

Challenges due to renewable energy integration in distribution system

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Abstract: This Energy is requirement in our daily life as we improving the resources, we need to increasing our energy sources so at that time we go to renewable energy sources. But we know that renewable energy is sources depends on the weather condition.so renewable energy is not surety of 24 hours power generation. Due to which suddenly changes in the voltages and frequency and other electrical quantity so due to which problem occurring in the distribution of the renewable energy. We resolving this problem we use many other energy sources with them and using of energy storing devices to store the energy and use when we need it. And many other government policies to uses renewable energy for clean climate.

Keywords: renewable energy, voltage, frequency, distribution.

I. INTRODUCTION

When increasing amount of integration of renewable energy to making the traditional distribution we faced many problems. Just like problem in voltage drop also suddenly changing in frequency ,power supply reliability ,using of power electronics devices ,power quality ,the life period of renewable power plant is less ,they accrue more space, initial cost is high and for the distribution we need to making of integrated instruction communication technology to coordinate with our demand and supply, technological problems because renewable energy comes recently, not much testing laboratories and they depends on the weather condition through that we faced many problem if we using solar system but the solar system work when sun light come on the solar plat and solar plat works on day time but night time they not work so that is not 24 hours surety of supply of power.

We resolving with this problem we use smart grid through that they collecting the date of energy requirement. Some time distribute the renewable energy to the short distance power station through that our line losses is less, also uses voltage control plan, we using of energy storing devices to store the energy and uses when the power not come from the source. government also applied new policy to using renewable energy for clean environment and trend people for recover the equipment failure, increasing testing laboratories, promote investments, less tariff on renewable power through that more people use it.

Many new opportunities through renewable is many job opportunities come from it, many people open new start-up in it and clean over environment .

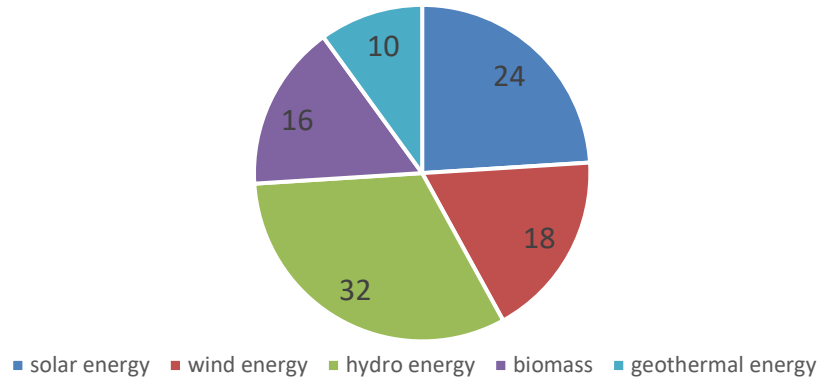
RENEWABLE ENERGY- renewable energy often referred to as clean energy, comes from natural sources or processes that are constantly replenished.

TYPES OF RENEWABLE ENERGY-

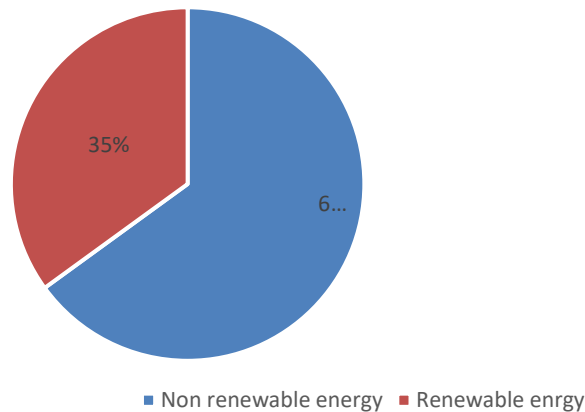
- 1.Solarenergy
- 2.Windenergy
- 3.Hydroenergy
- 4.Tidalenergy
- 5.BiomassEnergy
- 6.Geothermal energy.

PERCENTAGE DISTRIBUTION OF RENEWABLE ENERGY PRODUCTION-

[1]



PERCENTAGE DISTRIBUTION OF RENEWABLE ENERGY AND NON-RENEWABLE ENERGY:-



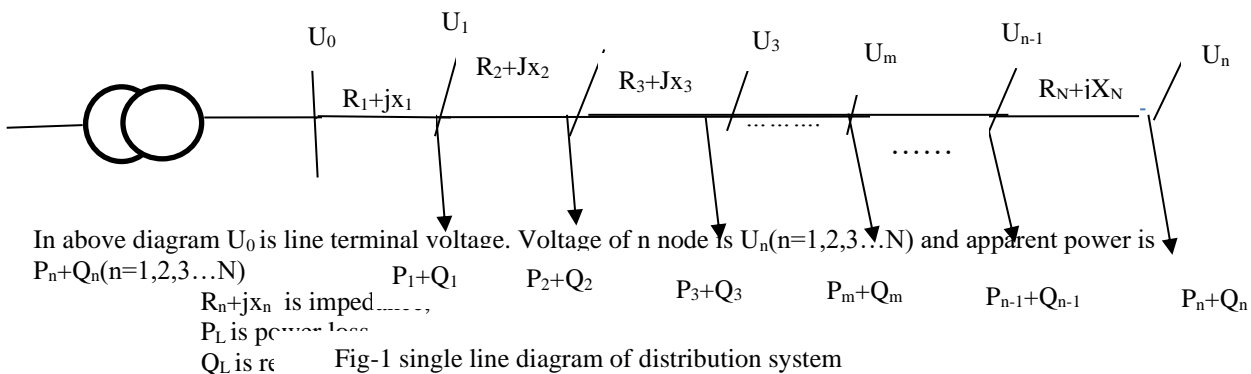
II. VOLTAGE VARIATION

In power system all the equipment is rated for certain voltage with a permissible voltage variable therefore voltage sensitivity must be controlled within a specified regulation. Voltage sensitivity is a method to obtained the sensitivity of dependent variable by studying their differential quantity. The power system optimization to obtained the stability of power system it is necessarily to maintained the power at the both the end receiving as well as sending. The real and reactive power deliver by the line for fixed sending end voltage $|V_s|$ and a specified receiving end voltage $|V_r|$ can be written as

$$P_r = \frac{\text{mod}(V_s) * \text{mod}(V_r)}{x} \sin \delta$$

Where P_r is a real power demand [2]

The typical single line diagram of distribution is shown below in fig-1



$P_{tra,an}$ active power in distribution on line
 $Q_{tra,n}$ reactive power in transmission

The voltage drop across every line is derived is from distribution formula then the voltage drop of n line is

$$\Delta U_n = U_n - U_{n-1} = \frac{P_{tra,n} R_n + Q_{tra,n} X_n}{U_n}$$

In distribution active and reactive power as follow

$$P_{tra,n} = P_n + P_{L,n} - P_{rewbl,n}$$

$$Q_{tra,n} = Q_n + Q_{L,n} - Q_{rewbl,n}$$

So renewable energy affects the line distribution power before the connecting that is no effect on distribution power line behind the points but we distinguish these two distribution in renewable energy, the change in voltage in n line is:

$$\Delta(\Delta U_n) = \frac{d\Delta U_n}{dP} P + \frac{d\Delta U_n}{dQ} Q$$

The change in initial and final voltage depends in change in voltage with respect to active and reactive power.

II. CHANGE IN FREQUENCY

In unbalanced of demand and supply of power in renewable

We know that

$$P_a = P_m - P_e$$

P_a =Accelerating power

P_m =Mechanical power

P_e =Electrical power

When P_e increased at constant P_m then P_a decreased .and if P_m is decreased at constant p_e at that time also P_a decreased. And when both P_m and P_e changing at the same time P_a also fluctuating.

We know that

$$N_s = \frac{120f}{p}$$

N_s =synchronous speed

f =frequency

p =no. of pole

in the system P not changed and N_s is directly proportional to f .

and N_s is directly proportional to P_a .and if P_a changing N_s also changing and then frequency also fluctuating. but our home appliances work of the constant frequency. And if frequency changed over home appliances will damage.

III.USING OF POWER ELECTRONICS DEVICE

Renewable energy power system situation to becomes the far term power solution for portable. Transport and stationary system application there are many types of renewable system like solar panels, wind, fuel cell, batteries and etc. power electronics devices handle high, low and changing power requirement

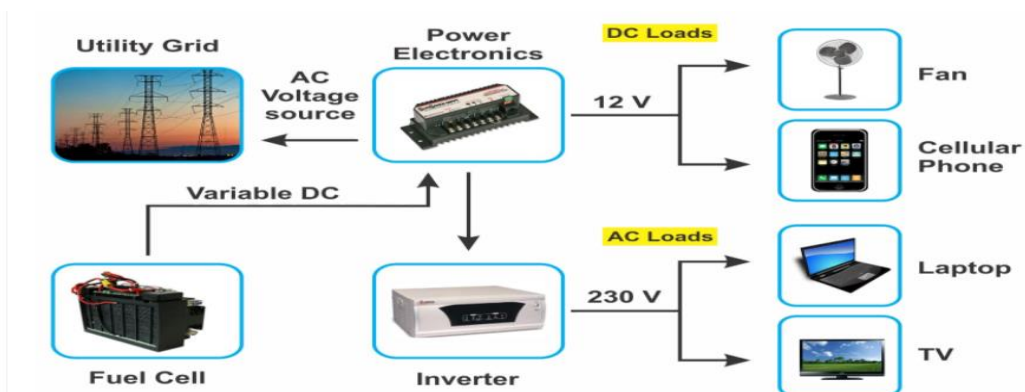


Fig -2 using of power electronics devices in distribution

Many electrical outputs of power system sometime not give the input required for some device. In many situations, such that as grid or residential power, needed AC power. Another device needed DC power. Output of some devices are DC voltage but we know that in our home appliances work on AC so we convert DC to AC and some renewable energy system tendency slow start time through that we waiting for that so at that time also used of power electronics device (power converters) we used in it. Figure -2 showing the general power flow diagram of fuel cells with using of power electronics devices.[3]

Many renewable energy technologies provide specific voltage and current to power converter. Power conversion adjust the voltage available from cells to a voltage more enough to respond the load. In figure-3 a DC-DC boost converter required to boost voltage intensity for inverter.

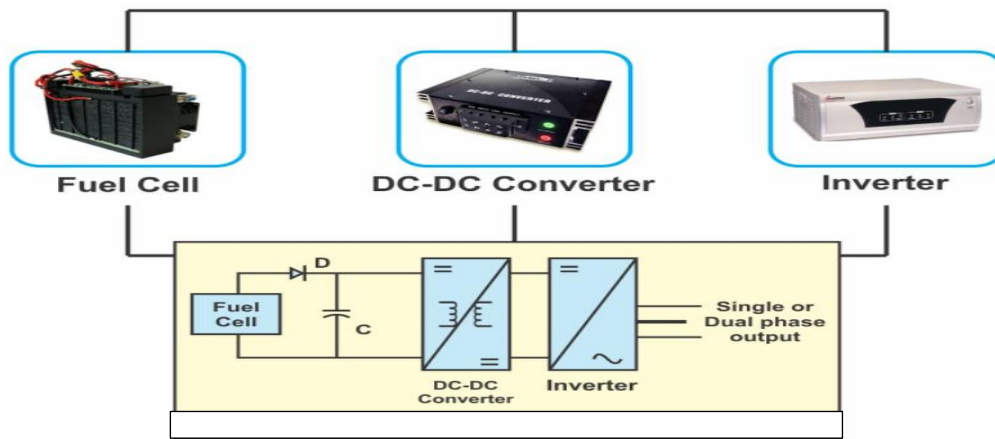


Fig 3- DC-DC boost converter with block diagram

IV.HARMONICS

When we using power electronics devices in system to generating specific waveform but due to heating issue or losses and some time for nonlinear loads, they generated distortion wave form on output side. Overloading and excessive current create the fusses the trip such as shunt capacitors draw the more current in the system when resolving the power

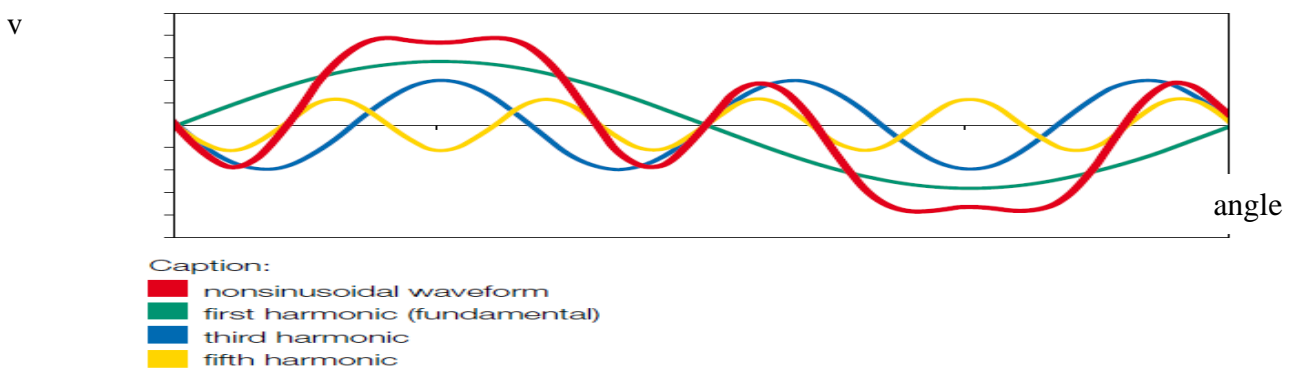


Fig-4 distortion wave in AC waveform output

factor. through that risk increases fig-4 showing waveform.[4]

V. LIFE PERIOD OF RENEWABLE ENERGY SYSTEM IS LESS-

In the table-1 we seen that life periods of different renewable system [5]

Table-1 life period of different renewable energy system.

S.no.	Name of system	years
1	wind	20yr
2	Biomass heat	20 to 30 yr
3	photovoltaics	25yr to 40yr
4	Solar water heat	10yt to 25yr
5	Solar vent preheat	30yr to 40yr

VI. POLITICAL AND REGULATORY BARRIERS –

Lack of political and regulations will cause the development of renewable energy technologies will causing of adoption of technologies. Renewable energy required good policies and legal procedure to enhance the interest of investors. The tariff rate of is different for different state in India which is also not good for people.[6]. In countries like India renewable energy is on developing state or advancement state so not complete policy is declared. In private sector of renewable energy project in some nation is obstruct by lack of good policies on private investment and delays in the licence of private sector. So renewable energy need policies on renewable energy.

VII. TECHNICAL OBSTACLE-

Technical obstacle on renewable energy development includes insufficient technologies and lack of infrastructure necessary to help the technologies. Not present of well-trained worker to resolving the problems. In many countries lack of testing kits and industries for test the parts of renewable system. Lack of physical facilities of transmission and distribution. Lack of knowledge and awareness of renewable energy technologies and system in many rural areas is challenges faced in renewable energy developing

CONCLUSION

In this paper, the voltage variation problem in distribution system, suddenly changing of demand and supply they effect on the frequency, some renewable system generate the DC output power but we used in home appliances AC power so we used the power electronics devices to convert DC to AC. due to power electronics devices harmonics will generate and we not get pure AC waveform. Many renewable power plant life periods less compare to non-renewable power plant. Due to new technology also problem in technical obstacle. Sometime political and regulatory barriers. Some problem we resolved by using of smart grid with non-renewable power generation.

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