The 18th IERE General Meeting and Japan Forum
May 21-24, 2018, Kyoto, Japan

The new world of energy : Engie's vision

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Keywords: *energy mix, role of Hydrogen, multigrid fluid*

Abstract

Yesterday, gas and electricity were considered as distinct and even competing and costumers had often to choose between them. For the companies that distribute them, gas and electricity had a major difference, gas could be easily stored, not electricity… and for the countries, gas has often to be imported, not electricity. Obviously gas can be burned to produce electricity and the flexibility of these installations allows to insure the fit between production and consumption.

For some years, the ratio of renewable sources versus traditional ones has been increasing within the electricity mix. Wind as solar farms are producing when the weather is favorable; so not especially when the demand is high. At the top of that they don't have the frequency stability of rotating machines. The electricity grid is suffering. Gas power plants than can be rather quickly switched off and on, may help to solve part of this misfit. However, using a power plant only few days a year is uneconomical.

Today new solutions based on electrolyzers, fuel cells and hydrogen are emerging and may change the game. Electrolysis allows to store the electricity through H2, and a blend of H2 and natural gas allow to distribute it as just as natural gas toward the citizen's boilers, and fuel cells allow to go back to electricity if needed, and when needed. All these new technologies are the results of years of research and obviously some of them are still not fully ready. Their cost has often still to be reduced to allow these green solutions to be competitive.

The main challenges to solve are numerous. For instance, just two of them (1) The optimization of a multifluid system which is rather complex. In case of a grid with wind and solar farms, batteries and electrolysers, charge but also frequency need to be jointly adjusted to fit to the demand whose usually can be only marginally shifted. Depending on the weather forecast and on the energy demand profile the energy management system (EMS) and on the grid elements optimization could be completely different. Digitalization and optimization are mandatory to have a working and stable system, pilots are currently ongoing to test this kind of microgrid. (2) The blend of natural gas with H2, issue of the electrolyze of renewable electricity, in the gas distribution network is clearly an elegant solution to store and use the surplus of the RES.