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Off Grid Solar Biomass Hydro Hybrid System for Renewable Energy Production for Village Pachori

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Abstract: The paper present a scheme for renewable and alternative sources of electricity remote and tribal village pachori. The proposed work has done with simulation on HOMER software for off grid approache. The ultimate motto of this presented paper is to analysis the result of the approache for feasibility.

Keywords: HOMER, PV, Biomass,Bus bar, COE .

I. INTRODUCTION

Earlier the energy need of any human society was very limited due to limited expansion of such conversion work is quit simple and limited &its consumption was a linear process but in todays era electrical power system is one of the complex networks in the world with invention of new techniques of power generation and utilization. The HOMER software is a very fast tool for designing and analyzing hybrid power system with renewable energy sources. HOMER is a computer model that simplifies the task of designing distributed generation systems - both on and off-grid. HOMER's optimization and sensitivity analysis.

II. PROPOSED SYSTEM

The proposed hybrid alternative energy system comprises of biomass generator, PV, and micro hydal. Solid State Converter is also used for conversion of its output to AC. This system is design for off grid system. Pachori is a small tribal village located in Burhanpu district, Madhya Pradesh with total 1300 families residing as per Population Census 2011. Among which approximately 1000 tribal families resides for way from main village. The survey conducted in village for for utilization of the electrical equipments available like TV, Fan, and Light, etc. but in the absence of power they could not used the device. The total load peak load with daily electricity consumption is shown in table 1:

Table 1 Electric Load of Study Area Village Pachori (M.P.)

Load Category	Peak Load	Daily Electricity Consumption
Cottage Houses	12 KW	216KWH/D
Irrigation System	200 KW	4.6 MWH/D
Total Load (KWH/Day)		4.816(KWH/Day)

III. OFF GRID MODEL

The off grid or standalone model for the above concept is designed with all three sources of electricity biomass, PV and hydal system. The hydal system has choosen becose of Solar PV is selected as most of month availability of solar radiations while due to forest and agricultural area; agricultural wastes are available in bulk which has no use of other purpose even in some cases villagers destroy them with fire so its availability is at very low cost. Figure 2 shows the off grid model. The Village Pachori is far awayfrom main citythere is more power cut problem only 5 to 7 hours supply in a day and all time villagers suffer electricity problem. The Solar-Biomass-hydal system is the best option for fulfill the villagers electricity need as the village is nearby fe small mountains and fall which has enough water available to delevop a micro hydal system.

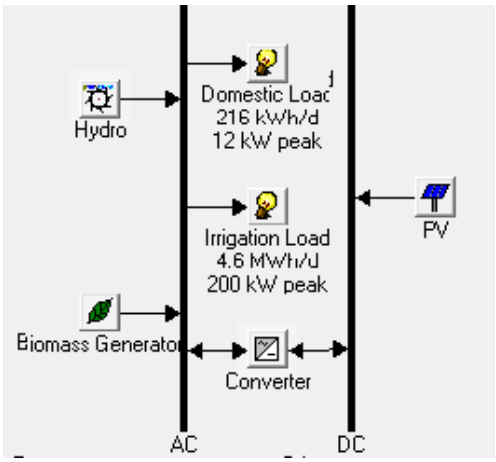

Figure 1 Off Grid Hybrid Renewable Energy System

IV. RESULT AND DISCUSSION

The HOMER software automatic consider the different size of components for feasible model according to pre defined size by user and gives the number of simulated results in simulated results the best optimized result is shown as in fig 2

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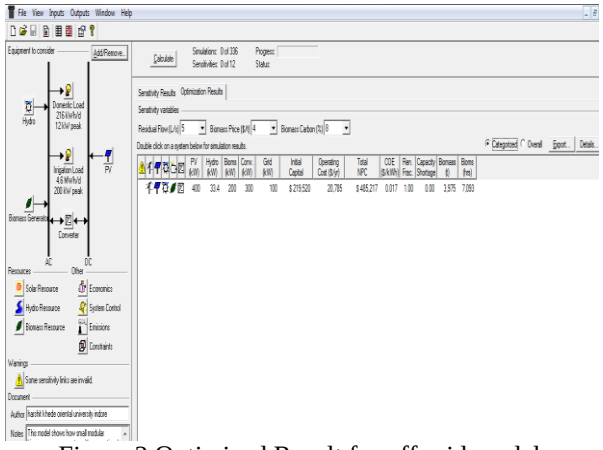

Figure 2 Optimized Result for off grid model

The total capital cost of all the components is $219520, replacement cost after components life completed $ 93505, during running time, Fuel Cost $ 203268, and salvage cost $ -4731 salvage cost mean after completed system life usable components cost. The NPC $ 485217 and COE have shown in table at different cost of biomass and different carbon percentage. Figure 3 shows all these details

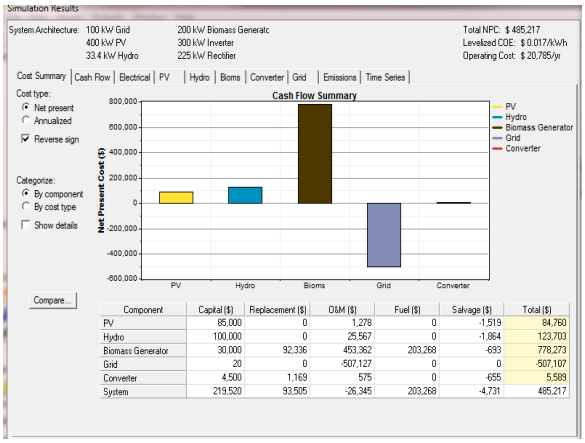

Figure 3 Cost summery for off grid system

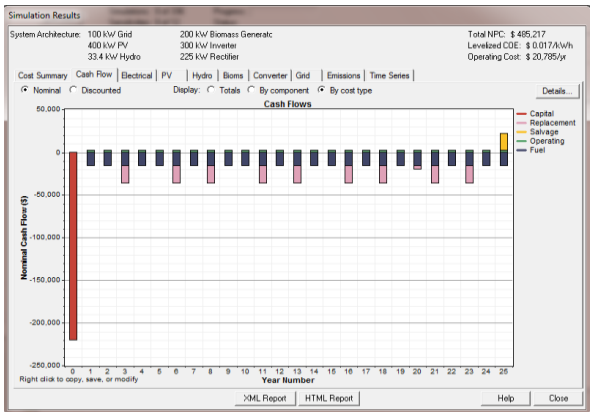

Figure 4 Cash Flow of Off grid Model

In hybrid system architecture of hybrid system is as 400KW PV system, 200kW Biomass generator system, 33.4 KW hydak system 400 kW Inverter, 100KW Grid are used. The cash flow chart of solar-biomass hybrid system show that the cost of energy per unit is reduces after first year because after installation year per year expenditure is low only fuel and operating cost invest and after 5 year replacement cost in spend. Figure 4 shows the cash flow of off grid model

In solar-biomass hybrid system the number of PV array is used 400 kW, 300 KW biomass generators to fulfill the electric load requirement 4.816MWh/d. The total production of power is 2603244 kWh/yr, in which power 1854014 kWh/yr (71%) is by Biomass generator, 745953 kWh/yr (29%) by Solar PV. The bar graph show the electricity production by solar and biomass as upper yellow color bar show the solar panels output power and lower color show the biomass generator output. Figure 5 shows the electricity production by off grid model

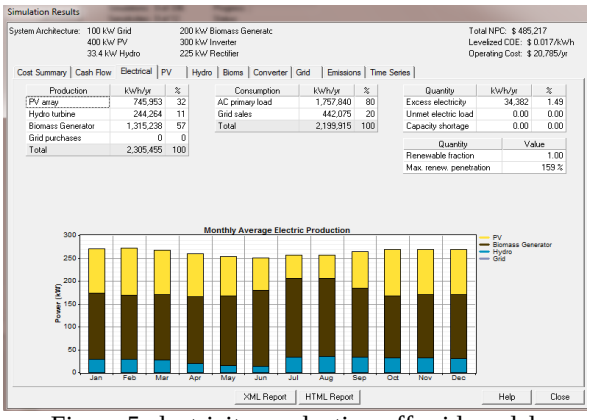

Figure 5 electricity production off grid model

Figure 6 is about PV output of off grid model

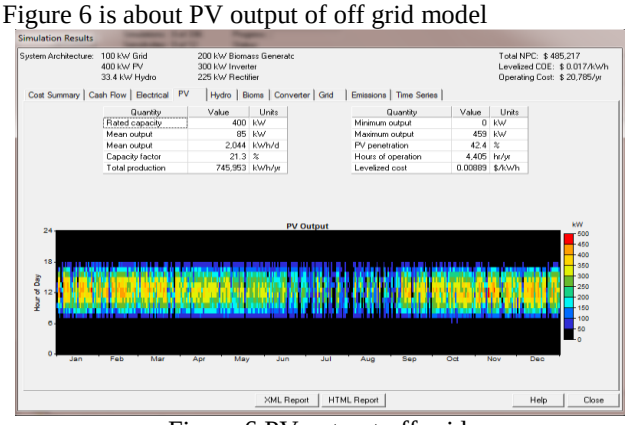

Figure 6 PV out put off grid

Figure 7 is about the hydal generation in case of off grid system

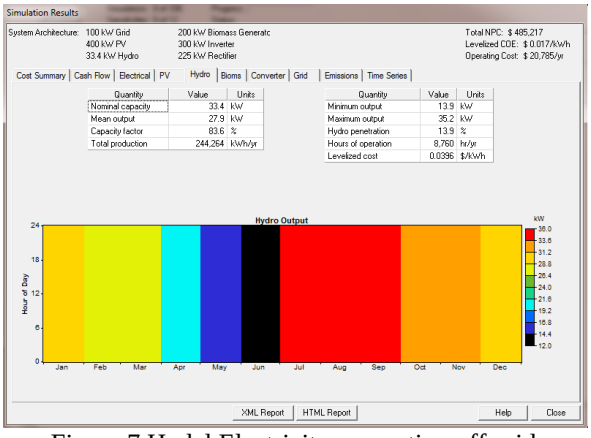

Figure 7 Hydal Electricity generation off grid

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Figure 8 tells the biomass generation is for off grid model

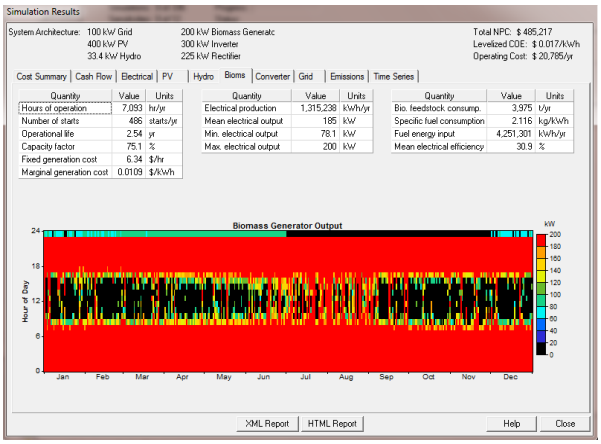

Figure 8 Biomass Electricity generation off grid

Figure 9 is about the grid data

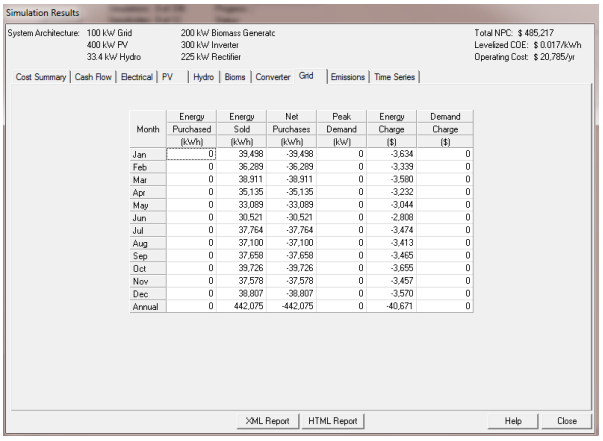

Figure 9 Grid Data

Table 2 is discusses the COE and NPC for off grid system

Table 2 Result of COE & NPC

S. No	COB/ Ton (In Rs.)	Residual Flow of Water	Carbon in Bio mass (In %)	Off Grid Connected Model	
				COE/KWH (In Rs.)	NPC (In Rs.)
1	276	5/Lt	8	1.173	33479973
3	345	5/Lt	8	1.311	36969372
5	552	5/Lt	8	1.725	47325720

The cost data gives different rates of biomass and same carbon contain and residual flow of water. The tables gives least cost of electricity at lower biomass value and is suitable for rural purpose and gives electricity to a common men.

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BIOGRAPHIES

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