

Toward the hydrogen economy in Paraguay: end-uses of green hydrogen potential

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Abstract

This study analyzed the final stage of the hydrogen economy structure and the end-uses of green hydrogen potential in the Republic of Paraguay. Methodologically, the potential for hydrogen production is considered from key renewable resources (solar PV, wind, and hydro) in Paraguay. This study focused on two opportunity niches for green hydrogen use: in the residential sector, substituting firewood and liquefied petroleum gas (LPG) as fuel for cooking and heating, and in the transportation sector, displacing diesel and gasoline in light vehicles and buses. Firewood and LPG demand in homes and diesel and gasoline demand in the transportation are obtained from official statistical data. Energy equivalences to calculate the hydrogen amount required for replacing firewood, LPG, diesel, and gasoline consumption and hydrogen end-use technologies models proposed in similar studies in other countries of the region were considered. A total green hydrogen potential of 394.2×10^6 t was obtained, 367 times higher than the total consumption of secondary energy in the country, which indicates the magnitude of the potential. Firewood, LPG, gasoline, and diesel substitution in the residential and transportation sectors are fully achieved, except in the case of the Capital District and Central Department. The results of this study envisage an optimal scenario for a future hydrogen economy in Paraguay. This will require financial investment from both public and private sectors for the development of sustainable energy projects and the implementation of a suitable infrastructure for using hydrogen as an energy carrier. The geographic distribution of mentioned key renewable resources in Paraguay implies a huge opportunity for the advance of distributed generation in energy policies, meaning greater decentralization, redistribution, sustainability, and democratization of the energy system.