
Title: Contributions in Production, Storage and Distribution of Hydrogen and its Applications for Decarbonization



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Proposal

Nowadays, investments in clean energy sources to meet 2030 renewable hydrogen targets are consistently growing in line with the widespread of decarbonization, and reduction of carbon footprint strategies worldwide. Clean hydrogen has been recognized by many institutions and scientists, as the green fuel that will boost the 21st century transition towards an effective zero-emission economy.

The European Union needs to radically accelerate the deployment of hydrogen production, import terminal, reconversion, storage, transportation, and consumption infrastructure. Public and private investments have resulted in a springing up of multiple international projects highlighting opportunities and constraints that decarbonization based on HY applications can bring within.

New hubs dedicated to HY transportation are going to be implemented but also the injection of HY produced through clean pathways into the existing Natural gas pipelines has been tested resulting as a reliable option for heat and power production with lower emissions than using only NG.

A new generation of smart meters for HY are ready to be use and different mixing blending rate value for HY transportation into the existing NG pipeline have been approved. But further experiments and on-field tests are still required for validating HY use on large scale.

Hydrogen can be obtained by electrolysis, applying an electrical current and many studies are evaluating the impact of empowering its use by means of Demand Response programs.

Other studies are focusing on HY synergy with ammonia. Ammonia can play a crucial role as carrier for hydrogen delivery and distribution and as an onboard storage medium due to its high hydrogen capacity.

Moreover, in transportation, E-mobility powered by hydrogen cells is contributing to complete the emission-free portfolio. Sustainability targets for the transport sector are not limited to only road transport but also ports & terminals are seen as potential cornerstones for the adoption of hydrogen technologies and as backbone infrastructure for hydrogen transport. Furthermore, the hydrogen adoption as an alternative fuel in the existing ports & terminals for the equipment handling has raised the awareness of HY potential and will facilitate to bridge the existing gaps between research development and industrial application.

Now is the time to scale up technologies and bring down costs to allow hydrogen to become widely used. The growing investments, pilot projects, and researching studies on the latest advance in HY technology together with the exploration of HY synergies with other energy source like ammonia are essential to tackle the development of a reliable hydrogen infrastructure.

In this Special Issue, potential topics include but are not limited to the following:

- the theoretical and technical potential for the utilization of HY in industry and transportation
- integration of renewable energies as solar, biomass, and others to produce HY energy
- modelling of operations and the energy performance of HY for heat and power production
- devices and systems for HY blending with Natural Gas
- processes and methods for clean HY source usage
- new achievements in HY technologies production for micro or large-scale application
- analysis of the integration and effectiveness usage of clean HY source by means of DR programs.
- adoption of hydrogen technologies and backbone infrastructure for hydrogen transport in road transportation and ports & terminals equipment handling
- applications of Ammonia as one-way carrier for clean HY
- economic and environmental analysis of HY systems in relation to the scale of their applications and state of economy of the country, regulatory energy market, and other legal entities
- analysis of the challenge and advantages of the new generation of green smart meters and the existing hubs to transport HY

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