**Optimum design of a Hybrid Renewable energy system**

Keerthi Jayaram Keerthana Sandepudi

16251A0282 16251A02A8

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G Narayanamma Institute of Technology & Science G Narayanamma Institute of Technology & Science

keerthi1708@gmail.com keerthanasandepudi@gmail.com

**ABSTRACT**

The world is witnessing a change-over from its present centralized generation to a future with greater share of distributed generation. It is desirable that the system meets the electrical demand, the costs are minimized and the components have optimal sizes. An overview of different distributed generation technologies has been considered. Hybrid energy systems are inter-connected with wind power, photovoltaic power, fuel cell and micro-turbine generator to generate power to local load and connecting to grid/micro-grids that decrease the dependence on fossil fuels. The hybrid system is a better option for construction of modern electrical grids that includes economic, environmental and social benefits.

The combined use of multiple power resources can be a viable way to achieve trade-off solutions, because **the daily output will be more stable, seasonal variations are offset and** since many sources are involved in power generation, its stability, reliability and efficiency will be high. The major advantage of multiple components is that when used together, the reliability of the system is enhanced. Additionally, the size of storage systems can be reduced as there is less reliance on one method of power production. The number of components is directly dependent on the load pattern. In this hybrid model, due to combination of more than one source of energy generation, even if one of them fails, the other components continue to meet the demand and thus, the design system will be more economical. This paper puts forward a comprehensive review of optimal sizing, operation & integration of different renewable energy sources to constitute a hybrid system. The main objective is to propose innovative and improved solutions for management of energy flows in a HRES, aimed at providing a secure, reliable and high quality supply to varying load demands.