

Hydrogen storage & transport challenges

The intermittency and delocalization of renewables makes necessary to transport and storage energy in order to have it available only when it is needed by the off-takers. Hydrogen is an energy carrier that can fulfill this purpose without CO₂ emissions. Hydrogen transport systems can be done via truck, ship or pipeline. An efficient solution would be to use the European existing gas pipeline network by mixing hydrogen into natural gas. In this case, checks must be undertaken to determine whether the materials are suitable and to date one of the few tools available is the ASME B31.12. At present in Italy it is not possible to inject hydrogen into the existing gas network and there are no dedicated laws or regulations. This is noted by the National Recovery and Resilience Plan and a reform in this regard is soon expected.

Together with hydrogen transportation, there is a strong need to store hydrogen for the different end users. Storage can be liquid, gaseous at high and low pressure. Low pressure storage is very convenient and it is feasible with adsorbing material that allow high hydrogen density per unit volume at low pressure (20-50 bar). In this field nanotechnologies can give an important contribution to identify mechanisms and engineering materials in order to enhance storage capabilities and overcome the challenges related to the performance over time and heating effect of current materials.