ISSUE OF DECARBONIZATION BY HYDROGEN IN CHEMISTRY AND ENERGETICS

Wichterle K.

Technical University of Ostrava, Ostrava, Czech Republic

Decarbonization is usually understood as a decreasing employment of fossil fuel in energy production and in vehicles. It is supposed that renewable energy sources as solar and wind energy will be the substitute. Due to the unstable production of renewable energy, it should be accumulated either in big battery plants or in “green” hydrogen produced by the electrolysis of water. When hydrogen labelled as renewable would be available in excess, it may also be employed in fuel-cell driven vehicles, in chemical process industries as a reducing agent (e.g., in iron production), and even as a fuel for high-temperature heating (e.g., in cement and ceramics manufacture). Of course, it requires to develop a new infrastructure (large-scale hydrogen storing facilities and pipeline network), and a complete reconstruction of equipment and processes in the related plants. Theoretically, such processes should work and some of them have been tested yet either in laboratory or in pilot-plant scale. Therefore, policymakers of Green Deal consider the green hydrogen technology to be a simple business. Now, it is aim of engineers to discuss its technical and economy issues. Subject of the presented paper is to show quantitative pros and cons related to the feasibility of the large-scale application of hydrogen. Requirements of photovoltaic systems, wind power stations, water electrolysis process, hydrogen storage, fuel cells, and hydrogen employment it thermal processes are discussed from the viewpoint of scale-up, economy, and the environmental impact. Unfortunately, the results do not seem to be optimistic. A minor percentage of fossil fuels can only be substituted by the renewable energy sources. Evidently, nuclear energy seems to be a future way how to contribute significantly to the decarbonization and to the stable production of green hydrogen for the process industries.