Progressive Education Society's
Modern College of Engineering, Pune-411005
Department of Electrical Engineering
B.E. - 2022-23

Project Group No: In-house

Project Title: Economic Management of Alternative Energy Sources for Electric Power Generation

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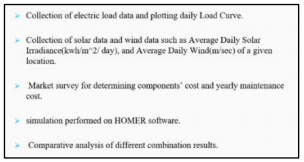
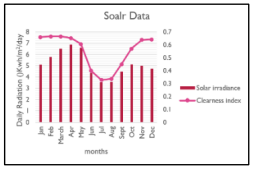
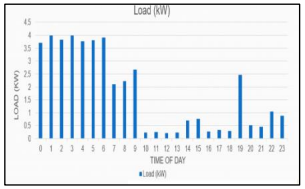
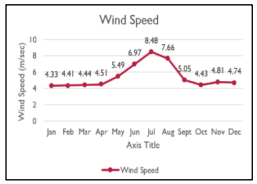
Objective: To check the feasibility (Technical and Economical) of the proposed hybrid system before its installation. Perform simulation studies of different combinations. Analyze the proposed system's Net Present Cost (NPC), Cost of Energy (COE), and Operating Cost.

Methodology:

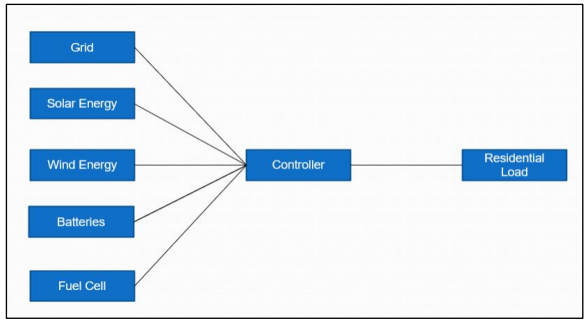


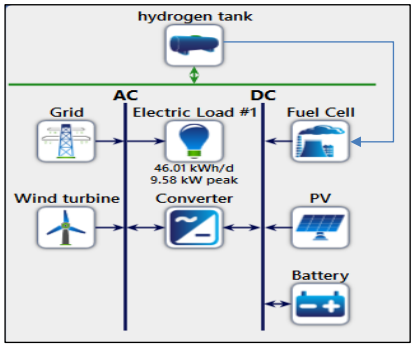






Block Diagram:





Average (kWh/day)	46.01
Average(kW)	1.92
Peak (kW)	9.59
Load factor	.2

Electrical Load Specifications

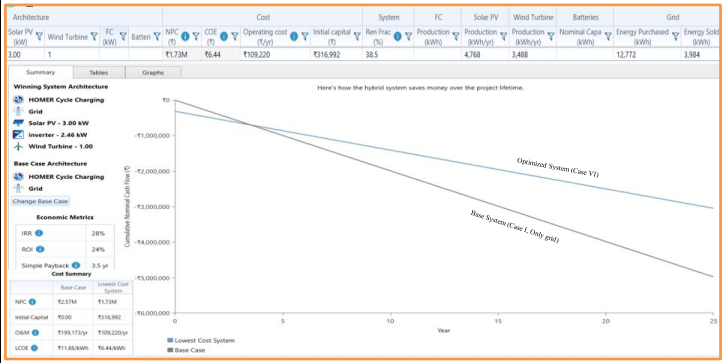
Testing:

Economic and Technical Parameters	CASE I (Only Grid)	CASE II G+PV	CASE III G+PV+ W	CASE IV G+PV+ W+FC	CASE V G+PV+ W+FC+B	CASE VI [optimized system] (G+ PV3kw +W 1kw+ Inverter 2.46kw)
Initial Cost (Rs.)	0	1,57,000	1,80,000	637000	747000	317000
Energy purchased (KwH)	16,794 kwh	15,603 kwh	13,538 kwh	12,915 kwh	12,907 kwh	12,770 kwh
Operating Cost (Rs.)	1,99,172	1,78,621	1,44,901	1,45,115	1,50,200	1,09,220 Rs.
Total NPC (Rs.)	25,74,808	24,66,131	22,10,210	21,20,496	26,88,712	17,28,936
Energy Sold back (KwH)	0	542 kwh	1,742 kwh	1,101 kwh	1,107 kwh	3,984 kwh
Renewable %	0	10%	27%	27.8	27.9%	38.5%
COE (Rs.)	11.86	11	9.22	10.86	11.60	6.44

Specifications / Features:

Component	Rating and costing
Solar PV system	1 kw (Rs. 32000)
Wind Turbine system	1.5 kw (Rs. 260000)
Single phase inverter	7.5 kw (Rs. 125000)
Battery (Lead Acid)	12v,200amph (quantity-10) (Rs. 110000)
PEM Type Hydrogen Fuel Cell	500 W (Rs. 300000)

Results:



Conclusion: We conclude that the HOMER-optimized system is more economical than our actual system in terms of cost of energy (COE) and NPC. Hence, it is good to perform the HOMER simulation to check the system's feasibility economically and technically before making an investment in hybrid system projects.