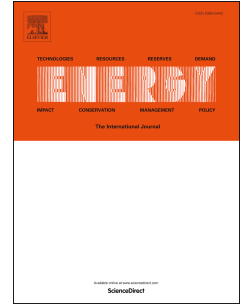


Accepted Manuscript

Demand side management approach to rural electrification of different climate zones in Indian state of Tamil Nadu

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PII: S0360-5442(17)31324-5

DOI: [10.1016/j.energy.2017.07.140](https://doi.org/10.1016/j.energy.2017.07.140)

Reference: EGY 11328

To appear in: *Energy*

Received Date: 14 September 2016

Revised Date: 25 May 2017

Accepted Date: 21 July 2017

Please cite this article as: Vishnupriyan J, Manoharan PS, Demand side management approach to rural electrification of different climate zones in Indian state of Tamil Nadu, *Energy* (2017), doi: 10.1016/j.energy.2017.07.140.

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218 **Demand Side Management Approach to Rural Electrification of Different Climate Zones**
219 **in Indian State of Tamil Nadu**

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223 **Abstract**

224 This paper involves the hybrid power potential implementation in view of six climatic zones in
225 Indian state of Tamil Nadu. An intertwined techno-economic feasible study and energy
226 management analysis of Hybrid Renewable Energy System (HRES) has been proposed to cater
227 to need of the electrical energy requirement in un-electrified village hamlets of Tamil Nadu. The
228 HRES feasibility, size optimization, cost and sensitivity analyses are performed to satisfy the
229 electrical energy requirements of the considered area. A combination of Demand Side
230 Management (DSM) and optimum tilt solar panel approach has also been analyzed through
231 HOMER Energy® simulation. The selection of HRES configuration is based on real-time data
232 collected from six different climatic zones. The optimization results of the considered system are
233 presented and compared with and without DSM strategy. The optimum planning of HRES is
234 based on ranking scheme which includes technical and ecological aspects for sustainable
235 development. In addition, to evaluate the most feasible consideration of the system, sensitivity
236 analysis has been performed upon the load variation, biomass and diesel price too. The
237 simulation results of the proposed HRES configuration can improve the renewable fraction and
238 offer more employment opportunities to the local people, compared to the existing PV-DG-
239 Battery HRES.

240 **Key words:** Hybrid renewable energy system (HRES), Demand side management (DSM), Net
241 present cost (NPC), Renewable fraction (RF), Employment.

242 **1. Introduction**

243 In recent years, avoiding the grid power utility has become an interesting option for residential
244 applications even in suburban locations, due to continuity and reliability of electric supply [1].
245 As per Indian Government statistics, the Tamil Nadu state has 100% power supplies to all
246 regions including rural areas and there is no power shortage in all the sectors [2]. However, the

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