

Sizing of microgrid using HOMER software

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Abstract: The need of electricity is increasing day by day at higher level. In a country like India many people faced with the problem of insufficient electricity, to overcome this problem Microgrid is a best solution. So in this project, we will optimize Microgrid size using homer software. The homer software decide' s size of sources such as wind, solar, battery, DG set and UPS etc. this software perform three task- simulation, optimization and sensitivity analysis. For reliable operation of power system the proper sizing of Microgrid is essential.

Keywords: HOMER software, PCC, DC to AC Converter, Sources, Control panel

1.INTRODUCTION:

What is Microgrid?

Microgrid is a small part of power system with distributed energy resources (DER) such as renewable (photovoltaic system, wind turbines) and non renewable(fuel cells) resources with storage system. Microgrid can operate in two mode grid-connected and island mode.

Grid connected Microgrid:-

When Microgrid operate with utility grid, the static switch closes all the feeders connect with utility grid, and the Microgrid can then give surplus power to the main grid. Figure 1.1 shows the point between Microgrid and utility grid where more than one sources connected. This point is called as Point of common coupling (PCC).

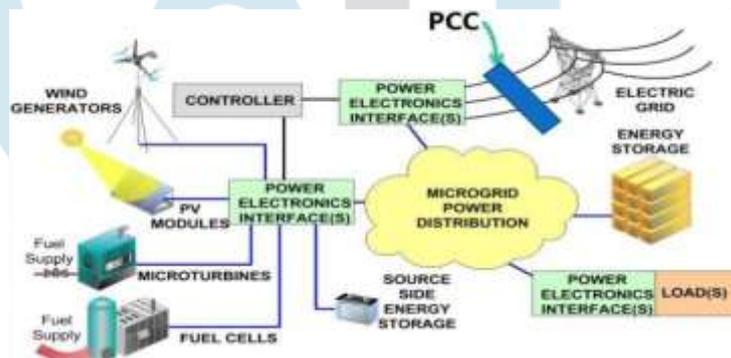


Fig. 1-Grid connected Microgrid

Island mode:-

When PCC is not connected to main grid that is main grid and Microgrid is disconnected from each other in this case PCC act as open switch hence, this mode of operation is called as Island mode. When Microgrid operating in island mode the installed power must meet load demand. Figure 1.2 represents a Microgrid in island mode.

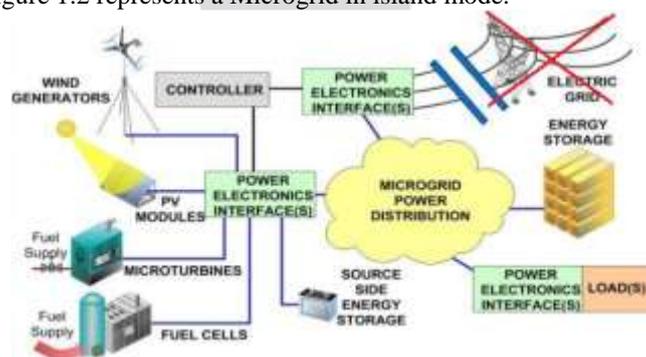


Fig. 2- Island mode of Microgrid

II.BLOCK DIAGRAM

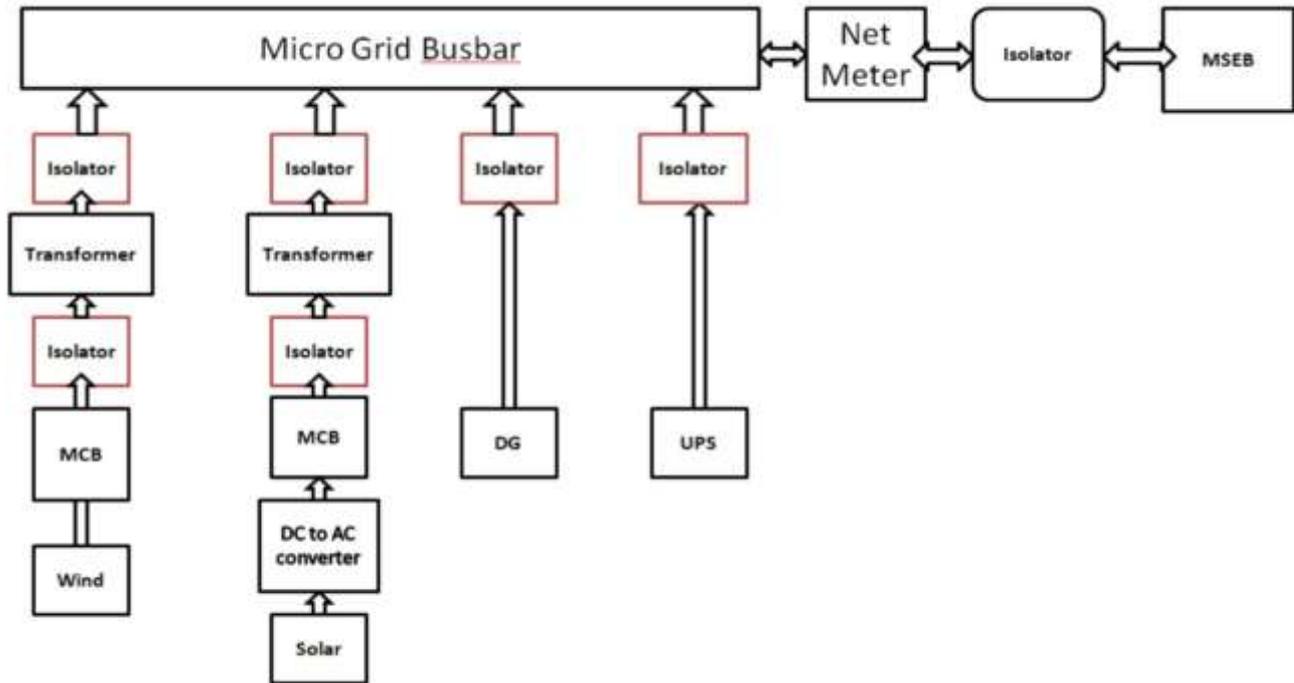


Fig.3-Block Diagram of Microgrid

Block diagram consist:

1. WIND SOURCE
2. SOLAR
3. UPS
4. MSEB
5. DG SET (OPTIONAL)

WIND SOURCE:

Wind source generate AC power which is supply to Microgrid bus through Isolation transformer and protective devices- MCB and isolator.

MCB is Miniature Circuit Breaker used to provide overcurrent protection. **Isolator** act as contactor which is provided on both side of isolation transformer for switching action and also for Isolation purpose.

SOLAR:

Solar is DC source which generate DC power, which is converted into AC power by DC to AC converter, then this converted Ac power is supply to Microgrid bus through isolation transformer and isolator' s.

UPS:

UPS IS UNINTERRUPTED POWER SUPPLY. IF ALL THE SOURCES WHICH ARE CONNECTED IN THIS SYSTEM ARE UNABLE TO SUPPLY THE POWER THEN UPS WILL CONNECT TO MICROGRID AND SUPPLY THE EMERGENCY POWER.

MSEB:

AS PER THE LOAD REQUIREMENT IF GENERATED AND POWER STORED IN UPS IS INSUFFICIENT THEN MSEB WILL DIRECTLY CONNECT TO MICROGRID.

DG SET:

DG set is used as optional backup source of energy which provide auxiliary power

III.OPERATION:

In this stand alone Microgrid power system wind and solar energy generate electricity which supply the load. Battery bank and UPS used to store electricity and it also supply the load when there is insufficient of electricity. UPS and battery also store excessive generated power than load demand. The shortage of renewable energies can be overcome by energy storage system, but its existence brings difficult the sizing problem.

Hence, we decide the size of microgrid as,

SIZE TABLE:

Sr.No.	Source	Capacity
1	Wind	240VA
2	Solar	240VA
3	UPS	600VA
4	DG set	160KVA and 100KVA
5	MSEB	-

Table.1-sizing of sources

LOGICAL OPERATION TABLE:

Input				Output				
UPS	Solar	MSEB	Wind	Wind(c1)	MSEB(c2)	Solar(c3)	UPS(c4)	DG set(c5)
0	0	0	0	0	0	0	0	1
0	0	0	1	1	0	0	0	0
0	0	1	0	0	1	0	0	0
0	0	1	1	1	0	0	0	0
0	1	0	0	0	0	1	0	0
0	1	0	1	1	0	1	0	0
0	1	1	0	0	0	1	0	0
0	1	1	1	1	0	1	0	0
1	0	0	0	0	0	0	1	0
1	0	0	1	1	0	0	0	0
1	0	1	0	0	1	0	0	0
1	0	1	1	1	0	0	0	0
1	1	0	0	0	0	1	0	0
1	1	0	1	1	0	1	0	0
1	1	1	0	0	0	1	0	0
1	1	1	1	1	0	1	0	0

Table.1-Logical operation of sources

IV.WORKING OF HOMER SOFTWARE:

The HOMER is Hybrid Optimization of Multiple Energy Resources developed by the National Renewable Energy Laboratory in the United States.

The HOMER software is used as optimization tool in order to determine the size and energy management of the system. The HOMER software provides a powerful framework for comparing a lot of different economic and technical options for users. Moreover, the consideration of many changes and uncertainties in input data is possible. The HOMER software simulates the performance of energy system for each hour of a year and shows the possible ways of energy supplying and lifetime cost. In the optimization procedure, the software searches various possible configurations, the size of renewable resources and demand satisfaction by considering restrictions.

V.FUTURE SCOPE:

- Provide continuous power supply without interruption and increases productivity
- .Economic and reliable operation of power system.
- If more power generated than the load requirement then excessive generated power can be sold to the customer (for eg.- MSEB) at retail price.

VI. ACKNOWLEDGEMENT:

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VII. CONCLUSION :

This project can be concluded to be innovative and very useful to the people who face with problem of insufficient electricity or discontinuous electricity so by implementing the microgrid system using HOMER software which reduces this problems And also saves the energy bill as system is supplied by microgrid.

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