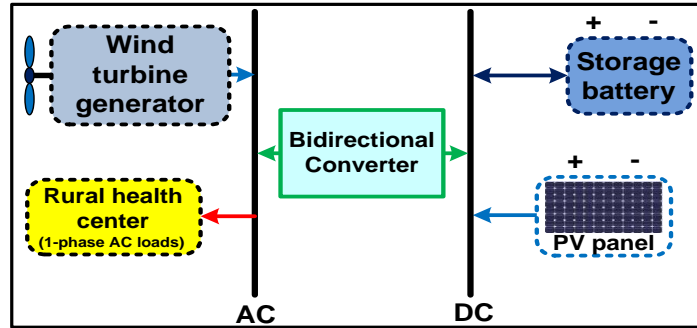


# Analysis of a Hybrid Energy System for Supplying a Remote Critical Load in Onshore Coastal India

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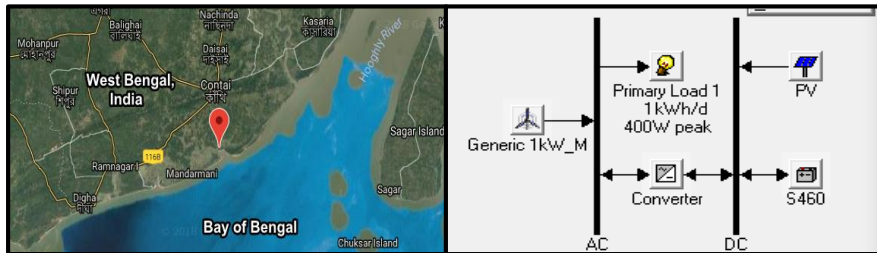
This paper presents a technical analysis of a solar-photovoltaic based hybrid energy system for its use in a remote health center

## PROPOSED SYSTEM

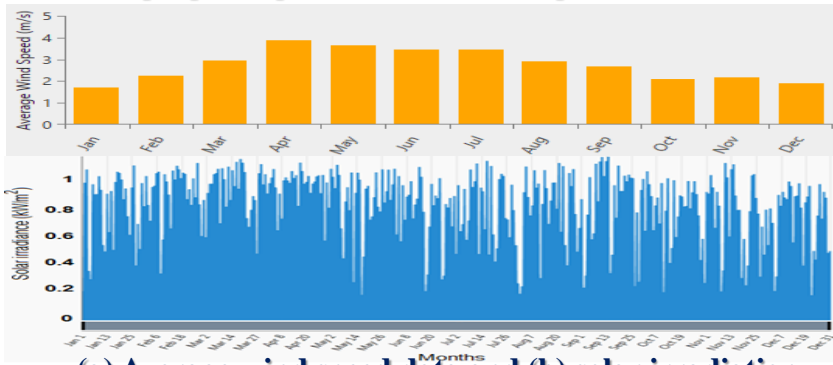


- The health-center load is chosen as a critical load i.e. a load which is to be continually supplied without interruption.
- The system is installed in a remote onshore place in eastern India which receives good solar insolation and good wind kinetic energy all over the year.
- The peak load of the system is 400W during a typical day. The overall load supplied in the day is 1.00kWh.

## RESULTS AND DISCUSSION

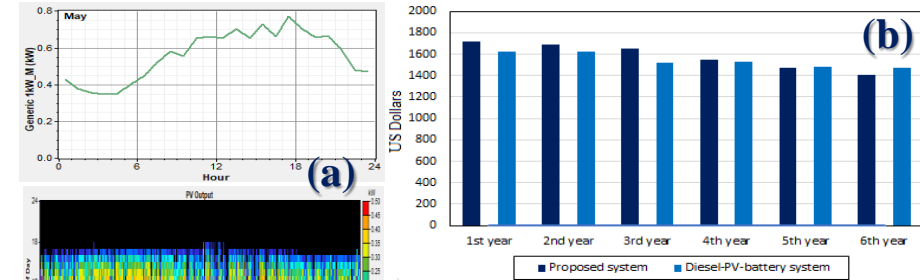


Location of proposed plant and simulated plant in HOMER



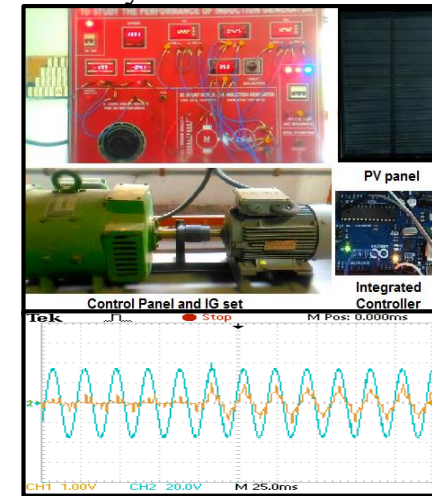
(a) Average wind speed data and (b) solar irradiation

- The system is simulated in HOMER (Hybrid Optimization Model for Electric Renewables) for techno-economic analysis. Also experimental data is collected from lab prototype.
- Electric load of the plant is taken as 1.00kWh/day with a peak load of 0.21kW
- The system is simulated for 25 years. The initial capital cost of the system is found as US\$3120 with net present cost of US\$3340. The system running cost is US\$1720.



(a) Wind turbine power, PV panel power with (b) Comparative analysis

- A comparative analysis for the economic aspect with respect to a similar diesel-PV-based generation system is shown. **Proposed system is 100% renewable.**
- The system cost is decreased as expected, initial cost of the system will be recovered in payback period.



Experimental setup with generated voltage and load current plot

## CONCLUSION

- The cost implication is within **affordable limit** and system is **sustainable for critical isolated loads.**
- The system has a **great prospect** for installation in an onshore area in eastern Indian conditions.