# Feasibility Analysis of Power Crisis in Remote Area using HOMER in Pahadgaon and Senha

**Soma Rajwade, Albert John Varghese**

***Abstract:*** ***The paper optimise the hybrid energy system using HOMER PRO by giving the energy production cost analysis .This paper optimize the hybrid renewable energy system considering the metrological data at village of Korba. The proposed energy system including solar(pv model)and hydro sources and the other system is of PV module. Thus the model consist of first PV panels, power converter and battery for storage and the second model consist of PV panels, HYDRO and battery for storage and power convertor. The data considering for homer at KORBA village( Pahandgaw (in Pali) and Senha is taken from (NASA) national aeronautics and space administrator and the hydro flow rate is taken from the Madwa plant and Darri plant of Korba.***

***Keyword: Hybride Energy System, PV Stand Alone, Solar PV, Hydro, HOMER.***

## I. INTRODUCTION:

The hybrid power system is developing day by day. All the applications such as educational institute, home, industry the basic knowledge an engineer needed on technology, availability of economics, regulations, resources, sizing. Renewable energy are such type of energy that comes by resource according to human timescale which are naturally replenished such as wind, waves, tides, sunlight, geothermal heat and rain. In four different distinct area the conventional fuels are replaced by it; water and air cooling/heating, rural energy services ( off-grid), motor fuels, electricity generation. Hybrid system or co-generation are always useful for electric power generation with good efficiency. A hybrid system is usually made up (consist) of two or more then two renewable energy source applied (used) together with some conventional resources to give more system efficiency and greater balance to the load in energy supply.

In order to build-up a hybrid power system design for identification economic configuration of PV and hydro, national renewable energy laboratory's HOMER (hybrid optimization of multiple electic renewable) is used. HOMER PRO is the software used to find and design optimized configuration of grid and hybrid power system in terms of economic, stability, number of component and size, prior to installation. This paper main aim is to design a model of hybrid power system with metrological input data also to describe technology feasible component cost on the basis of availability of resources. The input data considered is used for simulating different combination of component or system configuration, the all configuration present the result which is shown in the form of list shorted by its net present cost. This paper simulate a propose hybrid model of hybrid power system, the composition of the simuling model is a combination of PV and hydro using converter and battery storage.

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This simulation done in HOMER gives the evaluation of best configuration with comparative economic analysis. All the things understood throughout the result which will be presented in paper after simulation HOMER is the good way to know the feasibility of the operation is feasible or not before the area prepared for installation.

## II. SYSTEM DESCRIPTION:

The proposed hybrid power system design, considering a metrological data at village of Korba .The proposed energy system including solar (PV module) and hydro sources.The input data considering at latitude 22^o, 35'N, longitude 82^o75'E from NASA (National Aeronautics and Space Administration) and NREL (National Renewable Energy Lab) for the analysis of the system performance. The simuling model is designed with describing the technology option by various input, availability of component and resources and their cost at a area priorly mention.

.The renewable energy sources available there:

**A. Solar radiation: the monthly average solar radiation data at Korba shown in fig,**

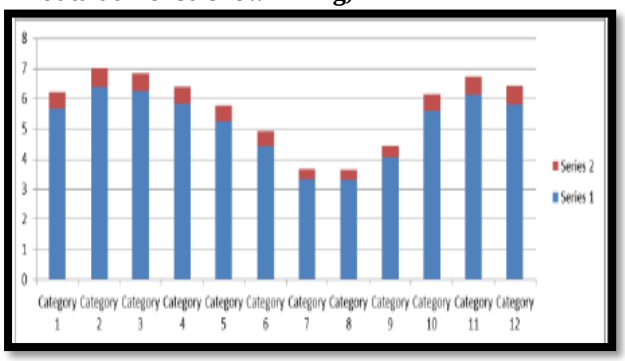


**Fig 1.1:- Available Solar Resources of Proposed Zone**

B. Hydro: data flow rate of water is shown in fig given below

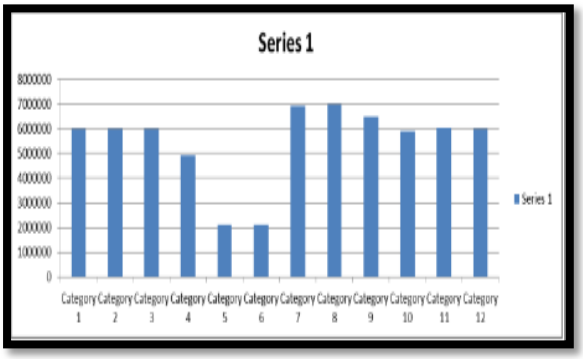


**Figure 1.2:- Available Hydro Energy based on Flow Rate of Proposed Zone**

C. Load data: yearly seasonal load and 24 hour daily load connected to bus is assumed is shown in fig,

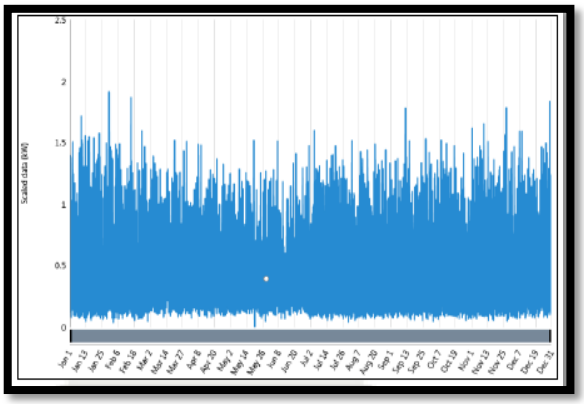

**Figure 1.3:- Input Graphical Data of Pahand Gawn**

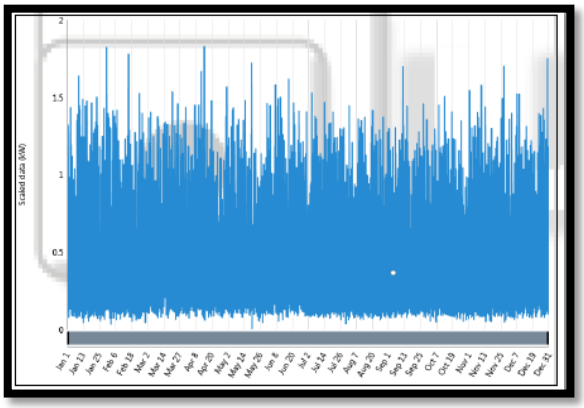

**Figure 1. 4- Input Graphical Data of Senha**

1. Solar PV flat panels: A panels designed to absorb the sun's rays as a source of energy for generating electricity or heating. A photovoltaic module is a packaged connected assembly of typically 6x10 photovoltaic solar cells.
2. Hydro power turbine: hydro turbines are device used in hydroelectric grnrration plants that transfer the energy from moving water to rotating shaft to generate electricity. These turbines to water being introduce to their blades.
3. for storage purpose·to improving the working capability of effiency of the model, energy storage is needed.
4. Converter: power converter is used to maintain the current flow rate or flow ratw of AC&DC buses. The life of converter is about to be 15 years.

## III. POTIMIZATION COST

HOMER can simulate the available data in possible combinations that are shown in possible combinations that are shown in search space of every configuration and component.

It optimized the best configuration with less net present cost of the optimized problem. Grahans Algorithm is used in HOMER for optimization.

**A. PV alone Senha Site**The (NCP) net present cost of the model is calculated by

$C_{NPC} = C_{ann,total} /CRF(i,R_{proj})$ _{1}

$R_{proj}$ shows the lifetime of project

$C_{ann.total}$ prefers forthe total annualized cost

CRF prefer for capital recovery factor which is done by the equation.

'i' shows annual interest rate.

$CRF(i,N)=i(1+i)^n/[(1+i)^{n-1}]$

N denotes the number of years.

For COE (calculating the levelized cost of energy equation is

$COE = C_{ann.total} / E_{prim}$

$E_{prim}$ is total amount of primary load.

**Simuiling model:**

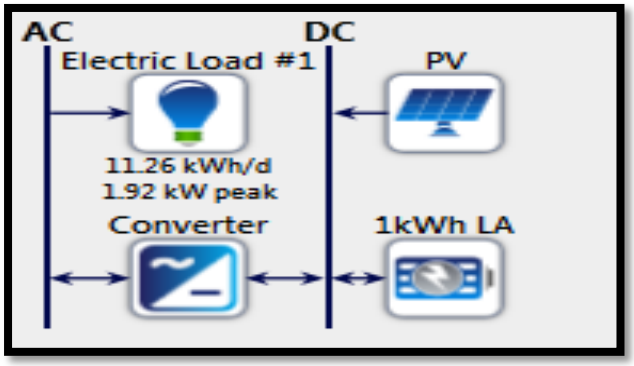


**Figure 1.5 PV system Alone (Senha Site)**

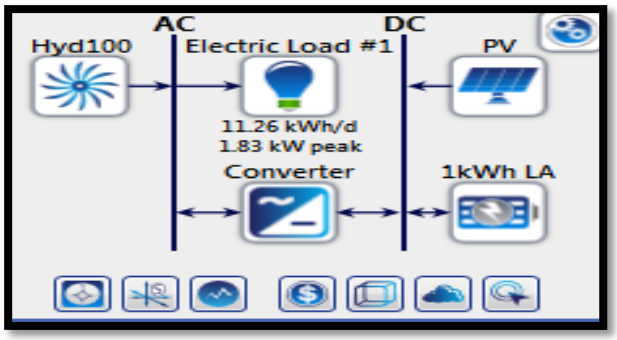


**Figure 1.5 Hybrid PV/Hydro systems (Pahand Site)**

## IV. RESULT

**Table: Optimized cost analysis of alone system and hybrid system.**

| Rural Area Location | Cost/ NPC (Rs.) | Cost/ COE (Rs.) | Cost /Operatin (Rs./g cost yr) | Cost/I nitial capital (Rs.) | Syst em/ Ren Frac (%) | Syst em/ Tota l Fuel (L/y r) |
|---|---|---|---|---|---|---|
| PV alone Senha Site | 71642 .28 | 1.349 56 | 595.7449 | 63940. 78 | 100 | 0 |
| Hybri d syste m Pali site | 63818 0.1 | 12.01 377 | 13795 | 459845 | 100 | 0 |


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## V. CONCLUSION

The paper presented the simulated model of hybrid system of hydro and PV and the stand alone system of PV module. The models are designed in homer software which represents the cost analysis. The NCP is also known as life cycle cost. NPC is used for the comparing the system designing options of the system. HOMER software perform energy balance configuration to each hour to choose feasible configuration. Thus the designing of system for the feasible combination for operating and initialising over the life time for the defined area is analyzed successfully.

## REFERENCES

1. J. K. Maherchandani1, Chitranjan Agarwal, "Economic Feasibility of Hybrid Biomass/PV/Wind System for Remote Villages Using HOMER", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 1, Issue 2, August 2012.
2. PragyaNema1, R.K. Nema, SarojRangnekar, " PV-solar / wind hybrid energy system for GSM/CDMA type mobile telephony base station, International journal of energy and environment 2010.
3. Tariq Iqbal, "International Journal of Optimal Sizing and Modeling of a Hybrid Energy System for a Remote Telecommunication Facility.
4. PrabodhBajpai , Sowjan Kumar, "Sizing Optimization and Analysis of a Stand-alone WTG System Using Hybrid Energy Storage Technologies, AIP Journal 2011.
5. S. M. Hakimi, "Optimal sizing of reliable hybrid renewable energy system considered various load types", AIP Journal of Renewable and sustainable energy 2011.
6. Deepak Kumar Lal, BibhutiBhusan Dash, "Optimization of PV/Wind/Micro-Hydro/Diesel Hybrid Power System in HOMER for the Study Area", International Journal on Electrical Engineering and Informatics - Volume 3, Number 3, 2011.


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