

Conférence Coriolis – Ecole Polytechnique

Why and how hydrogen can be part of Energy Transition?

Pierre-Étienne Franc

Directeur Advanced Business and Technologies chez Air Liquide

Our society is evolving very fast following major trends: the worldwide population grows very fast (~+15% over the last 15 years), the middle class of the developing countries is growing even faster, urbanisation keeps on growing... We are living within a society with more and more people, with a growing consumption appetite and capacity, who are living in a more and more concentrated way.

This begins to have consequences on our everyday life. Indeed we face more and more noise, more and more traffic jam, more and more air pollution episodes. We are reaching the limits of a system that is based by a large majority on the use of fossil resources. The European Union has reacted to this situation by defining objectives in terms of GHG emissions decrease. The energy and the road transport sector are particularly targeted with a reduction of their emissions of ~95% by 2050.

To reach this objective in the energy sector, an increased proportion of renewable energies will be needed, bringing new issues to deal with like intermittency. **Hydrogen can participate in the introduction of these renewable energies by storing** the excess electricity at large scale and durably through electrolysis (hydrogen production thanks to water and electricity) and contributing to the **stabilization of the grid**. The hydrogen can then be used for **different energetic** usages, one of the most promising being **road transportation**. Indeed, hydrogen can be used to refuel fuel cell electrical vehicles. These only release heat and water at the tail pipe, while providing the same level of service as a classical diesel/gasoline car (driving range ~600km, refuelling time 3-5min).

Through the storage of renewable energy and 0 emission road transportation, hydrogen has a strong potential to contribute to energy transition. Today, fuel cell and hydrogen technologies are at an advanced stage of development with large demonstration projects. Some technologies are already reaching the market, like forklifts. **The main issue that we are facing today is not technical. It is “how to scale up to reduce the costs of the technologies”?** Hydrogen energy technologies are substitution technologies. It means that they offer the same service as the incumbent fossil fuel based technologies without any direct added or lower service to the customer. The value added of these clean alternatives is for the whole society. Consequently, an action of public bodies is necessary for those technologies to reach the market. A number of initiatives have started in Europe, in the US and in Japan and will need to be re-inforced to make hydrogen a strong actor of energy transition.