



Nuclear power in the aftermath of Fukushima

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The 22nd WEC Congress, to be held this year in Daegu, Korea, is a great opportunity to highlight the evolution in the world's energy sector, to look at the aspirations of our societies and to analyse the challenges that lie ahead, while identifying solutions. This necessary stock-taking is very relevant for all energies, and particularly for nuclear energy, which provides around 16 per cent of world electricity supply and more than 20 per cent in the OECD countries.

The OECD Nuclear Energy Agency (NEA) has, for more than 50 years already, been helping its member countries that use or are planning to use nuclear power to identify through international co-operation the best practices in nuclear safety, protection of the environment and competitiveness, and is particularly involved in the analysis of these practices in the aftermath of the Fukushima Daiichi accident.

The use of electricity has always been associated with the social and economic development of societies, as it contributes to the welfare of present and future generations. Despite the impressive development of the use of electricity in the 20th century and the beginning of the 21st, well over one billion people still have very limited access to electricity, and understandably aspire to change that situation. We therefore need to be prepared to meet a continuous increase in electricity demand during this century, while at the same time protecting the environment from corresponding detrimental effects, especially climate change.

The first priority is, logically, an efficient use of electricity, rationalising consumption, followed by the development of those energy sources that do not emit greenhouse gases, which constitute one of the major threats to the planet's environment. Among these sources, nuclear power has historically been a very important contributor to both security of electricity supply, providing a baseload source of energy, and to reducing CO₂ emissions. In its role as a baseload source of energy, especially in the OECD countries where new hydropower projects are very limited, it is directly competing with coal and gas, which are both significant emitters of CO₂. In our efforts to move towards lower-carbon economies, one could see nuclear power playing an even more significant role in the production of electricity in the years to come. While feasible, it is important to first look at the challenges that lie ahead for this energy source.

Challenges associated with nuclear power

The first condition for maintaining and further developing nuclear power is social acceptance and support, along with

the corresponding political support. Many societies, and foremost that of Japan, have been significantly impacted by the Fukushima Daiichi nuclear power plant accident. As is widely known, the accident did not have its origins in the plant itself, but was the consequence of a seismic event followed by a tsunami, both of unprecedented levels, that killed thousands of inhabitants. While the nuclear power plant accident did not have any significant physical health effects for the population, it has disrupted the lives of thousands of citizens and greatly impacted the collective psyche of Japanese society.

Although the specific impact that this accident will have on the operation of the Japanese fleet of reactors is still being debated, it has already led to changes in the nuclear energy policies of such countries as Belgium, Germany, Switzerland and Italy, which have decided to progressively abandon this energy source or not to reintroduce its use. However, far more countries have maintained their policies, including in many cases the further development of nuclear power: Canada, China, the Czech Republic, Finland, France, Hungary, India, Korea, Russia, the Slovak Republic, Sweden, the United Kingdom, the United States and others with experience in nuclear power are looking to new developments, and countries such as Poland, Saudi Arabia, Turkey, the United Arab Emirates and Vietnam are taking significant steps to obtain access to this source of energy for the first time. In all those pursuing the nuclear option, there is a clear consideration that accidents such as those at Fukushima Daiichi can be avoided.

In fact, nuclear safety is a prerequisite for the use of nuclear power. The Nuclear Energy Agency has been very active in analysing, with the best experts from the member countries and other collaborating countries, the safety lessons learnt from this accident. It is making this analysis available to the public through a report which highlights the main lessons learnt and the additional work to be carried out in the future.

Analyses have concluded that the safety level of operating plants is appropriate, and while enhancements, especially those related to better protection against extreme natural events, will be gradually implemented, no immediate shutdowns are required. Since it is necessary to be prepared for the unexpected and accidents can never be completely ruled out, prevention and mitigation of accidents, both design-basis and beyond-design-basis, should be analysed in a new light considering that mother nature can create events much larger than was thought. Access to power and

to means of cooling under all circumstances are crucial for defence against severe accidents.

The prime responsibility for nuclear safety remains with the operator, and the role of the national nuclear regulator is essential in ensuring that appropriate regulations are established and enforced, taking into account the international efforts that address the lessons learnt from this accident. More results of analyses and of the international research that is starting to be launched will be incorporated into new regulations as more information becomes available.

Emergency planning, both onsite and offsite as well as at the national and international levels, should be reinforced along with the capacity to promptly provide information during crises. It is also important to incorporate into the analysis not only prevention against adverse health effects, but also against large societal impacts.

In addition to societal/political support and nuclear safety, there are other factors that will affect the future of nuclear power. They are country- or region-specific and have to be appropriately addressed to attract investment in this sector. The availability and competitiveness of alternative baseload energy sources are key as, in many cases, market forces will be at play. In many countries, the economic and financial crisis is affecting electricity demand, and in some cases is even reducing it. It is also having an impact on the possibility to obtain affordable financing. A stable framework for investments in nuclear power, including from the safety regulation perspective, is crucial when it comes to deciding to launch a nuclear power project, as it determines the risk of the return on such investments which are capital-intensive and have long periods of amortisation. Another variable that could be a determining factor for deciding on the investment is whether the country in question has a levy or a limitation on CO₂ emissions.

Finally, an important factor for the future of nuclear power is the efficiency of the industry itself, especially in the construction phase. The nuclear technologies currently available tend to be for large amounts of installed capacity and require a very significant commitment in financial terms. Thus, the final cost of

the kWh also depends on how well construction is managed to schedule and budget.

Conclusions

Looking into the future, although the energy sector is faced with some uncertainties, the characteristics of nuclear power, with safe and clean technologies, makes it very attractive for industrialised countries as well as for developing countries that consider industrialisation to be an important objective in their social and economic development. In contrast with other energy sources, nuclear power is mainly based on science and technology, and is an asset based on human capital far more than the availability of natural resources. Of course uranium is required, but it plays a very minor role in terms of cost, is readily available in largely sufficient quantities, and with the new technologies that are being developed, could potentially ensure supply for centuries to come.

In order to continue using and developing this energy source in a rational way, it is fundamental to recognise the importance of societal support. This support cannot be taken for granted, and largely depends on how industries, regulators and governments are perceived to control nuclear energy in terms of safety and protection of the environment. It is therefore essential that societies receive adequate information in a transparent way, so that reasoned and informed decisions can be made with confidence. □

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