

## A Hybrid Approach Based on a Solar PV-Hydrogen System for Household Electric Energy Supply in Mexico

M. Tufiño Velázquez<sup>1\*</sup>, R.G. González Huerta<sup>2</sup>, A. Yunez Cano<sup>2,3</sup>, G.S. Contreras  
Puente<sup>1</sup>, D. Jiménez Olarte<sup>1</sup>

<sup>1</sup>Laboratorio de Física Avanzada, ESFM.IPN, UPALM, México, DF

<sup>2</sup>Laboratorio de Electroquímica y Corrosión, ESIQIE- IPN UPALM, México, DF.

<sup>3</sup>Laboratorio de Energías alternas CIITEC IPN, Cda. Cecati s/n, Azcapotzalco, Mexico D.F.

Email: mitufinovel@gmail.com

Telephone: 57296000 ext 46138

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### ABSTRACT

Mexico as the world has a 90% energy production based on fossil fuels. Billions of CO<sub>2</sub> tons are emitted to the atmosphere; greenhouse gas emissions are generated causing side effects as global warming. The oil peak production was already reached in 2005 and oil production is decreasing every day. Fossil fuels are non-renewable resources and reserves are being depleted much faster than new ones are being made; besides, domestic energy consumption demand is rising steadily. Therefore the use of renewable energy sources is under way to help meet increasing energy needs. On the other hand, every day conventional energy sources increase their cost, while renewable ones become cheaper; this goes hand in hand together with technology progress. In this work we present a hybrid approach based on a solar PV -hydrogen system for household electric energy supply. A mobile house was designed and dimensioned to be powered by this hybrid system to be used as a demonstration household. This would make possible to show this prototype house to more people as we can move it to different locations for making them aware of the feasibility and benefits of using renewable sources of energy. A 1 kW PV system was installed in the roof of the mobile house and a hydrogen system made out of an electrolyzer, a hydrides storage tank and a two-500 W fuel cell system will be installed to be used as a back up system. The capacity of the PV-hydrogen system was calculated from the average electric power consumption of a typical Mexican family living in a CFE 01 rated house by the Electricity Federal Agency in Mexico (CFE: Comisión Federal de Electricidad). House rating by CFE is made according to its bimonthly average energy consumption; CFE 01 rated house has an established baseline day average consumption of 2.2 kWh/day. The implementation of renewable energy is currently growing in Mexico at a moderate pace, as some government programs encouraging investment in these technologies begin to appear. A direct impact is achieved when renewable energy sources are interconnected to the grid so they cause a reduction in the cost of electricity tariffs, thus benefiting the citizens economy.

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