

## Insertion of Photovoltaic Energy at Residential Level at Tegucigalpa and Comayagüela, Honduras

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**Abstract :** Currently in Honduras, is been incentivized the generation of energy using renewable fonts, such as: hydroelectricity, wind power, biomass and, more recently with the strongest growth, photovoltaic energy. In July 2015 were installed 455.2 MW of photovoltaic energy, increasing by 24% the installed capacity of the national interconnected system existing in 2014, according the National Energy Company (NEC), that made possible reduce the thermoelectric dependency of the system. Given the good results of those large-scale photovoltaic plants, arises the question: is it interesting for the distribution utility and for the consumers the integration of photovoltaic systems in micro-scale in the urban and rural areas? To answer that question has been researched the insertion of photovoltaic energy in the residential sector in Tegucigalpa and Comayagüela (Central District), Honduras to determine the technical and economic viability. Francisco Morazán department, according the National Statistics Institute (NSI), in 2001 had more than 180,000 houses with power service. Tegucigalpa, department and Honduras capital, and Comayagüela, both, have the highest population density in the region, with 1,300,000 habitants in 2014 (NSI). The residential sector in the south-central region of Honduras represents a high percentage being 49% of total consumption, according with NEC in 2014; where 90% of this sector consumes in a range of 0 to 300 kWh / month. All this, in addition to the high level of losses in the transmission and distribution systems, 31.3% in 2014, and the availability of an annual average solar radiation of 5.20 kWh/(m<sup>2</sup>•day) according to the NASA, suggests the feasibility of the implementation of photovoltaic systems as a solution to give a level of independency to the households, and besides could be capable of injecting the non-used energy to the grid. The capability of exchange of energy with the grid could make the photovoltaic systems acquisition more affordable to the consumers, because of the compensation energy programs or other kinds of incentives that could be created. Technical viability of the photovoltaic systems insertion has been analyzed, considering the solar radiation monthly average to determine the monthly average of energy that would be generated with the technology accessible locally and the effects of the injection of the energy locally generated on the grid. In addition, the economic viability has been analyzed too, considering the photovoltaic systems high costs, costs of the utility, location and monthly energy consumption requirements of the families. It was found that the inclusion of photovoltaic systems in Tegucigalpa and Comayagüela could decrease in 6 MW the demand for the region if 100% of the households use photovoltaic systems, which acquisition may be more accessible with the help of government incentives and/or the application of energy exchange programs.

**Keywords :** grid connected, photovoltaic, residential, technical analysis

**Conference Title :** ICEPEE 2016 : International Conference on Energy, Power and Electrical Engineering

**Conference Location :** London, United Kingdom

**Conference Dates :** January 18-19, 2016