CONSIDERATION ABOUT THE HYDROGEN FUEL CELL POWERTRAIN LCOE

Mario Valentino Romeri, Independent Consultant, +39 339 4980033, valentino.romeri@alice.it

Overview

The notion of Levelized Costs of Generating Electricity (LCOE) is a handy tool for comparing the unit costs of different power generation technologies.

The Vehicle-to-Grid concept is well known but it is possible to consider the vehicle power generation system hydrogen fuel cell based (H2FC powertrain) not only in V2G perspective, but as a power generation plant, smart grid connected.

In this study, based on public USA data, H2FC powertrain LCOE was compared with the traditional power generation technologies LCOE with very promising results and, having in mind the perspective H2FC powertrain LCOE competitiveness, I made some consideration about the possible role of this kind of power source in the Japan energy context after the Great Earthquake.

Methods

In LCOE financial model, different cost components are taken into account: capital costs, fuel costs, operations and maintenance costs (O&M). These costs are an average over the life of a project and for a specific technology, based on a specific and particular set of assumptions. The costs cash-flow is discounted to present (date of commissioning) using assumed specific discount rates. The resultant LCOE values, one for each generation option, are the main driver for choice technology.

In mass production perspective, H2FC Powertrain will be so cost competitive to be useful adopted also for stationary power generation application. Using US DOE data (Current or Targets) I calculated the H2FC Powertrain specific LCOE cost range and I compared the H2FC Powertrain LCOE cost range with the generation costs of the traditional power generation technologies (US EIA data).

Results

Results were very promising. Using 2009-2010 US DOE H2FC powertrain data (referred to high projected production volume) I found that the LCOE would be in a range of USD 175 - 192 for MWh. Using the 2015 US DOE data target the H2FC powertrain cost range moves to USD 107-207 for MWh, and, for the lower value of this range, it appears competitive with many of the power generation technologies analyzed.

Having in mind these interesting results I observed that, in the current energy policy debate after the Great East Japan Earthquake, H2FC powertrain is still not considered in the range of feasible power generation options.

Conclusions

If the current US Hydrogen and Fuel Cell Vehicle Program is able to meet all the 2015 technological targets the high volume associated with the H2FC vehicles mass production will permit to reduce dramatically the Fuel Cell (PEM) system manufacturing costs, in order to be competitive with current gasoline ICE systems. In this mass production perspective, H2FC Powertrain will be so cost competitive to be useful adopted also for stationary power generation application.

In mass production perspective H2FC Powertrain investments cost will be one of the lowest compared to other current power generation technologies. Observing the specific LCOE data, it will be necessary to think the Hydrogen Fuel Cell Vehicles link to energy sector considering the possibility to adopt H2FC Powertrain as a Power Generation Plant, smart grid connected, with relevant and positive consequences for a rapid development of these low-carbon technologies both in transport and power generation sectors, in Copenhagen Accord and Cancun Agreements perspective. Finally, I made some general consideration about the Japan energy context and I suggest the possibility to consider the H2FC Powertrain generation technology as a feasible option also in the future energy policy after the Great East Japan Earthquake.

References

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