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Abstract (867 Kb)

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Year: 2005 | Volume: 20, Issue: 2 | Journal Article | Publisher: IEEE
Cited by: Papers (133) | Patents (1)

Abstract (248 Kb)

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2020 6th IEEE International Energy Conference (ENERGYCon)
Year: 2020 | Conference Paper | Publisher: IEEE

Abstract (187 Kb)

Comparative Analysis of the Implementation of Solar PV Systems using the ECOS Model and HOMER Software: A

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IEEE International Conference on Recent Advances and Innovations in Engineering (ICRAIE-2016), December 23-25, 2016, Jaipur, India

Modeling, Simulation and Comparison of a Hybrid Power System for Economic Analysis and Environmental Impact

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***Abstract*—Chhabra Thermal Power Plant (CTPP) is one of Rajasthan's coal-fired power plants, India. It has installed capacity of 1000 MW of total four unit of each 250 MW. In this paper, we propose the best Hybrid Energy System (HES) for CTPP to reduced grid extension. Electricity need for an off-grid remote area supplies from a mixture of Biodiesel generator and nonconventional energy resources to satisfy in a reliable manner. Here we are using HOMER (Hybrid Optimization of Multiple Energy Resources) software is used for whole analysis. The main power of the HES comes from the mixture of bio-diesel generator, Flat PV array and wind generators, while the battery is used as backup. As per simulation results, the proposed hybrid system is a feasible solution for distributed generation of electric power for the rural area at remote locations. The HES is feasible, economically viable and environment friendly.**

Keywords*—Thermal Station, HOMER, Hybrid System, Distributed Generation.

I. INTRODUCTION

The electrical energy demand increase due to industrialization, urbanization day by day. In all over the world, about one hundred thirty million people in the world live without access to electricity in 2010[1]. The challenge of providing cost-effective and reliable electricity services remains the major global challenge. This problem isn't only facing by India but also by the world. The grid extension still remains the preferred mode of rural electrification [2]. The grid extension of the central electricity grid to an urban and rural area electrification can either be financially feasible or practical impossible. Off-grid electrification options can be helpful in such remote area.

The objective of this research effort is to find out the mixture of nonconventional energy resources from the available resources in a given remote area location to reduced grid extension. The Hybrid Energy System (HES) is a combination of nonconventional energy system sources in the remote area, where the utility of grid extension is either financially unfeasible or practical impossible and where the cost of fuel change with respect to a diversity of remote location [3].

In recent time, the combination of flat PV array, a wind turbine is become more popular and being widely used in all over world alternative of fossil fuel.

For grid extension reduction of Chhabra thermal power plant, we choose nearest seven villages for electrification and used HOMER software. HOMER software is the widely used for system optimization [4]. For optimization result first, we identify the available resources at the remote location, model electricity generation based on various mixtures of nonconventional energy sources and biodiesel generator. Secondly, we used HOMER software and obtain the best optimization result of the hybrid power system.

For example, Bhattacharya and Hafez investigated the optimal model of the RES based micro grid system for a hypothetical rural area. Where the base load demand is 600 kW and daily energy demand is 5000 kWh/day. The hybrid system is combination of flat PV array, wind turbine, hydro and diesel generator resources for electricity generation [5] and AHM Yatim et al. analyzed the case of a hypothetical residential area with peak demand 80kW in Malaysia and used HOMER software to optimization of a hybrid system [6].

By using HOMER software, in this paper, we are trying to address the following issues.

- How economical would it be if electricity supply by the hybrid system?
- If renewable energy system used for all seven villages, what will be the gain in an economy?

Another advantage nonconventional energy sources based hybrid power system, the total CO2 emission is reduced comes from the conventional power plant.

II. METHODOLOGY

A. HOMER software

HOMER is "A tool for modeling and evaluating micro power technology or hybrid power system, which contain conventional generator, Flat PV, batteries, fuel cells, biomass and other input'[7]. It is developed by NREL for designing

[978-1-5090-2807-8/16/$31.00 ©2016 IEEE]