

## Hydrogen Production from Renewable Energy in Yucatan

C. Sosa, E. Us, J. Chi, R. Patiño \*

Departamento de Física Aplicada, Cinvestav – Unidad Mérida, A.P. 73 Cordemex, 97310 Mérida, Yucatán, México

\*Tel: +52(999)9429438; e-mail: rtarkus@mda.cinvestav.mx

---

### ABSTRACT

An estimation of the solar and wind energy resources was performed in four locations of the Yucatan state in Mexico: Mérida, the capital city, and three coastal towns, Sisal, Chelem and Telchac. These renewable resources were evaluated from meteorological stations having an automatic data registration every 10 min, during at least 4 years. Hourly averages were used with the SAM-NREL software to calculate the annual production of electrical energy in 500-kW installation plants with photovoltaic cells or wind turbines. In addition, the same plants were evaluated with monthly averages of the solar and wind resources using the HOMER software, obtaining similar results by both methods. Then, the hydrogen production through electrolysis was estimated using the electricity produced from solar and wind energy, and it is proposed here to use this hydrogen for a local transportation network. On the other hand, the methane production was evaluated from urban organic wastes in Mérida and from wastes in agricultural and livestock in the Yucatan state, mainly corn, poultry and pigs production. These estimations were performed using simple models with a number of different results, but it is possible to find that both urban and agricultural wastes have similar small amounts of methane production, while livestock wastes are much more important for biogas production. This biogas could be also transformed to hydrogen production for the transportation network, although it can be used directly by the farms. Therefore, using organic wastes, the methane is also proposed here as energy vector, being avoided the natural emissions to the atmosphere together with its contribution to the greenhouse effect in the planet.

---

**Keywords:** solar energy, wind energy, Yucatan

