

Thinking about Hydrogen Town - Energy System as Social Infrastructure -

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Summary

As various initiatives have been taken for expanding hydrogen use in Japan in recent years, researchers have conducted studies on individual hydrogen technologies including fuel cell vehicles, fuel cells and hydrogen power generation. However, an analysis on social infrastructure for hydrogen use from a macro viewpoint may be useful. Under such approach, this paper assumed a hydrogen town for the buildings sector for a cost and benefit analysis to extract problems and consider the feasibility of a hydrogen town.

If the ceiling hydrogen price is defined as the level to represent the present value of zero for the net benefit from substituting hydrogen-based energy infrastructure (a hydrogen town) for power grid and city gas infrastructure for a conventional town, our analysis results indicate a ceiling price of 21 yen per Nm³ (normal cubic meter) on a terminal shipment basis or 29 yen/ Nm³ on a user basis. This means that it is difficult to establish economic rationality for a hydrogen town at present, while an estimate points out that hydrogen made from lignite in Australia could be imported into Japan at a CIF price of 30 yen/ Nm³.

However, there is a conceivable scenario in which fossil fuel prices will increase sharply, with Japan required to substantially reduce carbon dioxide emissions (under high carbon prices), while hydrogen technology development will make great progress to substantially cut hydrogen costs. In such case, the economy of a hydrogen town may improve substantially. Paying attention not only to imported hydrogen but also to a diversity of other hydrogen sources, we can conceive a scheme to reduce hydrogen distribution costs by producing hydrogen from regional energy resources for supply to regional hydrogen towns.

Hydrogen towns may also have social and economic spillover effects. Matters of concern to rural and suburban cities include the aging of urban infrastructure built in the high economic growth period, declining regional industries, and falling birthrates and aging population. Such cities could introduce hydrogen towns consuming locally produced hydrogen to create new local industries and jobs and vitalize regional economies. A hydrogen town scheme could provide clues as to rural

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cities' town building. Falling birthrates and aging population, industrial hollowing-out and regional revitalization and other challenges are not only faced by Japan but also by other developed countries mainly in Europe. By taking advantage of hydrogen to realize regional economies, Japan could provide a precedent for these countries. The precedent may also have useful implications for the environmental friendliness and sustainability of urban or regional development in emerging countries that will develop infrastructure from now on.

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