NUCLEAR POWER AND THE LIMITS OF THE GLOBAL DEVELOPMENT

Editorial

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During the past decades and centuries our parents and our grand-parents were living in an unlimited world with a broad spectrum of resources and opportunities. The economists were convinced the growth and the rate of growth depends only on the willingness to use the resources, on the abilities to be more efficient, and determination to support the development. An open world with infinite opportunities!

Today we are more aware on our limits, not only on the stock of resources, but especially on the boundaries defined to live in a safe space of the sustainable development.

A nine dimensional model of planet boundaries was agreed after 2015. It is characterized by nine limits of the development and well-defined indicators to check the thresholds we have to respect to keep the humanity on the sustainable track. The nine boundaries are: (1) climate changes, (2) biodiversity loss, (3) biogeochemical flow (nitrogen removed from atmosphere, phosphorus going into the oceans), (4) ocean acidification, (5) land use, 6) freshwater, (7) ozone depletion, (8) atmospheric, aerosols, overall particulate atmosphere, (9) chemical pollution (plastic, heavy metals, radioactivity, etc.).

What is the relation of nuclear power to these limits? Is nuclear power contributing to a development inside these boundaries?

This year, in the European Union, a sensitive debate on the sustainability of the nuclear power was started around the ″taxonomy document″ aimed to identify the financial sustainable investments of the society. The devoted working group expressed the opinion there are not enough proofs to include the nuclear power on a list of such investments, even there is an undoubtable recognition on the large contribution of the nuclear to the reduction of the carbon dioxide emissions in the context of the great concerns on the climate changes. The main argument introduced by the group is the long term impact of the radioactive wastes on the environment. In their opinion there are no enough proves to demonstrate the capabilities to ensure the confinement of the radioactive materials for the long periods involved in the radioactive waste management.

A prompt reaction of the nuclear community appeared in forms of petitions, statements, opinions, articles. A dedicated working group on the issue is in the set-up stage involving experts from different nuclear countries.

Looking carefully on the issue, it becomes clearly the controversial idea of the non-sustainability was introduced by the Greens fighting against nuclear power. In fact they are claiming the long impact of the radioactive materials in connection with the inter-generational responsibilities. It seems they are more concerned on what will happen after hundreds and thousands of years in comparison with the present crisis of the clime changes.

Nowadays, the concentration of carbon dioxide is around 400 ppm, greater than the boundary limit of 350 ppm, and much further on the pre-industrial level of 280 ppm. There is a great agreement among experts the efforts to keep the global warming in the limit of 1.5/2.0 ^{0}C increase of the global average temperature are very stringent. Many of the experts are convinced the present measures show a trend clearly outside of the 2.0 ^{0}C scenario.

The climate objective for 2050 is without doubts critical. *In this context is it moral, including the inter-generational perspective, to exclude nuclear power from the list of sustainable projects? Is such a measure helping the society to build a future inside the safe space of the sustainable development?*

Looking again to the model of the planet boundaries, the climate change limit is not the only one the humanity already crossed. Biodiversity and the nitrogen flow into the oceans are already violated by our development oriented to growth despite any costs: growth of the economy, of the population, of the quality of life. The society is based too much on the exponential development of the economic model constructed on the debts and selling the future.

What is the impact of nuclear power on the all nine indicators of the planet boundary model?

Clearly nuclear is a great contributor to the decarbonizing of the economy. Based on the existing practice and scientific assumptions, there is no negative impact on the biodiversity, biogeochemical flow, ocean acidification, ozone depletion, and overall particulate atmosphere. In terms of land use, the nuclear power plants produced high amount of electricity by using very small surfaces of land in comparison with the renewable alternatives. At the same time, nuclear power is not a net consumer of fresh water. Moreover, nuclear is a resource to produce freshwater by desalination.

Only the ninth boundary (chemical pollution) may be affected by nuclear development in case of accidents involving release of radioactivity in the environment. It should be noted the nuclear field produces artificial isotopes, but most of them are used in nuclear application (medicine, industry) with great benefits for the humanity and also for the environment.

In this context what is to be done? On the short time, it will be difficult to change the opinions in the society and the present influence of the environmentalists. Today nuclear sector is not in the golden flourishing age and not in a comfortable context. On medium and long term, the perception may be changed if enough dedicated actions oriented to the education of the new generations will be implemented. A fair treatment of the nuclear energy is necessary to be introduced in schools, in manuals, in Curricula. The new generations should have a complete and correct understanding of the nuclear sector based on facts and scientific arguments. If the knowledge in the schools will not be influenced by the ideology there is a significant chance the new generations will understand the large potential of nuclear power to support the sustainable development of the humanity. It is difficult to change the opinion of older generations much influenced by the nuclear military sector and by the past accidents. In the school there is a chance to build the future of the nuclear. It depends on the availability and imagination of the nuclear community to produce the most appropriate instruments and ways to communicate.

In this context, our journal is oriented to publish meaningful results oriented to reflect the efforts of the research and development, education and training, academia and industry, and also the efforts to build sustainable decisions by involving the diversity of the stakeholders.

Dear readers and dear potential contributors, you are welcomed in our journal to participate to a balanced debate on the nuclear issues and moreover to contribute with innovative and valuable solutions to the nuclear development in the context of the modern society sustainable development.