MIRCO HYBRID WIND-SOLAR PV ENERGY SYSTEM FOR THE REMOTE REGIONS

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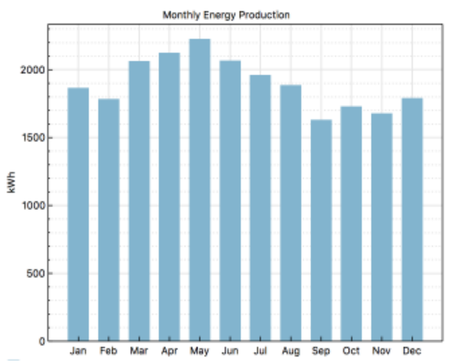
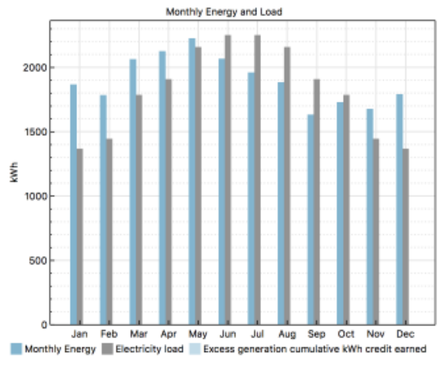
Objectives

- To provide families in desert areas with electric power.
- To provide electricity with acceptable costs.
- To provide a simple off-grid system to be used and maintained by locals.
- To be able to provide power during the year non-stop.
- To be able to fulfill the energy demand.



Hybrid system energy production



Hybrid system energy production with load

Abstract

Renewable energy systems are very likely to become widespread in the future due to some environmental impacts and increase in energy costs linked with the exercise of established energy sources. Solar and wind energy resources are alternative to each other which will have the actual potential to satisfy the load to a high degree. However, such solutions any time researched independently are not entirely trustworthy because of their effect on unstable nature. In this project, photovoltaic and wind hybrid energy systems have been found to be a more effective alternative to fulfil the energy demands worldwide. This project aims to give the idea of the hybrid system configuration, modelling, sizing hybrid system. We will be using a simulation software for the sizing in the deserted area to compare between a hybrid system and a regular system.

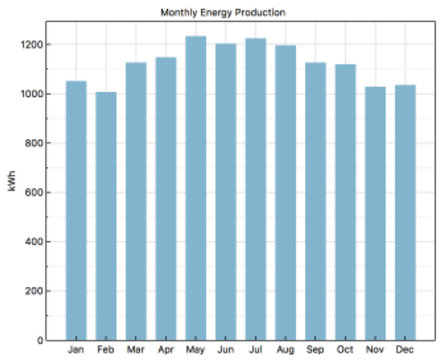
Introduction

Due to many reasons the electrical power grid cannot be economically either physically connected in many remote and deserted communities around the world. In those specific areas, the electricity demand needs to be generated by isolated small shape diesel generators. Due to the high costs of fossil fuels with along the difficulty of the fuel delivery alongside with its generator maintenance the operating cost of these diesel generators will be very high.

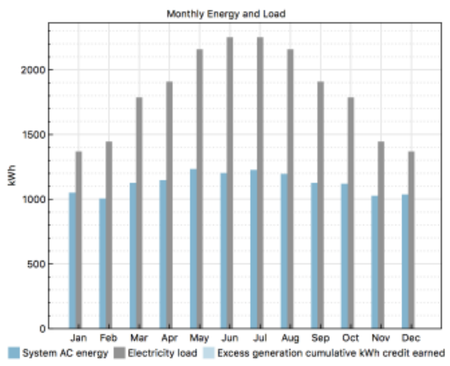
The wind turbine generator and the solar photovoltaic (PV) are promising alternatives renewable energy sources to supply electricity generation from the engine-driven generators in such remote areas. By using a combination of different sources of energy that have been provided by the hybrid system can be a reliable supply of electricity generation. By using a variety of technologies developed by the expanding renewable energy industries, given credit, so many hybrid systems are installed across the world.

The sustainable PV– wind vitality framework is a blend of sun based PV, wind turbine, inverter, battery, and other expansion segments. Abundance created a control is sustained to the battery until the point that it is completely charged, Once the power assets (sunlight based PV and wind vitality) are adequate. This is the point at which the battery becomes an integral factor when the sustainable power sources (PV– wind) control can't fulfill the whole request because of the atmosphere. The operation of breed PV– wind framework relies upon each component and segment. With a specific end goal to estimate the most extreme yield from every part, the single fragment is displayed, from that point which their blend can be evaluated to meet the required reliability. If the electrical power creation, through this sort of individual component, is acceptable the real half and half framework will produce electrical power in any event charge.

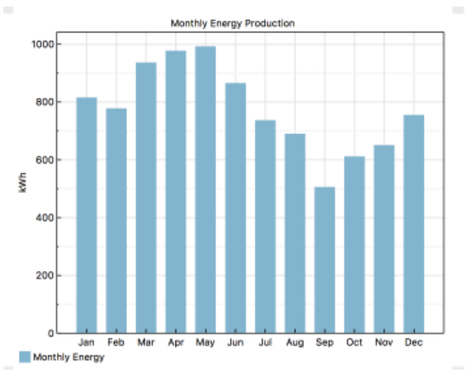
Results



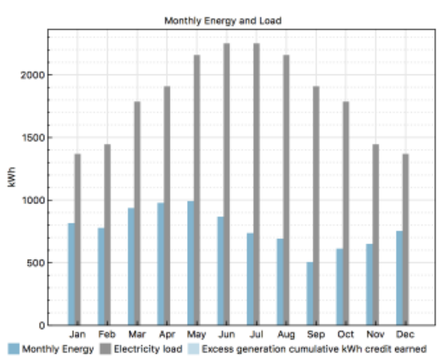
PV monthly energy production



PV energy production with load



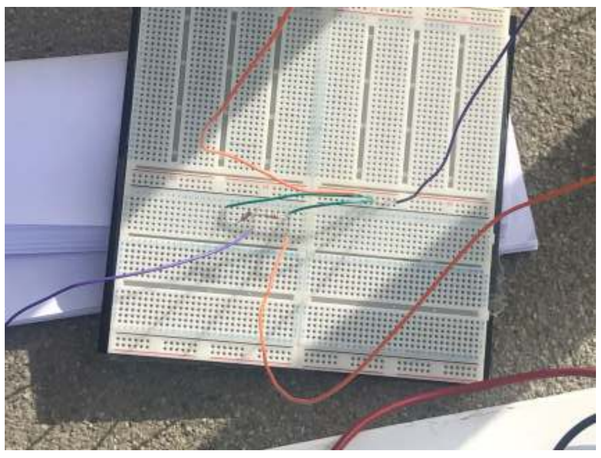
Wind turbine monthly energy



Wind turbine monthly energy with load

Design



Acknowledgment

First of all, we would like to thank our supervisor in senior design project Dr..Tareq for his undivided attention and full support throughout the phase of preparing this report and providing us with the information needed during our research. We would also like to thank Dr..Abdul Hai for providing us with the data logger, and engineer Monadel for helping us with our prototype. Finally, we appreciate all the help we got from all our professors during the years and our university for all the knowledge and the means of the learning.

Conclusion

After we finished our project, we could tell from the simulations that the hybrid systems are a very strong alternative energy option, especially for the remote areas where it is very expensive for the grid to reach
.
For our location, the PV was the primary source and the wind was a back-up, and combined together they showed a high potential as they could produce annual energy enough to satisfy the load assumed. Finally, the system's overall price was very low and affordable in comparison to grid systems.

Challenges:

- The cloudy weather that affected reading our data from the system.
- We could not afford a load simulator to change the load, so we had to assume the hourly load for our small scale system.
- The data logger that we got to read our data needed a voltage divider circuit which we made, but it only reads the voltage without the current.

References

- .National Renewable Energy Laboratory (NREL). 2012. Renewable Electricity Futures Study. Volume 1, pg. 210.
- GWEC global statistics http://gwec.net/

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