

Globally Growing Interest in and Hopes on Hydrogen

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From late February to early March, I toured London, Riyadh and New York to discuss various energy topics with government officials, energy industry stakeholders and experts. Through these discussions, I felt that interest is globally growing in hydrogen as an innovative technology option. Over the past several years, the Institute of Energy Economics, Japan, has continued to provide an analysis on hydrogen in its annual long-term global energy outlook, IEEJ Outlook. Until three years ago, however, such analysis had not necessarily attracted great global interest. Apparently, frank responses to our decision to take up hydrogen in the annual outlook had not necessarily been favorable. In the past few years, however, the situation has turned around, making hydrogen a key topic for global discussions.

There are various background factors behind the turnaround. A basic factor among them is that hydrogen has attracted attention anew as one of the innovative technology options to substantially reduce greenhouse gas emissions to promote decarbonization under the Paris Agreement. While urging each country to set and attain a voluntary GHG reduction target known as nationally determined contribution, the Paris Agreement calls for limiting the average global temperature rise to “well below 2°C” above preindustrial levels. It is well known that fundamental GHG emission cuts would be indispensable for realizing the temperature target. In the circumstances, major Western countries have come up with targets for cutting GHG emissions by 80-90% by 2050. To attain such steep emission reduction, the power generation sector among major GHG emitters will have to cut emissions to zero. In this respect, hopes have globally grown on renewable energy as a zero-emission power source.

To cut emissions by 80-90%, however, the power generation sector’s reduction of emissions to zero alone would not be enough. Transport, industry, buildings and other major sectors would have to make fundamental decarbonization efforts. Hydrogen has attracted attention as an option for all these sectors to contribute to decarbonization. A “hydrogen society” where hydrogen would play key roles in various fields has attracted interest as a decarbonized society. Interest in hydrogen thus grows more and more as decarbonization efforts become more serious. In this sense, serious decarbonization

efforts have become a background factor for growing interest in hydrogen particularly in Europe.

The second factor behind growing interest in hydrogen is related to a hydrogen supply side problem. Hydrogen contributing to building a carbon-free society must be free from CO₂ as a matter of course. Manufacturing and providing massive CO₂-free hydrogen efficiently holds the key to a hydrogen society. An attention-attracting potential option is green hydrogen made from renewable energy. While falling costs for power generation using renewables such as wind and solar photovoltaics are attracting global interest, manufacturing hydrogen from renewable energy is viewed as significant for addressing the intermittency of renewables and utilizing surplus electricity. In this respect as well, Europe has achieved renewable energy diffusion and boosted interest in the effective utilization of renewables.

Another matter attracting attention on the manufacturing and supply side for CO₂-free hydrogen is the presence of fossil fuel producing and exporting countries. Fossil fuels covering oil, coal and natural gas account for about 80% of global primary energy supply and are predicted in major long-term energy outlooks to remain a dominant energy source, though with their share of global energy supply decreasing. However, it is pointed out that if energy transition toward a carbon-free society makes more rapid progress than expected, demand for fossil fuels may decelerate and decline. In fact, we see anti-coal movements and arguments about peaking oil demand. If oil and coal demand peaks and falls rapidly, oil and coal resources may become unburnable assets for their owners.

Then, a meaningful option for fossil fuel resource owners may be to utilize and export CO₂-free hydrogen that they will produce from fossil fuels while capturing and storing relevant CO₂ emission with CCS technology. Such CO₂-free hydrogen, called blue hydrogen, is now seen as one of the survival options for fossil fuel resource owners amid transition to a carbon-free society. The hydrogen option has thus become a great matter of interest in Australia, Brunei, Saudi Arabia and the United Arab Emirates. In Norway and the Netherlands among European countries, hydrogen option plans using existing natural gas infrastructure have emerged.

In Europe, even the cleanest fossil fuel of natural gas has come under decarbonization pressure. Under the recognition of natural gas as one of the fossil fuels, arguments are emerging for decarbonizing gas continuing to be used in a carbon-free society. The blue hydrogen concept has attracted attention in regard to the decarbonization of gas which I would like to take another opportunity to discuss.

To make great contributions to full-blown decarbonization, hydrogen will have to overcome numerous challenges and hurdles. Hydrogen supply costs will have to be substantially reduced for the appropriate development of relevant infrastructure. Technological, economic and social hurdles are

too high to be cleared promptly or easily. For example, Japan's basic hydrogen strategy includes a target of cutting hydrogen supply costs to 30 yen/Nm³ or one-third of the present level and to 20 yen/Nm³ or one-fifth. What specific initiatives Japan would take to attain such target as a top runner for hydrogen use is attracting global interest. Important for reducing costs and diffusing innovative technologies are the promotion of technological competition, international cooperation and technological support under integrated policies. In this respect, Japan initiated an international ministerial conference on hydrogen last year and plans to promote discussions on hydrogen at a Group of 20 summit this year while following up on the ministerial conference, attracting global attention.

At a time when interest in and hopes on hydrogen's roles are growing globally, the implementation of integrated long-term policies and strategies is becoming more important. Both the government and private sectors are required to enhance competition for developing hydrogen technologies, but at the same time are required to promoting appropriate international cooperation as well. It is significant for Japan to strengthen relevant initiatives to play a central role in the hydrogen field for the world.

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