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A REVIEW ON MITIGATION OF TRANSIENT OVER-VOLTAGE IN MICRO GRID

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ABSTRACT- In Brazil, most electricity generation is hydroelectric. Because of the size of the country, a long transmission system is required to carry this energy to consumer centers. Power rationing that occurred in 2001 showed the fragility of the generation system in Brazil, strengthening the discussions on alternative energy sources [2]. These factors show the importance of diversifying energy sources through Distributed Generation (DG). A significant change is foreseen for the current structure of highly centralized, large capacity power plants. A new structure, with the highly decentralized insertion of small- and medium-capacity power units, is expected [3]. Regarding the use of renewable energy, Brazil is one of the most advanced countries in South America [4]. Data from the National Energy Balance 2011 show that the primary energy on the Brazilian matrix is composed by 45.5% renewable energy (hydraulic, firewood, charcoal, sugarcane and other renewable sources, such as agricultural residues) [5]. Figure 1 shows the distribution of the sources of primary power generation in Brazil. It should be highlighted that the percentage of useful energy consumed in Brazil obtained from renewable sources should be evengreater because much of Brazilian renewable energy is hydroelectric. Moreover, power conversion efficiency, from electrical energy to final end use, is usually higher compared to other energy sources. Thus, the percentage of useful energy from renewable sources tends to be higher than the 45.5% mentioned.

Index Terms- Street Light, microgrid; PIR; LDR

I. Introduction

The analysis of electricity generation alone is shown in Figure 2 and reveals that 74.3% comes from hydro sources. Furthermore, imported electrical energy is also hydroelectricity; thus, it can be stated that over 80% of the electricity used in Brazil is renewable [5]. These figures contrast strongly with the World's electrical energy consumption because renewable sources account for approximately 20.9% of the electricity generation.

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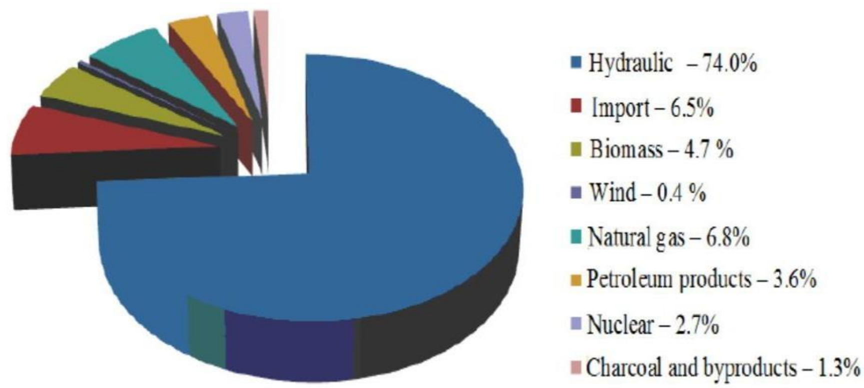

Figure 1. Domestic supply of electricity in Brazil in 2010

The use of microgrids powered by photovoltaic systems and other alternative energy sources can contribute significantly to world energy demand, gradually replacing the plants that generate electricity using coal, petroleum and nuclear powerThe main elective sources incorporate miniature turbines, photovoltaics, power devices and gas powered motors utilizing biofuels, like ethanol, biodiesel and biogas. These arising advancements have lower emanations and the potential for lower costs in the medium term. A few nations and associations have put resources into exploring microgrids, and much still needs to be finished the microgrids to be put available [6,7].
In view of its area, Brazil has magnificent sun oriented radiation levels. This component is a benefit over industrialized nations in regards to the utilization of sun oriented photovoltaic energy [8-10]. The Brazilian Government made the Incentive Program for Alternative Energy Sources (PROINFA) to broaden its energy sources in view of the rule that circulated age frameworks can give a quick, secluded, and decentralized answer for grow the limit of force age and increment unwavering quality. Under the coordination of the Ministry of Mines and Energy, the program was set to get 3300 MW of electrical power in the Integrated National System to be produced by wind, biomass and small hydropower (SHP) by the year 2008 and supply approximately 10% of the consumption in 20 years. Mitigation of transient over-voltage in micro grid, Although Brazil has high levels of solar radiation, the lack of incentives and the elevated costs of photovoltaic systems have been a barrier to the development of the PV marketin Brazil. To promote the feasibility of PV systems, a microgrid model that increases the earnings from generated electricity was proposed. The present study aimed to simulate and analyze the operation of microgrids connected to the electric power system with photovoltaic generation and energy storage in batteries.

II. OBJECTIVES

The fundamental goal of this study is to foster a continuous model of a conveyance framework for HIL study. The model ought to be approved and measured on a constant stage. The review ought to introduce the moves experienced and the answer for those difficulties. The dispersed assets ought to be chosen and demonstrated in a continuous stage and, these models will frame the microgrid with the 13-Node dissemination framework. The other significant part of the microgrid is the microgrid regulator which ought to be created and tried under various situations. Every one of the sections in this proposal begins with a short prologue to the substance introduced in the part and end with a synopsis and following stages towards the goal.

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III. METHODOLOGY

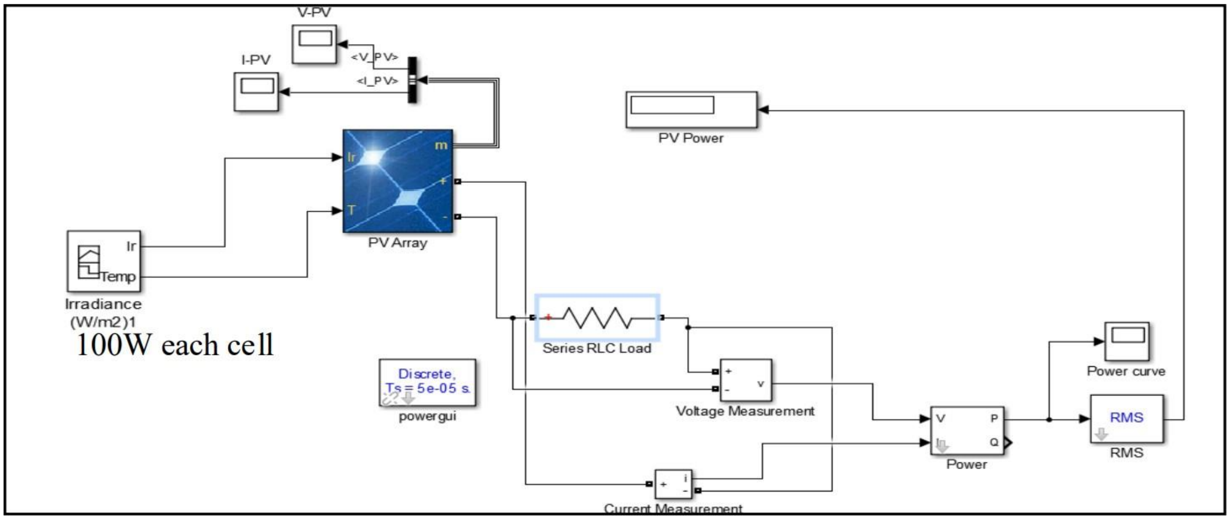

Figure 2 :Matlab/Simulink Model Of Pv Array

3.1. Radiation Data

The methodology developed by Cabral et al. was used to simulate the radiation data used in this study. Radiation data were evaluated by a stochastic method, using monthly average daily global radiation values derived from a typical meteorological year over a period of 20 years to generate hourly data to be used in the simulation. In this methodology, the following parameters were estimated: (I) the hourly global radiation on a inclined surface; (II) the hourly global radiation on a horizontal surface; (III) the daily global radiation on a horizontal surface; (IV) the hourly diffuse radiation on a horizontal surface calculated from hourly global radiation and extraterrestrial hourly radiation; (V) the hourly sky diffuse radiation based on an anisotropic model; and (VI) the hourly ground reflected diffuse radiation based on anisotropic reflection model. Markov transition matrices were used to estimate the daily clearness index based on historic data from meteorological stations. It was possible to describe the radiation data by a stochastical model improving the estimation of the electrical output power from the photovoltaic modules.

3.2. Battery Model

Battery set sizing depends only on battery rated capacity, voltage and the desired autonomy. For the photovoltaic system simulation, the batteries were considered to be initially fully charged, and the total stored energy (Wh) was obtained by multiplying the battery capacity (Ah) by its rated voltage (V). The efficiencies of battery charge and battery discharge were considered to be 70% and 90%, respectively, according to the data obtained by.

3.3. Loads Characterization

The electrical load considered was a set of residences. For each residence, the load was considered to be the sum of lights and electrical appliances. The average power values for the daily and weekly pattern of use of the electrical residential load commonly used in Brazil were considered to be the ones described by PROCEL.
The load curves were obtained from the adapted stochastic method proposed by Souza et al. For each load, the amount of usage time was simulated during the day, stochastically, by considering the following: (I) the random, daily average

usage time variation; and (II) the random, time of day use variation.
The variation allowed in the load pattern was controlled by the algorithm. The first step was to determine the daily amount of usage time for each load for any given day. The second step was to determine the most likely period of usage for each load. For this purpose, probability curves were generated for each load according to usage patterns of the Brazilian middle class. These curves show the chances for the loads to be used at a particular time of day on a particular weekday. The third step was to estimate the number of times that the load is used throughout the day. The developed algorithm simulates the load probability curves using the value determined by [12] in 2011 as the average and a deviation around a range bounded by minimum and maximum limits

3.4 Topologies

The microgrid model presented in this study proposes that residential consumers are interconnected, forming a group in which some homes have photovoltaic generation and energy storage in batteries, while others do not. Thus, the surplus of energy generated by those with photovoltaic systems could be used by those without as an alternative to a local electrical utility. The photovoltaic systems were sized to supply consumers isolated from the network. The proposed microgrid should be connected to the power system. A schematic model of the proposed microgrid is shown in Figure. Mitigation of transient over-voltage in micro grid

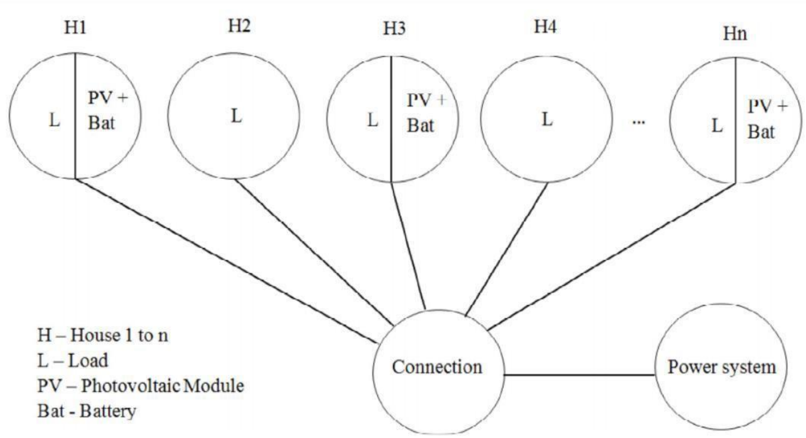

Figure 3. Schematic drawing of the proposed microgrid.

IV. CONCLUSION

This study investigates the mitigation of transient TOVs in a μG supplied by RDGRs, which includes PV generators, HGU, and WPGs. ATP is used in this study as electromagnetic transient software. Accurate simulation models are needed to carry out the study. Therefore, a three-phase PV system model based on ENRCis used.

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