

Socio – Economic and Environmental Impact of Solar Home Systems in Sri Lanka

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ABSTRACT

This paper presents the results and analysis of a study conducted with the objective of investigating the social, economic and the environmental impact of Solar Home Systems (SHS) in Sri Lanka.

The study was conducted out through a sample selected from the district of Badulla, in the Uva province, basically considering the sub sectors of households given a grant for the acquisition of SHS and the households, which were not.

1. INTRODUCTION

The energy supply in Sri Lanka is mainly based on hydroelectricity, biomass and petroleum sources. As per estimates in 1998, these sources corresponds to 17% from hydroelectricity (1,258,000 toe), 57% from bio mass (4,218,000 toe) and 26% from petroleum oil products (1,998,000 toe) (see Fig 1.). It is evident that these estimates do not include direct solar energy usage or the use of other renewable energy sources, such as wind power, solar electricity and coal. That is basically due to their insignificance compared to the three main sources of energy.

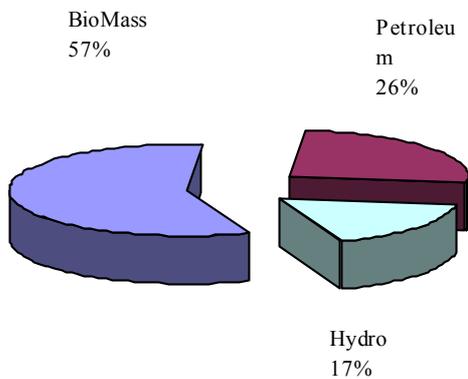


Fig 1. Primary energy Supply in Sri Lanka (1998)

Around 75% of national energy supply comes from renewable sources of energy; biomass and large hydro plants. Attempts have been made to promote photovoltaic (PV) for rural lighting, wind energy for lift irrigation, agricultural residues for industrial heating, biogas generators for domestic use and solar water heaters for industry, hotels and domestic use, but their contributions have still remained relatively small.

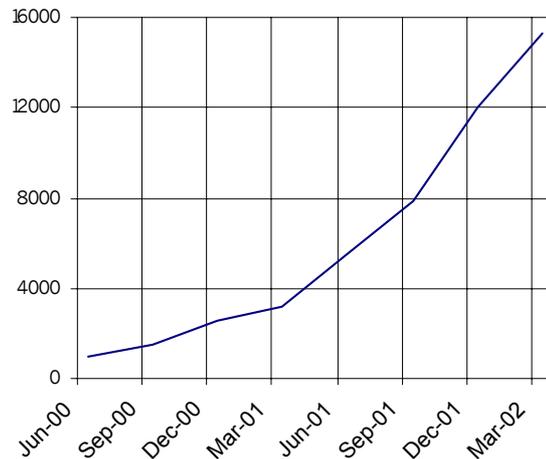


Fig 2. Growth of SHS sales in Sri Lanka (2000 – 2002)

Though the Ceylon Electricity Board started popularizing solar PV for rural domestic lighting in the early 1980s, it is presently the private sector, which is mainly involved in installing domestic solar energy systems in Sri Lanka. A large number of grid connected as well as isolated small hydro power plants are now being developed by the private sector, although their total contribution still remains small in comparison with conventional large hydropower development. The use of dendro power plants (fuel wood-fired plants) with energy plantations is still in the experimentation stage in Sri Lanka.

Sri Lanka has seen a rapid boost in the SHS sales during the recent years. One of the major reasons for such a growth is the monetary incentive the house holds has got in terms of easy pay schemes and grants. These would be discussed in depth in the chapters to come.

2.OBJECTIVE

One of the major objectives of our study was to contribute to a better understanding of the impact and of the limitations of the Photovoltaic systems on sustainable rural development, especially highlighting the income generating activities if there are any.

Therefore the scope of this project basically depends upon the following set of research parameters.

- Carrying out an extensive data collection and analysis of rural solar power system users in Sri Lanka (off-grid).
- Identifying the installed systems and whether they have delivered the expected benefits to the subscribers or not.
- Scrutinizing how these projects have or would help the rural households to uplift their socio – economic status.
- Critically evaluating whether the completed SHS projects have boosted the economic growth of the area concerned as a whole.
- Investigating the other viable renewable energy sources in the areas and to ascertain their feasibility in a smaller scale.

3. SAMPLE SELECTION

The selected sample was 125 households with installed SHS. All the selected samples were from Badulla district, basically divided in to two sub groups. They were the households given a benefit in the form of a grant of Rs 10,000 by the Uva provincial council and other Non– Governmental Organizations (NGO) and the households, which were not fortunate enough. The non-granted households amounted to 20.

We have taken special interest towards Badulla district due to the following reasons

- Various surveys carried out by project-undertaken groups suggest the entire project to be a success. The validity of such statements with respect to Badulla is of interest to be evaluated.
- The Uva provincial council and various NGOs have given household in Badulla a grant of Rs 10,000 towards the acquisition of SHS s.
- Since Badulla district is a very under developed area any economic or social advancements could be easily identified.

4. QUESTIONNAIRE

After the preliminary studies of the Solar Home systems in the district of Badulla, a questionnaire was developed based on the below research criteria.

- What are the major applications of PV systems at present – especially activities related to income generation?
- What potential impact do these systems have in terms of social and economic development?
- What advantages and disadvantages do these systems have in comparison to alternative technologies?

- How the service of these could be improved?
- How the PV systems are to be utilized in order to achieve sustainable development in rural households?

Each and every household was presented with the questionnaire and besides that an in-depth understanding on the social and economic life styles of the people in the areas concerned was acquired.

5. ANALYSIS

The desired and the real outcome of this study is the extensive analysis of the data collected, identifying the problems not forgetting the benefits of SHS, evaluating the social and economic advancements of rural house holds, studying various alternatives for SHS and the critical evaluation of government intervention and it’s attitude towards off – grid electrification projects of this nature.

There is no significant difference between the distribution of solar home systems with respect to income levels, in the two sub sectors of granted and non-granted households. The income group of Rs 1,000 – 5,000 has been the most favorite with a percentage of 59%.

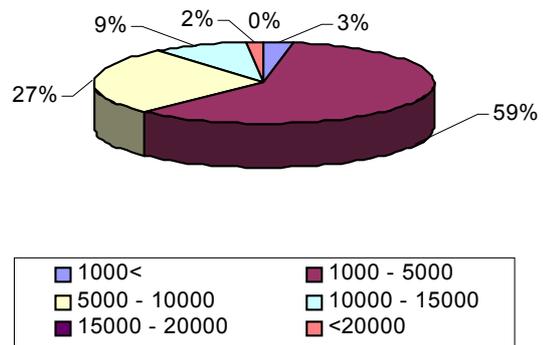


Fig 3. SHS distribution with income levels

One of the major relieves the rural households has experienced with the introduction of SHS is the almost total elimination of kerosene expenditure. On average this has amounted to around Rs. 300 –600 per household per month. Although the benefits of kerosene and the SHS cannot be compared by any means this is quite a significant saving to the rural household.

It should be noted that the households are paying a higher installment to the micro financing company for the acquisition of the SHS.

It’s a vital fact here that the introduction of SHS has totally eliminated the environmental unfriendly gaseous emissions from the burn of kerosene. Even though the emission by a single household could seem to be insignificant the accumulated emission of gases by a collection of households cannot be looked down on.

This is a major environmental impact with respect to the introduction of SHS.

Emissions	Lb/mmbtu
NO _x as NO ₂	4.41
ROC	0.30
CO	0.95
SO _x as SO ₂	1.01 * S

Table 1. Emissions of Kerosene burn

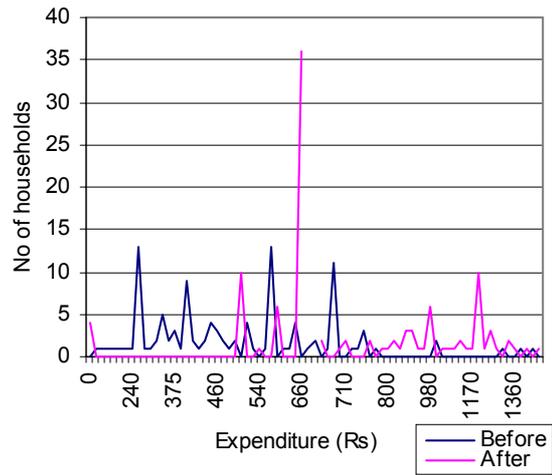


Fig. 4. Expenditure on Kerosene