

Towards the Hydrogen Economy in Paraguay: green hydrogen production potential and end-uses

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Abstract

This study was conducted to estimate the potential for green H₂ in Paraguay. A total production potential of 22.5×10^6 tons/year was obtained with a main contribution (93.34%) from solar photovoltaic. The greatest potential for producing H₂ from solar and wind resources is in the Western region, and from hydro resources is in the Eastern region of the country. Two end-uses of green H₂ were assessed: (1) automotive transportation, replacing gasoline and diesel; and (2) residential energy, replacing firewood and LPG for cooking in households across the country. In 16 of the 17 departments, green H₂ is able to replace the overall consumption of gasoline and diesel, as well as firewood and LPG. Finally, energy service cost (mobility), environmental aspects and CO₂ emissions were considered for three urban mobility technologies for the Metropolitan Area of Asunción. Results show that the mobility cost of fuel cell hybrid electric buses is still very high in comparison to diesel buses and battery electric buses. However, when a longer driving range is required, fuel cell hybrid electric buses could become a viable alternative in the long term. From an environmental point of view, green H₂ used in fuel cell hybrid electric buses has the potential to save about 96% of CO₂ emissions in comparison to diesel buses. It is concluded that the estimated green H₂ production potential favors the incorporation of the Hydrogen Economy in Paraguay.