

# Optimal Cost Minimization Strategy for Fuel Cell Hybrid Electric Vehicles Based on Decision Making

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**Abstract:** *The low economy of fuel cell hybrid electric vehicles is a big challenge to their wide usage. A road, health, and price-conscious optimal cost minimization strategy based on decision making framework was developed to decrease their overall cost. First, an online applicable cost minimization strategy was developed to minimize the overall operating costs of vehicles including the hydrogen cost and degradation costs of fuel cell and battery. Second, a decision making framework composed of the driving pattern recognition-enabled, prognostics-enabled, and price prediction-enabled decision makings, for the first time, was built to recognize the driving pattern, estimate health states of power sources and project future prices of hydrogen and power sources. Based on these estimations, optimal equivalent cost factors were updated to reach optimal results on the overall cost and charge sustaining of battery. The effects of driving cycles, degradation states, and pricing scenarios were analyzed.*

**Keywords:** ECMS; fuel cell; hybrid system; EMS; degradation