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International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Power Quality Improvement of Hydro Power Generation System by STATCOM

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ABSTRACT

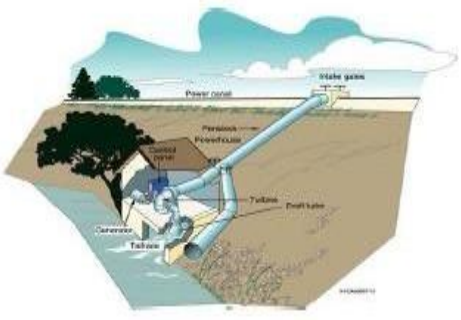
The purpose of this paper is to improve power quality by regulating the voltage and the frequency of an isolated microhydraulic generation. Based on a capacitor-excited synchronous generator that feeds a linear load and is controlled by an electronic load controller. We are attempting to research micro hydro plants in order to increase power quality. FACTS devices are used to aid in this process.

1.INTRODUCTION

The phrase "hydroelectricity" refers to electricity generated by hydropower, which is the generation of electricity using the gravitational force of falling or flowing water. Hydropower generated 16.6% of global total electricity and 70% of all renewable electricity in 2015, and is predicted to grow at a rate of 3.1 percent per year for the next 25 years. Hydropower is generated in 150 nations, with Asia-Pacific accounting for 33% of worldwide hydropower generation in 2013. With 920 megawatts of hydropower, China is the world's greatest producer. In 2013, TWh of production was produced, accounting for 16.9% of domestic power consumption. Hydroelectricity has a cheap cost of production, making it a competitive renewable energy source. Unlike coal or gas plants, the hydro station uses no water. The typical cost of power from a hydroelectric plant with a capacity of more than 10 megawatts is 3 to 5 cents per kilowatt-hour. [2] It is also a flexible source of electricity with a dam and reservoir since the amount produced by the station can be moved up or down very fast to react to changing energy conditions demands. Once built, a hydroelectric complex creates no direct waste and emits far fewer greenhouse gases than fossil-fuel-powered electricity facilities.

Micro Hydropower

A micro hydropower plant can produce up to 100 kilowatts of electricity. A home, farm, ranch, or hamlet can all benefit from a tiny or micro-hydroelectric power system.



2. REVIEW OF LITERATURE

Scaelotte and Eugene are credited with the first study in the field of energy economics (1952). The main focus of this research was on the reserve potential of major commercial and non-commercial fisheries.energy, as well as the rate at which they are used. Despite the fact that the study's scope included the entire world, the authors' investigation was mostly limited to affluent countries due to significant data difficulties in the developing world. Economists have been very interested in looking at the role of energy in economic growth as a result of this work. In this regard, Joel Darmstadter's paper "Energy in the World Economy: A Statistical Review of Trends in Output, Trade, and Consumption Since 1925" deserves special note. He discovered that as GNP climbed, energy consumption increased in lockstep. In their article Public Infrastructure and Growth: New Channels and Policy Implications, P. Agenor and B. Moreno-Dodson identify that energy infrastructure influences economic growth through a variety of channels. It has both direct and indirect effects on the development process, and most studies agree that the effects of energy infrastructure on the development process are significant.

Indicators of progress are encouraging. Energy infrastructure operates as an intermediate element of production that supports commercial activity, resulting in direct consequences. Indirect influence occurs through a variety of channels, including facilitating the diffusion of ideas and technology, as well as improving quality of life in a region to encourage the retention of higher skilled workers – both of which are factors that fit into endogenous growth theories – and encouraging the development of technology and human capital (Agenor and Moreno- Dodson, 2006). In his study titled "Econometric Analysis of Energy Use in Urban Households," B. Sudhakara Reddy looked into the pattern of energy carrier consumption in the residential sector. A Carrier Dependence index was used to determine the dependence of Income on the energy carrier used in this article. The index used regression analysis to verify the impact of several explanatory variables on consumption. Income was found to be a factor in the study.

Not only does it have a significant impact in the choice of energy carrier, but it also influences the amount of energy consumed per family. Reddy discovered that the share of traditional fuels in home energy consumption has been quickly falling from 67 percent in 1953-54 to 25 percent in 1989-90 in another study on the end use pattern of power consumption of the residents of Bangalore's metropolitan. In contrast, there has been a significant growth in demand for LPG and power. The study's main finding is that as household income rises, household energy carrier use rises in favor of electricity (Reddy, 1995). In their research titled "Public Capital and Economic Growth: A Critical Survey," W. Romp and J. Haan De claimed that electricity is a unique and particularly complicated commodity. It's tough to store, because it necessitates immediate supply and demand matching across huge geographic areas. It is defined by the necessity for huge capital investments and strong institutions to manage a large amount of money.

Infrastructure that is both huge and widespread. To make managing such a massive and technically complicated infrastructure easier, power networks were traditionally operated as large, centralized monopolies. Given the importance of energy to both economic and social activities, this resulted in the politicization of electricity delivery in many countries. As a result, it is clear that providing energy cannot be viewed exclusively as a technological or even commercial activity (Romp and Haan De, 2007). K. P. Kannan and N. Vijayamohanan Pillai set out to investigate the physical efficiency and financial health of state electricity boards in the past. Their study is one of the few to take into account the economic and technical aspects of electricity system evolution, such as scale economies and innovation. The authors of a collaborative study titled "Plight of the Power Sector in India I & II (Physical and Financial Performance of the State Electricity Boards)" have looked at the important components of the power sector in India.

The expenses of inefficiency in SEB operations. The paper focused on physical performance, including technical inefficiency, T&D losses, potential underestimate, electricity supply cost, tariff and revenue, and financial performance. They noticed that the State Electricity Boards (SEBs) in India are unaccountable, resulting in significant inefficiency at all levels. And the system continues to deteriorate due to inefficiency, which is grown and fed by a variety of elements at the technical, institutional, and organizational levels, as well as financial and sociopolitical policy levels. However, the scientists pointed out that the most reassuring feature of this system's predicament is that the issues are confined to the system's internal workings. As a result, the writers of this study emphasized that the system urgently requires essence-specific reforms rather than structure-specific reforms (Kannan and Pillai, 2002). V. Anbumani and K. Amutthavalli examined the performance of state electricity boards in their article "Performance of State Electricity Boards."

In terms of physical and financial parameters, 18 SEBs performed well for 13 years, from 1980-81 to 1991-92. A striking finding from this study's comparative analysis of SEBs was that practically every board with regard to financial performance had negative returns during the study period. And, based on their findings, they ranked the SEBs based on their physical and financial performance: Andhra Pradesh was ranked first, Maharashtra was second, Tamil Nadu and Madhya Pradesh shared third place, and Punjab and Gujarat shared fourth place (Anbumani and Amutthavalli, 1997). In their paper titled "Analytical search of problems and prospects of power sector through Delphi study: Case Study of Kerala State, India," D. Parameswara Sharma, P.S. Chandramohanan Nair, and R. Balasubramanian reviewed and analyzed the critical issues that afflict the power sector of Kerala, a developing state in India, using a Delphi study.

Delphi research the report outlined the steps involved in conducting a Delphi poll as well as evaluating the results. The study yielded useful and illuminating results that will aid in the formulation and review of future planning strategies for the state's power sector expansion. The Delphi study's overall conclusion was that the Kerala power industry is experiencing a power crisis. And the survey's findings were found to generally agree with the findings of previous analytical investigations conducted by other writers. Kerala is dealing with a genuine energy crisis. The findings of the investigation revealed that the issues and the best available remedies are almost obvious. The authors advocated for the successful execution of an integrated planning strategy to revitalize Kerala's power industry, which is critical in order to avoid an impending "energy famine." In addition, valuable recommendations on a variety of topics such as future fuel mix for generating expansion, power sector changes, and so on emerged.

this questionnaire (Sharm, Nair and Balasubramanian, 2003). In their paper "Analysis of Power Sector in India: A Structural Perspective," Niranjan Swain, J. P. Singh, and Deepak Kumar point out that while there were many small and large inhibitors to growth in the power sector, the main roadblock in the growth path was Government Policy, which made it difficult or impossible for a private player to enter. This exacerbated the problem of Indian entrepreneurs lacking sufficient knowledge and experience in the development of electricity plants. To make matters worse, the SEBs and other government agencies have become financially unfit to support any further expansion or growth in the industry. The Electricity Act of 2003 was a significant step toward resolving the power sector's underlying issues. A completely new structure was created, in which private participants were asked to participate actively. The system necessitated financial, political, and other infrastructure development, with a focus on highways and communication. Some of the daring

Moving generation and distribution out of the 'License Raj' regime, extending access to the national grid, and destroying the 'Single Buyer' paradigm were all moves taken in the Act. The breakdown of the massive federal structure, as well as the shifting global environment, has compelled the government to consider how to resurrect this critical infrastructure sector. Midgets or Small Power Plants and CDM—Clean Development Mechanism are two of the ways that the government can rely on for future expansion of this sector (Swain, Singh and Kumar, 2004). Sudha Menon, the author of the article "Energy Sector in Gujarat: Performance and Prospects," provided an overview of the major public and private players in the energy sector, as well as the performance and prospects of the energy sector, which included oil, natural gas, and renewable energy sources. According to the author, enormous expansion is required to meet expanding power demands in order to maintain growth in the secondary, primary, and tertiary sectors of the economy.

The author stated that the energy structure should not just rely on conventional energy sources, but should also take advantage of the power generation potential of unconventional energy sources (Menon, 2008). In his book "Power Sector Reforms in Orissa," Abhijit Dutta acknowledges that India's power sector reform began with the goal of reorienting the system. On the one hand, the goal was to improve the like environment, while on the other, the goal was to improve distribution and make an effective adjustment to the exchequer. The SEBs were substantially redesigned as part of the privatization process. Unfortunately, a few shortsighted decisions, such as keeping the SEBs as corporate rather than refocusing the function in most of the state, tainted the process. As a result, the newly constituted private power industry was a repackaged old wine. The electricity sector reform in most of the state, including Orissa, has taken a nosedive due to the social agenda and conflicting agendas. He proposed that an all-out effort be made.

The government, distribution businesses, regulatory agencies, the media, the political class, and the general public must all work together to enhance the distribution system's health, since it is the foundation for reform's success (Dutta, 2003). In their collaborative study titled "Power Sector Reforms (A Case Study of Punjab)," Kulwant Singh, Rajesh Kumar, and Surender Kumar evaluated the technical and financial performance, as well as the reforms process, in Punjab's power utility. They determined that the utility's technical and financial performance were both inadequate in their assessment, owing to a lack of commercial vision and unaccountable and unneeded political meddling in the utility's operations. Power sector reforms were launched in Punjab in 1999 to ensure financial viability, transparency, and accountability in its operation, as well as to insulate it from political meddling.

3.CONCLUSION

The review based on the hydro power study . we tried to improve the power quality of system with the help of fact device , finally we decide to improve system performance of micro hydro plant with the help of STATCOM.

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