ABSTRACT

The maintenance and acceleration of the economic growth of a country depends primarily on energy. It is a fact that access to a continuous supply of clean and sufficient energy is very vital for the all round development of the society, irrespective of social and/or economic status and geographic location. In order to address this issue effectively, energy security through the use of biomass and solar energy has been incorporated in the present work. Rural area depends primarily upon agriculture and is much marginalized, vulnerable and they also lack access to most of the basic resources. In order to bring this energy security, a study in energy sector has been proposed in this piece of work.

The agricultural wastes from the rural areas can be used as fuel to the gasifier, which in turn, can produce syngas which is then introduced to the dual fuel generator to produce electricity. From the field study of biomass gasification with rice husk as feedstock, the obtained output are syngas, tar and char. Biomass gasification included downdraft gasifier, set of scrubbers, blower, fabric filter, and a dual fuel generator. The output syngas after being fed to dual fuel generator reduces the diesel consumption by 70%; as evident from the data noted from conducted experiment. Apart from the syngas, the tar can potentially be converted to bio-diesel, which can further reduce the consumption of diesel, upon replacing it with bio-diesel. The smokeless byproduct char is usually utilized by the villagers as a fuel for cooking purposes. A model using MATLAB software has been created for PV-Biomass and the economical analysis of the gasifier has been studied using NREL’s System Advisor Model software. The feasibility of the implementation of solar power has also been addressed using RETScreen software, where the technical, financial and environmental suitability for investment in solar energy project has been determined.