

IEA Workshop on the Future of Nuclear Power

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On March 31, the International Energy Agency sponsored a workshop titled “the Future of Nuclear Power” in Paris. The IEA designed the workshop to prepare for taking up nuclear power generation as one of the major topics in its annual flagship publication “World Energy Outlook 2014” that will be released in November to forecast global energy supply and demand through 2040. Some 100 government and industry representatives and experts participated in the workshop. The workshop featured vigorous debate in five sessions on the outlook for nuclear power in selected markets, the economic realities of nuclear power, challenges to financing new nuclear power plants, the impact of public acceptance, safety and regulation on the future of the nuclear industry, and a summary, conclusions and next steps. In the following, I would like to discuss impressive points of the debate.

First, the workshop reaffirmed that nuclear power generation in the world is highly likely to continue expanding. Following the Fukushima nuclear plant accident, discussions have continued on where nuclear power generation should be positioned in Japan. Germany has specified a policy of phasing out nuclear plants. Some other countries have grown more cautious about nuclear power generation. At present, however, more than 70 nuclear reactors are under construction in the world. While some new nuclear reactors are planned for construction in Western industrial countries, the future nuclear generation expansion will concentrate in Asian emerging countries and the Middle East where power demand is expected to grow substantially. Particularly interesting arguments emerged at the workshop on China’s renewed moves to accelerate nuclear plant development. Just after the Fukushima accident, the Chinese government toughened safety regulations on nuclear generation, slowing down nuclear plant development by freezing inland nuclear plant construction projects. Recently, however, there have been moves to promote the construction of sophisticated nuclear reactors including the AP1000 pressurized water reactor. Factors behind such moves have been power demand growth, problematic heavy dependence on coal and the promotion of environmental conservation. Workshop speakers said that as nuclear plant development is based on China's comprehensive strategy, it is important to understand the overall trend of nuclear development.

The Middle East is also making progress in nuclear plant development. Why is it that nuclear plant development is making progress in the Middle East including many countries rich with oil and gas resources? Behind the progress is a rapid increase in power demand. As a result, oil and gas consumption for power generation has rapidly expanded, affecting Middle Eastern oil producing countries' oil and gas export potential. For Middle Eastern oil producing countries, nuclear power generation can secure oil and gas supply for exports, can offer better economic efficiency than the planned gas and LNG imports and can become a target for strategic investment of currently abundant funds. Therefore, many of these countries are seriously considering nuclear plant

development. At the workshop, discussion was made with regard to a prospect that nuclear power generation capacity in the Middle East could expand to 75 gigawatts by 2030 depending on substantial progress in nuclear reactor construction projects in Saudi Arabia, Jordan and Turkey in addition to an ongoing project in the United Arab Emirates. Given nuclear policy and infrastructure development, how to secure human resources with nuclear technology, knowledge and experiences, grid constraints and other challenges to nuclear plant development in the Middle East, however, it is uncertain whether the prospect could be realized. But nuclear power is likely to attract great attention in the Middle East. In the workshop, there was an interesting discussion that whether the forerunning UAE project would be successful would be the key to nuclear plant development in the Middle East.

Second, it is important that workshop participants actively debated various key challenges for nuclear power generation expected to expand in the whole of the world. The Fukushima nuclear plant accident has affected the public acceptance of nuclear power and prompted governments to toughen nuclear regulations to enhance safety. The accident has been the most serious, grave event involving nuclear power not only for Japan but also for the rest of the world. Safety enhancement is a key challenge for nuclear policy and affects the economic efficiency of nuclear power, as noted at the workshop. Particularly, we must consider the economic efficiency of nuclear power generation while taking into account global progress in the promotion of electricity market liberalization, as well as the U.S. case where gas-fueled power generation has grown more competitive thanks to natural gas price drops under the promotion of the shale revolution. While conventional wisdom is that existing nuclear power plants are more economically efficient than other power sources, some U.S. nuclear plant operators have recently decided to shut down existing nuclear reactors in view of their problem about economic efficiency, as noted in the workshop. Safety enhancement measures work to increase costs and plant life assessment for existing nuclear plants affects overall costs. In this regard, nuclear power generation's economic efficiency in the particularly competitive electricity market is of great significance.

As new nuclear plant construction is important for expanding nuclear power generation in the future, the economic efficiency is expected to attract more attention than in the past. In this respect, workshop participants pointed out that nuclear plant construction costs have tended to rise and that costs for safety enhancement measures will be added. They also noted that the nuclear industry should tackle cost reduction measures including modularizing nuclear plant construction and standardizing plant designs and others.

Interestingly, many participants at the workshop pointed to the importance of policy for securing economic efficiency and financing for nuclear power plant development. In comparison with other power generations options, nuclear generation features (1) far bigger initial investment, (2) a far longer lead time between planning and completion/operation, (3) the absence of income during the long lead time, and (4) great potential damage from accidents. These features make it difficult for nuclear plant operators to decide on investment or secure financing, despite nuclear energy's advantages including contributions to energy security and global warming prevention, cost competitiveness in normal operation and stable electricity supply for base load. In this sense, nuclear policy and system stability are decisively important. Interestingly, workshop participants reiterated that policy and government play a decisively important role in supporting new nuclear power plant construction as it is difficult to expect effective signals for the support from the market alone, by citing an interesting example of introduction of British feed-in-tariff with contract-for-difference system.

As pointed out at the workshop, risks accompany any technology. In this sense, a key viewpoint is how we should interpret the relationship between risks and social benefits regarding the future of nuclear energy. As confidence or trust is required to counter risks, the key challenge is how policy, regulations, government and relevant industries can establish social confidence in nuclear power. Appropriate, transparent information must be developed, diffused and shared to establish confidence. Objective, neutral, scientific and quantitative analyses are required in this regard. I would like to expect the IEA's future analysis to play a role to this end.

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