

Innovative Drivers for Hydrogen-Fuel-Cell-Vehicle Commercialization: Establishing Vehicle-to-Grid Markets

While the potential of hydrogen-fuel-cell vehicles (H₂FCVs) to provide various benefits (e.g., reduced emissions) has been described in detail, it is often considered difficult to justify the private investment necessary to achieve these social benefits. This conundrum is particularly acute in private-vehicle markets where FCVs can justifiably be seen as expensive and inferior relative to today's cars and trucks. Accordingly, the commercialization pathways for H₂ as a transportation fuel are unclear.

As part of UC Davis' Hydrogen Pathways program, this paper focuses on how FCVs might become valued in the marketplace. Two major approaches to making markets for H₂ fuel are: 1) strategic niche marketing and 2) creating innovative value, often from unique product-attribute/service combinations. These approaches are briefly described with examples.

One example of the latter approach is developed further using the framework of recombinant innovation theory (in collaboration with UCD's School of Management).^{*} Building on lessons from past examples of technological innovation, this framework describes how new markets are created using existing technologies in novel ways. The illustrative example developed further with this framework is that of using idle vehicle engine capacity to support the operation of the electrical grid, so-called vehicle-to-grid (V2G) power. Discussed conceptually at previous NHA meetings (e.g., Williams et al. 1997) and developed in detail for a range of electric-drive vehicles by others--e.g., Kempton (U of DE), Lipman (UCB), and Brooks (AC Propulsion)--V2G is an intriguing opportunity. Our discussion suggests a strategy for creating initial V2G markets using primarily hybrid vehicles in a fleet application. Once established, these markets could provide private value that would help drive the adoption of FCVs as they mature.

^{*}Hargadon (2003) *How Breakthroughs Happen: the Surprising Truth About How Companies Innovate*, Harvard Business School Press