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RENEWABLE ENERGY RESOURCES AND ITS IMPACT ON POWER SYSTEM- A REVIEW

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ABSTRACT

As we are in front of energy resource scarcities around the world, there is an urgent need to develop a more sustainable energy system to provide for growth. The use of renewable energy resources is one of the feasible options. Renewable energy has been becoming one of the independent energy sources in human life, and it will be major resources for the future generation of power. Today, some people tend to use renewable energy in their home or land such as solar or wind energy. Most of those have two inputs of the power source; the utility power supply and renewable energy power supply, so the integration of sustainable technologies adjustable generation sources within Ac grid has been made, but this connection is not easily accessible. This paper will be reviewed the impact of renewable energy on power system. While using the renewable resources for power generation purpose we are facing difficulties in continuous output as well the connection incorporate with it. This will give the large impact on the existing network. As all the renewable resources have the vast amount of potential to cater the need of power deficiencies. However, our consciousness of the risk of weatherchanging and worldwide heating leads us to find alternative resources to generate electricity. So, power generation technologies have developed several solutions of how we can produce neat, confident, economic, and safe energy. As a result, in the recent years, renewable energy technologies have been rapidly improved in highperformance, and they are a possible way to face the risk of the gas emission.

Keywords: Renewable energy, Grid Integration, Photovoltaic.

I. INTRODUCTION

The consistent supply of electric power is a serious element of our economy. The new operating strategies for environmental compliance, when combined with our aging transmission and distribution infrastructure, challenge the security, reliability, and quality of the electric power supply. Hence the designing and proper integration of renewable sources without a stress on existing grid infrastructure is an important point for the utility as well as consumers. Electrical power movements from the power station to consumer end through a remarkable system called the power distribution grid. Since high amounts of energy cannot be put in storage, electricity must be produced as it is used. The power distribution grid must respond speedily to ever-changing demand and continuously generate and route electricity to where it's needed the most.

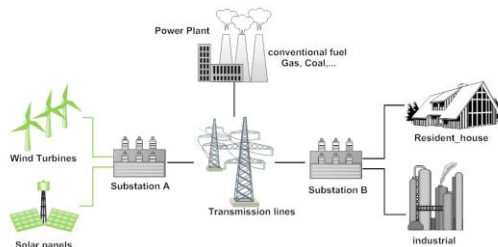


Figure-1: The general structure of integrating renewable energy into AC Grid [1]

The electrical grid to put up more proportion of renewable energy would need great quantities of conventional backup power and enormous energy storage. These would be necessary to recompense for usual variations in the amount of power generated liable at the time of day, season and other factors such as the amount of sunlight and wind at any given time. Since today the electrical grid cannot handle this changeability, the cost of adopting the renewable energy sources is much more costly than it should be. Renewable energy technologies (RETs) - hydropower, biomass, wind and solar photovoltaic – have been successfully demonstrated over the ages. Currently, the total shares of all renewable forelectricity production make up for about 30%, a vast majority (70%) of it being from hydroelectric power. Wind power has emerged as the world's fastest energy growing source. The dispersed and locally available nature of wind energy makes it particularly attractive to grid electrification. Solar system uses and applications have been accepted and strongly suggested for grid electrification. The current cost of PV devices, though lower than a decade ago, is still too high to provide power to compete the orthodox electric supply [5]

III. RENEWABLE SOURCES& ITS IMPACT ON POWER SYSTEM

• SOLAR ENERGY

Solar energy is most commonly exploited in three ways

Photovoltaic systems – for electricity generation

Solar thermal power plants – to obtain electricity and heat

Solar thermal systems – for thermal energy

Photovoltaic systems – for electricity generation: A photovoltaic (PV) system generates electricity directly from solar energy radiation. Photovoltaic systems (PV cells) are based on semiconductor materials such as silicon in a variety of designs and semiconductor compounds such as GaAs or CdTe, which are less widespread. Positive effects of these types of power plants are far more significant than the negative ones. In PV electricity generation, there are no CO₂ and greenhouse gas emissions. During power plant operation, there is neither emission of particles that cause respiratory problems in humans and animals nor emission of heavy metals such as lead (Pb) nor noise [6].

The impact on the grid: PV systems are connected to the distribution network. One of the advantages of these systems is the short-circuit current that is slightly higher than the nominal, which reduces investments in safety equipment. When measuring power quality (EN50160) by connecting PV plant, in most cases noticeable harmonic distortion can be seen, but within limits. This is due to power electronics in the inverter and nonlinear loads in the household. Also, at THD, voltage is not ideal; there is little distortion. PV power plants have a negligible impact on the voltage asymmetry, but it still exists[6].

• WIND ENERGY

Wind is the movement of air in response to pressure differences within the atmosphere. Pressure differences exert a force which causes air masses to move from region of high pressure to the one of low pressure. Such pressure differences are caused primarily by differential heating effects of the sun on the surface of the earth [2].

Environmental impacts: Harmful effects of these plants on humans, animals and the landscape are discussed very often, but all these problems are solved by choosing a good location. The area which is occupied by one unit is 30m² and the land between them may still be used for agriculture or livestock breeding. The noise produced by the generators is a problem, but there are certain legal norms on the amount of noise they can produce in certain areas, and they are placed only there where they do not exceed the set standards.

Impacts on the grid: Wind power plants affect system stability in many ways, and because of that, they are connected to the distribution network. Constant flickers due to changes in wind speed affect the quality of the voltage and frequency in the network, and both units are strictly regulated with minimal changes. Additionally, they produce electromagnetic disturbances that affect communication and signal transmission interferences. Wind power

plants can also influence power system reliability, available transmission capacity and power System operation in general. [6].

- **SMALL HYDROPOWER PLANTS**

Small hydropower plants are plants up to 10 MW, and they typically deliver electricity directly to the grid. These plants require special construction of individual components, such as the water supply pipe for the engine and the generator.

Impacts on the grid: Attention should be paid to the voltage at the point of connection, as well as to the power flows in the low-voltage and medium-voltage branches which the plant is connected to. In addition to the parallel working mode, there is island mode operation of the plant, where it is necessary to take account of default regulations during commissioning. Short-circuit currents should be taken into account; too, because small hydropower plants increase short-circuit current levels, and their impact on short-circuit currents will be higher if a short circuit occurs closer to the plant. [6]

IV. CONCLUSION

Today's power plants that use renewable energy sources are considered more an addition to electricity Production. Because of their growing trend, it is very likely that in the next few years they will become the primary source of energy due to their ecological dominance, regional development and the construction of smart grids that are definitely the future of electric power.

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