

The Future of Fuel Cell Electric Vehicles: Overcoming Barriers to Widespread

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Abstract : Hydrogen stands out as a promising alternative to fossil fuels due to its significantly high energy density. The promise of a sustainable transportation system with fuel cell electric vehicles (FCEVs) depends on overcoming economic and infrastructure barriers. The high cost of hydrogen and the scarcity of refueling stations require innovative solutions for the widespread adoption of FCEVs. Although developments in fuel cell technology have reduced costs in recent years, FCEVs are still considerably more expensive than internal combustion vehicles. This study analyzes the prospects for cost reduction of FCEVs, hydrogen, and the investments needed to expand the hydrogen distribution network. Projections indicate that the cost of FCEVs will align with that of gasoline cars by 2050, driven by technological maturation and mass production. Reducing the production costs of green hydrogen by reducing renewable energy costs, developing more efficient electrolyzers, and leveraging economies of scale could bring the price down to less than \$5/kgH₂ by 2030. Government investment and public-private partnerships are essential to build a robust infrastructure for production, transportation, storage, and refueling stations. The goal of a sustainable transportation future powered by FCEVs can only be achieved by converging these factors.

Keywords : alternative vehicles, fuel cell, fuel cell electric vehicles, green hydrogen

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