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**Research on Single-Phase Grid Connected PV Systems**

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**Abstract**

The demand for renewable vitality based power production has been increased because of many reasons such as to reduce the level of carbon emission, to minimize the consumption of non-renewable energy source and to maintain the environment pollution free. Among the available renewable resources such as hydroelectric, wind, solar, biomass and ocean, solar energy has gained much attention by researchers in the recent decades all over the world. The abundant availability and increasing global warming threat urge the researchers to develop an efficient solar energy conversion system. This survey purposefully intended to elaborate the significance of solar power system. This system consists of set of a PV array to transform sunlight into electrical power (dc). Then the converter and inverter circuits are utilized to produce stable ac power. To overcome the challenges like non-uniform insolation, temperature and partial shading effects, various artificial intelligence and optimization techniques have evolved to maximize the power output from the panel. Even with recent technological breakthrough the efficiency is still less than 20%. This survey presents the several existing solar energy conversion systems with its challenges and mitigation methods under different environmental conditions for improving the power output.

**Keywords:**

Hydroelectric, Wind, Solar, Biomass and Ocean, Solar energy

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