ECONOMIC ANALYSIS OF A MICRO GRID POWER GENERATION.

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Abstract

Energy plays a vital role in human life. A developed nation was denoted by its per capita consumption of electric energy. India is one of the developing countries in the world. Financial implementation is one of the major problems in a developing country, for energy, food, fuel, communication etc. and at the same time the necessity of these things has to be raised according to the increasing population of the country. Due to the economic unbalance, more constraints to implement various emerging trends in power generation. Implementation of Micro Grid with the existing utility grid resolves the increase in power demand. In this paper, it deals with the financial analysis to implement the Micro Grid power generation with the help of Mat lab.

Keywords: Micro grid, Power generation, Bio mass and Hydro power.

INTRODUCTION

[1] Micro grid is a proposed model to inter connects the renewable energy sources with the utility grid. The concept was developed during the year of 1970 onwards. But the very long ago we are using the renewable energy sources but the focusing and the necessary is present now only because of the abnormal development of energy consumers and the same time the growth of the fossil fuels are decreasing with respect to our consumption.

In Tamilnadu (India) past few years we are affecting the power problem because of the insufficient sources and the generation. The generation is cannot able to meet the demand.

[2] The white paper describes about that the payback period of micro grid implementation and the energy saving methods. It concludes if we implement the grids we can reduce the cost and getting back to the investment with in short durations. [3] It describes about that the total benefits resulting to consumers and generators equal 114,239.40 €.

WHY TO IMPLEMENT MICRO GRIDS?

In Tamilnadu the past ten years to still the deficit of electric energy was raised, to developed the enormous development of energy utilizes. But the same time the UN availability of fossil fuels the ratio of deficit was raised.

Fig(1) Consumer Growth
From this analysis has shown in number of consumer details during the year of 2005-2010. Now days it will increase.

Fig(2) Cumulative Growth of the consumers
From this statistics analysis, the total cumulative number of consumers is growing at about 20 % of every five years if these trends continue at 2015 the total number of consumers will be increase to 2,56,000.

ENERGY DEMAND ANALYSIS

From the chart shows the average generation of power, demand and the deficit of electric energy during the month of Jan 2011 to May 2011 during the Peak hours (18 hrs to 22 hrs). And the energy deficit was varied from 1500 MW to 3400 MW.

MODEL CALCULATION

(a) WIND POWER

Since the spare capacity is to be ignored, the installed capacity will be taken equal to maximum demand.

Annual fixed cost = 0.1*120*10^3=700
=Rs. 8.4*10^6
Total energy generated per year =120*10^3*0.25*8760
=262.8*10^6KWh
Running cost = 22.8*10^6*0.06
=Rs. 15.768*10^6
Operating cost per unit = ((24.168*10^6)/(262.8*10^6))*100
=9.196 paise
Total cost = Rs. (8.4 + 15.768)*10^6
=19.959*10^6

(b) HYDRO POWER GENERATION:

Annual Fixed cost=0.08*120*10^6=16,000
= Rs. 15.360*10^6
Running cost=262.8*10^6*(1.5+0.25)/100
=2.6281.75*10^6
=Rs.4.599*10^6
Operating cost per unit
= ((15.360+4.599)*10^6 ) /(262.8*10^6))*100
=7.597 paise
Total cost = Rs (15.360+4.599)*10^6
= 19.959*10^6

(c) BIO MASS POWER GENERATION:

Annual Fixed cost =0.08*120*10^6=2200
= Rs.21.12*10^6
Running cost= (0.03*262.8*10^6) =Rs.7.884*10^6
Operating Cost per unit
= (21.12*10^6)/(262.8*10^6)=10.04 paise
Total cost per year= 21.12*10^6+7.884*10^6= Rs. 29.004*10^6

ALGORITHM:
[6] Step 1: Open a new M-FILE in MATLAB.
Step 2: Input the values of maximum demand, load factor, installed capacity, capital cost, interest and depreciation (%), operating cost and transmission and distribution costs for Wind, Hydro and Bio mass power generating stations.
Step 3: Calculate the annual fixed cost for each station using the formula,
\[ Afc = \frac{I}{100} \times ic \times cc \]
Step 4: Calculate the total energy generated per year using the formula,
\[ TGE = md \times lf \times 24 \times 365 \]
Step 5: Calculate the running cost for each station as
\[ Rc = \frac{TGE \times (opcc + tdc)}{100} \]
Step 6: Calculate the total cost for each station as
\[ TC = AFC + RC \]
Step 7: Calculate the overall cost per unit in paise as
\[ OCV = \left( \frac{TC}{TGE} \right) \times 100 \]
Step 8: Print the result.

FLOW CHART:

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START

Input The Number Of Generating Units, n

Input The Load Factor Lf, Maximum Demand md

Input installed capacity ic, capital cost cc, operating cost opcc, interest and depreciation I, transmission and distribution cost tdc for n number of units.

Calculate Annual fuel cost
\[ AFC = \frac{ic \times cc \times I}{100} \]

Calculate Total generated energy,
\[ TGE = md \times lf \times 24 \times 365 \]

Calculate running cost,
\[ RC = \frac{TGE \times (opcc + tdc)}{100} \]

Calculate total cost.
\[ TC = AFC + RC \]

Calculate overall cost per unit,
\[ OCV = \left( \frac{TC}{TGE} \right) \times 100 \]

PRINT THE RESULT

STOP
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RESULTS

Number of generating units 3
1. Wind
2. Hydro
3. Bio mass
Load factor 0.25
Enter the type of unit 1
Maximum demand 120000
Installed capacity 120000
Capital cost 700
Interest and depreciation in %0.1
Operating cost 0.06
AFC = 8400000
TGE = 262800000
RC = 15768000
OC = 9.196
Enter the type of unit 2
Maximum demand 120000
Installed capacity 120000
Capital cost 1600
Interest and depreciation in %0.08
Operating cost 1.5
Transmission and distribution cost 0.25
AFC = 15360000
TGE = 262800000
RC = 4599000
OC = 7.597
Enter the type of unit 3
Maximum demand 120000
Installed capacity 120000
Capital cost 2200
Interest and depreciation in %0.08
Operating cost 0.03
AFC = 21120000
TGE = 262800000
RC = 7884000
OC = 10.04

![Results](image-url)
Conclusion
Micro grid is play as a major role in the energy sector. India is one of the developing countries in the world. And we adopt the micro grids, the raising of micro grids we need to study the financial planning to implement the micro grids. In this article is focused it and give the suitable solution for the financial planning.

Reference