

PROBLEM ASSOCIATED WITH GRID CONNECTION OF RENEWABLE ENERGY

Author:-Suzit Kumar

(Dual Degree)B. Tech (EE), M. Tech (P.S.),
Student of Suresh Gyan Vihar University

Batch: 2010-2015

Email Id:-sujeetkmr156@gmail.com

ABSTRACT:-

“As we know that the Renewable energy is important because of the benefits it provides. But there are some problems of renewable energy when it is added with grid after its generation. In this paper we are discussing about “what is problem, how many types of it and how we resolve the problem.”

As we know that solar energy is obtained only in day, wind energy is obtained when wind will flows with desired speed, tidal energy obtained when tides come, hydro energy is obtained when water flow is regularly occurs with max speed.

If these conditions are not satisfied then many types of problem occurs when renewable energy go to connect with grid. The main problems are:-

1. Variability problem
2. Frequency Problem
3. Voltage Problem
4. Distance Problem
5. Cost Problem

In this paper we are discussing about the main problem with grid connection of renewable energy, how we can eliminate this problem, how we can attach the renewable energy successfully with Smart Grid and the types of techniques and instrument which is used in this.

KEY WORDS: Renewable energy, Turbine, Grid connection, DC distribution system, VFC, VFVC, MOSFET.

1. INTRODUCTION:-

Grid connection issue of renewable energy is very difficult and considerable in the energy distribution in the rural area or remote area which is far away from the non-renewable energy generation. The main problem of grid connection is variability problem. As we know that at grid, the value of voltage, current, frequency, power, power factor etc. should be constant or same for reliable operation of distribution system. If these values are not same at the grid then uneconomical operation occurs and transmission & distribution system gets fail.

What is the variability problem of renewable energy, how serious of a problem is this and what can be done to fix it? This article examines this issue of variability, describing and defining it and listing some of the ways in which the unique challenges of renewable energy is being or can be addressed. Renewable energy has a variability problem and pretending that it does not at the very least on a public perception level won't make this issue go away. The wind does not always blow, nor does it always blow steadily and sunlight can be obstructed by clouds. Wind and solar are variable sources of energy and this poses certain unique challenges that need to be addressed. Wind energy in particular is also variable over short time scales with gusting wind producing peaks and troughs in power output that can cause voltage problems, because of the unevenness of the power being put onto the grid.

Wind, solar and wave energy vary over short duration time scales in addition to the longer more predictable seasonal and diurnal fluctuations. Wind gusts and swirls; wind is a chaotic laminar flow on the boundary of the earth, water to atmosphere interface. While preferred wind sites are selected in part because the wind blows steadily and does not gust and shift directions, all sites experience short duration peaks and troughs of power output in addition to longer duration swings between periods of stable weather patterns. Although it is possible to get average or mean values for potential wind or solar energy for some

geographic location and to predict on average what the potential energy yields will be for a given site it is pretty much impossible to predict or guarantee what the energy profile for a site (or region) will be in any given future instant.

2. THE MAIN GRID CONNECTION PROBLEM OF RENEWABLE ENERGY

There are more than one problems arises in the internal connection of the renewable energy at the grid. So here we describe some main problems of the internal connection of the renewable energy at the grid that are as follows:

- (I) Frequency Problem
- (II) Voltage Problem
- (III) Distance Problem
- (IV) Cost Problem etc.

3. VOLTAGE AND FREQUENCY

PROBLEMS

(I) Problem with solar energy

Cloudy or rainy day gives variable voltage and this also gives the variable frequency. These create the problems at the grid to connect the different energy sources. The solar energy output of a site will drop quite suddenly (especially for photovoltaic arrays) when a cloud wanders between the collectors and the sun and then surge back on when the cloud floats away and the sunshine returns to irradiate the mirrors or PV modules of the site. Solar energy also cycles with seasonal variations in the incident solar irradiance and of course the sun does not shine at night.

So, solar panel produce variability problem in energy generation.

(II) Problem with wind energy

As we know that the wind is not flowing at every place continuously. So the site selection for wind energy is difficult and produces the large distance from generating point to the grid connections. Wind is also variable sources of energy and this poses certain unique challenges. This causes the variable frequency problem in the renewable energy sources. To

eliminate these problems of the renewable energy, we use control scheme that is:

4. VOLTAGE AND FREQUENCY CONTROL SCHEMES

In this type of scheme, generally we use three stages that are:

- (I) **Input stage:-** In this stage, variable voltage and variable frequency taken as input.
- (II) **Operational stage:-** In this stage, operation of voltage and frequency controller takes place.
- (III) **Output stage:-** In this stage, constant or desired frequency and voltage are obtained from operational stage.

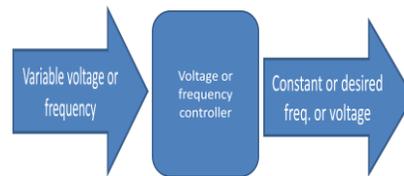


Fig.-:Block dig. of voltage and freq. control scheme

5. DEVICES USED IN CONTROL

SCHEME

- (I) VFC (for frequency control)
- (II) VFVC (for both frequency and voltage control)
- (III) MOSFET (for voltage control)

6. DISTANCE AND COST PROBLEM

(I) Problem with solar energy

Solar panel produces DC energy. The conversion of this DC to AC is problem at Grid to transmit the AC signals. Long transmission line for transmission and distribution of renewable energy produce very difficulties like cost problem, line losses etc.

To remove this problem, we establish the local DC generation and transmission system

that is sufficient in rural area to provide DC electricity directly from generating station to the home. DC transmission system has lesser losses in comparison of AC .So that the cost is also reduced.

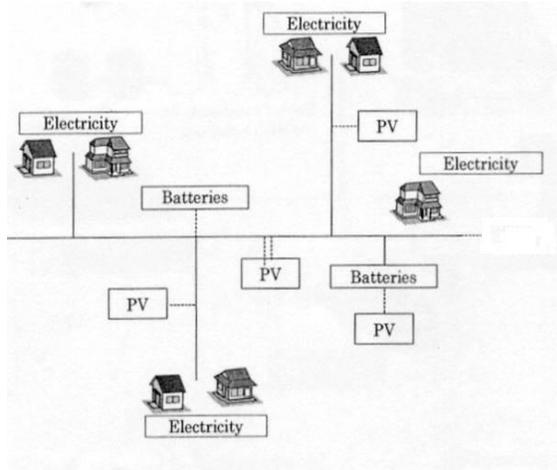


Fig.-:DC electricity distribution system via solar

(II) Problem with wind energy

As we know that the wind is not flowing at every place continuously. So the site selection for wind energy is difficult and produces the large distance from generating point to the grid connections. Long transmission line for transmission and distribution of renewable energy produce very difficulties like cost problem, line losses etc. To remove this problem, we establish the local DC generation and transmission system that is sufficient in rural area to provide DC electricity directly from generating station to the home. DC transmission system has lesser losses in comparison of AC .So that the cost is also reduced.

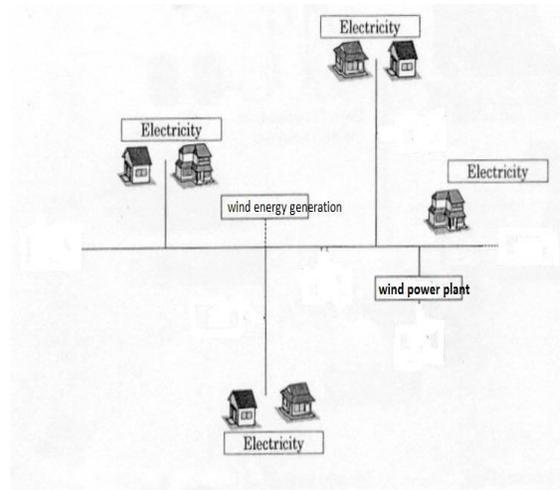


Fig.-:electricity distribution system via wind in small areas

7. Concluding remarks

- Grids connection problems are:-
 - a challenge in technology, economics and regulation
 - a key enabling factor to achieve the needs of future 20/20/20 objectives
 - Cost and benefits need to be assessed under different scenarios and boundary conditions
 - Pilot projects are required, and the explicability and scalability of the results must be carefully identified
 - Opportunity for new businesses and technology development
- Regulation:-
 - Promote efficiency
 - Balance incentives to regulated businesses – Share benefits among all system users

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