exactly from 1979, after the incident on the Island of Three Miles in Pensilvania, when the trust in safety of nuclear energy was shaken. New nuclear power plant with two reactors is planned to be put into operation in 2017. in the State of Georgia.

Recognizing the big potential of nuclear energy China and India have begun major expansions of nuclear energy infrastructure. Today, energy is priority and there are 56 nuclear energy reactors in construction in the world and the most of them 21 in China,

⁶ Biomass represents the renewable source of energy that can be used as substitution for fossil fuels in the production of heating and electrical energy.

then six in South Korea and five in India. The newest information from India suggest that in Kudankulam in the southern Indian area Tamil Nadu, should be constructed six reactors⁷, from which two are in the final phasis. On India Nuclear Energy Summit 2009, called »Nuclear energy in India – Vision 2050« held on the 14th of November 2009. in Mumbai was provided a platform which addressed key issues, identified opportunities and created a roadmap for Indian Nuclear Energy Industry to realize its full potential and to the bridge the existing energy gap.

In the European Union there are at the most nuclear power plants in the world, and Bulgaria is the leader by the number of nuclear power plants in EU.

The nuclear power plant in Caradache, in France is expected to be up and running in 2018. After an estimated 20 years of testing, a model fusion reactor called DEMO will then be built, thus inaugurating the era of fusion power. It might be 40 years or longer before nuclear fusion makes a significant contribution to the world's energy needs.⁸ Respect the old, embrace the new!

At the same time it is pointed out to the material support to the neighboring Bulgaria for the need of turning of 4 from 6 reactors in Kozloduj till 2013. year, while for complete shutting down of this nuclear power plant much more investments is still needed. Otherwise in the last 10 years Bulgaria has received about 550 million euros for the needs of decomission of the nuclear facilities remained from the Soviet era. Anyhow in the period between year 2007 and year 2009, EU has paid of to Bulgaria 230 million euros for the losses in energy production because of shutting down of nuclear power plants. Kozloduj has unexpectedly came in the center of attention of leaders from Brussels because of the gas crisis. Taking into consideration that nuclear facilities Kozloduj and Belene are located on the Danube riverbank, the protests of activists for the protection of environment who warn about the danger from ecological catastrophe do not stop.

Conclusion

Professional science communication is undergoing a period of crisis. The use of nuclear power has been concentrated in industrialized countries. However, new constructions now (17 of the 35 reactors being built) are in developing countries.

The former Federal Republic of Yugoslavia was changed to Serbia and Montenegro as of 4th February 2003. IAEA membership of Serbia and Montenegro was continued by the Republic of Serbia in June 2006.⁹

It is well known that in the field of ecology, prevention has higher importance than in the other areas of social life. Serbia's Law on Environmental Protection came into effect in December 2004. It is not enough to have legal norms to regulate protection from ionizing radiation, but to have the state and other organs and organizations strictly following the existing of that norms. It is very important that the new regulative predicts

⁷ See: »Politika«, December 2009, page 02.

⁸ Speaking at the session entitled »Fusion – Will it always be 40 years away? « by David Campbell.

⁹ This followed the Declaration of Independence adopted by the National Assembly of Montenegro on 3rd June 2006 and the Republic of Montenegro subsequently, on 14. June 2006. applied for membership of the IAEA, a process that is pending completion of procedures required to become on IAEA Member State. The total membership was 145 states (as of Sept. 2008.).

duty of strict punishment of environmental criminal acts, infractions on all levels, for what the precondition represents appropriate legal regulation and penal policy.

From the total quantity of all cargo transported across Europe, even about 20% are dangerous substances. Storing, removing and placing in depositary of the nuclear waste represent a great problem, but this problem is not solved at all in the world, so that goes without saying that protection of environment from the radioactive waste is not established.

Moreover, nuclear energy is considered to be an environmentally benign source of energy. Only nuclear energy offers emissions – free energy on the massive and expanding scale the world so urgently requires. However, it is known that the population of Austria has prevented by referendum the building of the nuclear power plant on the territory of this country.

In Serbia it was proposed to construct nuclear power plant in the area between the hydroelectric power station »Đerdap« and thermoelectric power plant »Kolubara«. Serbia should not bring the question of construction of the nuclear power plant without referendum. Dialogue is, of course a good thing. Visions, however, cannot be imposed. In technology, a good vision must be both bold and realistic. Of course, the role of international cooperation is very important too.

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