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Remote Area Electrification By Green Wind Energy

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Abstract - *The Renewable Energy Sources to increase access to modern energy services in remote areas. The provision of electricity generated from renewable sources such as wind, solar, tide and geothermal, and the provision of other modern energy services that are powered by renewable sources for activities such as household heating, space conditioning and water pumping. In this paper the discussion about wind energy for remote area electrification. The remote areas are sufferening from transmission electrical energy. So we develop electrical energy by local made. The non-conventional energy sources are the effective Energy sources for pollution free, no emission gases and also cost is less as compared to other conventional sources. However, in this paper we use wind energy suitable for remote rural areas electrification by using the power electronics based converter system*

***Key Words*: RES , Wind Energy, Inverters, System Selection, Economics**

1.INTRODUCTION

The Renewable Energy Sources to increase access to modern energy services in remote rural areas. the provision of electricity generated from renewable sources such as wind, solar, water, tide or wave and geothermal, and the provision of other modern energy services that are powered by renewable sources for activities such as household heating, space conditioning and water pumping. These kinds of technologies have long been subject to international debate and action as a means of expanding access to electricity by means of off- grid or grid extension programmes. Rural electrification has been financially non- viable, has reached the limits of its success and has become a large financial burden on electric utilities. However, the policy makers in the country have, over the years, considered that electric supply from the grid as a symbol of a progress and consequently have laid over emphasis on it in the planning process.

1.1 remote Rural Electrification Via Renewable Energy

At the end of 10th five year plan of the government of India renewable energy sources succeeded to meet only 1% of rural energy need; therefore, in the subsequent plan i.e. 11th five year plan, there are two programs introduced based on renewable energy. Namely, Remote Village Renewable Energy Program (RVREP) and Grid-connected Village Renewable Energy Program (GVREP). In contrast to the developed countries, in a developing country like India, with its large rural population and the much higher levels of poverty, the provision of grid electricity is economically unviable. Electric power generated from wind power can be highly variable at several different timescales: hourly, daily, or seasonally. Annual variation also exists, but is not as significant. Because instantaneous electrical generation and consumption must remain in balance to maintain grid stability, this variability can present substantial challenges to incorporating large amounts of wind power into a grid system. Intermittency and the non-dispatchable nature of wind energy production can raise costs for regulation, incremental operating reserve, and (at high penetration levels) could require an increase in the already existing energy demand management, load shedding, storage solutions or system interconnection with HVDC cables. Wind power is variable, and during low wind periods it must be replaced by other power sources. Transmission networks presently cope with outages of other generation plants and daily changes in electrical demand, but the variability of intermittent power sources such as wind power, is more frequent than those of conventional power generation plants which, when scheduled to be operating, may be able to deliver their nameplate capacity around 95% of the time.

1.2 Energy Poverty and Rural Development

Wind turbines are devices that convert the wind's kinetic energy into electrical power. The result of over a millennium of windmill development and modern engineering, today's wind turbines are manufactured in a wide range of horizontal axis and vertical axis types. The smallest turbines are used for applications such as battery charging for auxiliary power. Slightly larger turbines can be used for making small contributions to a domestic power supply while selling unused power back to the utility supplier via the electrical grid. Arrays of large turbines, known as wind farms, have become an increasingly important source of renewable energy and are used in many countries as part of a strategy to reduce their reliance on fossil fuels. Wind turbine design is the process of defining the form and specifications of a wind turbine to extract energy from the wind. A wind turbine installation consists of the necessary systems needed to capture the wind's energy, point the turbine into the wind, convert mechanical rotation into electrical power, and other systems to start, stop, and control the turbine. The very nature of the way in which energy is extracted from the air also causes air to be deflected by the turbine. In addition the aerodynamics of a wind turbine at the rotor surface exhibit phenomena that are rarely seen in other aerodynamic fields. The shape and dimensions of the blades of the wind turbine are determined by the aerodynamic performance required to efficiently extract energy from the wind, and by the strength required to resist the forces on the blade. In addition to the aerodynamic design of the blades, the design of a complete wind power system must also address the design of the installation's rotor hub, nacelle, tower structure, generator, controls, and foundation. Nuclear power and fossil fuels are subsidized by many governments, and wind power and other forms of renewable energy are also often subsidized.

2. SMALL-SCALE WIND POWER

A small Quiet revolution QR5 Gorlov type vertical axis wind turbine on the roof of Colston Hall in Bristol, England. Measuring 3 m in diameter and 5 m high, it has a nameplate rating of 6.5 kW. Small-scale wind power is the name given to wind generation systems with the capacity to produce up to 50 kW of electrical power. Isolated communities, that may otherwise rely on diesel generators, may use wind turbines as an alternative. Individuals may purchase these systems to reduce or eliminate their dependence on grid electric power for economic reasons, or to reduce their carbon footprint. Wind turbines have been used for household electric power generation in conjunction with battery storage over many decades in remote areas.

Grid-connected domestic wind turbines may use grid energy storage, thus replacing purchased electric power with locally produced power when available. The surplus power produced by domestic microgenerators can, in some jurisdictions, be fed into the network and sold to the utility company, producing a retail credit for the microgenerators' owners to offset their energy costs.

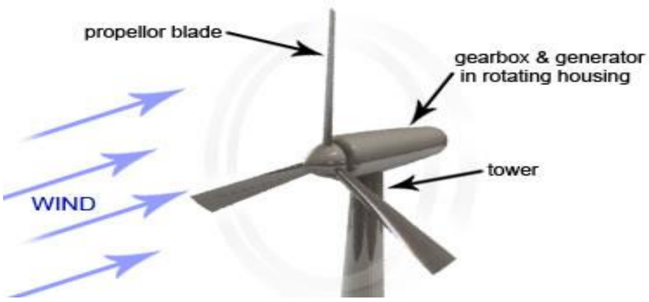

Fig -1: Vertical Wind Turbine

RES s are energy-providing technologies that utilize energy sources in ways that do not deplete the Earth's natural resources and are as environmentally benign as possible. These sources are sustainable in that they can be managed to ensure they can be used indefinitely without degrading the environment. The decentralized nature of some RESs allows them to be matched with the specific needs of different rural areas. For the purposes of this paper, it is useful to separate RETs into two categories: those used to provide energy for domestic use (predominantly cooking and heating) and those used to supply electricity. In a wind farm, individual turbines are interconnected with a medium voltage (usually 34.5 kV) power collection system and communications network..

Fig -2: Remote Electrification by grid connection

2.1 Inverters

Inverters convert DC to AC electricity. This capability is needed because PV modules and most small wind turbines produce DC electricity which can be used by DC appliances or stored in batteries for later use. Most common electrical applications and devices require AC electricity, which cannot be easily stored. Inverter output wave forms fall into one of three classes, square wave, modified sine wave, and sine wave. Square wave inverters are the least expensive, but their output, a square wave, is suitable only for resistive loads such as resistance heaters or incandescent lights. Modified sine-wave inverters produce a staircase square wave that more closely approximates a sine wave. Some sensitive electronics may not work with modified sine wave AC and require sine-wave inverters. Sine-wave inverters produce utility grade power, but of course cost more than the other types of inverters. Inverter efficiency varies with the load on the inverter. Efficiencies are poor at low power levels and generally very good (>90%) at high power levels. Mid range efficiency varies widely between inverters and may be an important selection criterion. Other items to consider are the inverter's no-load power draw and the presence of a "sleep mode". Sleep mode reduces the inverter power draw to a few watts when there is no load on the inverter. A parallel inverter can supply power to a load simultaneously with a diesel generator.

2.2 System Selection And Economics

The first section of this chapter describes lifecycle cost analysis and explains how and why it should be used when analyzing the economics of various options. The second part of this chapter discusses the various factors influencing system design: load, available resource, component costs, and desired level of service. Included are charts that show how typical system costs vary as a function of load and resource. A common error when performing simple economic analysis is basing the analysis upon initial cost and short time periods. Because the total cost of a project is the sum total of its initial cost and its future costs, life-cycle cost (LCC) analysis is more appropriate. Initial costs are incurred at the beginning of the project; these typically include expenditures for equipment purchase and installation. Future costs are incurred later in the life of the project, including operation and maintenance costs such as personnel, fuel, and replacement equipment. System options will have different combinations of initial and future costs, making consistent comparison between the options more difficult. Some RE projects fail or incur higher than expected operating costs caused by improper installation and lack of operator training. Sufficient project funds should be allocated to ensure proper training of installers and operators. The cost of servicing single systems in dispersed communities can also contribute to high operating costs. The cost of servicing RE systems can be greatly reduced if the systems can be serviced locally and the service costs are shared with other applications in or near the community. In many countries, fuel costs are artificially low because of government subsidies.

2.3 System Selection And Economics

This section describes the factors that affect system configuration and costs. A mini-grid (also sometimes referred to as a micro-grid or isolated-grid) provides electricity generation at the local level, using village-wide distribution networks not connected to the main national grid. The production is managed by an operator who can take different legal forms and who supplies electricity to several distinct and autonomous end-users against payment or participation. A mini-grid can be supplied by all sorts of energy resources and power plants, but for the purpose of this document, it will focus on those supplied by hybrid power systems . Most of the time, a mini-grid will use low AC voltage (220 or 380V) with centralised production and storage and will have an installed capacity of between 5 and 300kW even though bigger systems exist. 15 A hybrid power system uses renewable energy as a primary source and a genset (most of the time diesel fed but potentially with gasoline and LPG) as a back up resource. This solution is especially interesting for isolated villages/small towns, away from the national electricity grid and without realistic hope of being connected to it in the near future. The use of local renewable energy sources such as wind, solar and hydro dramatically reduces the need for fossil fuels and increases the autonomy of the community.

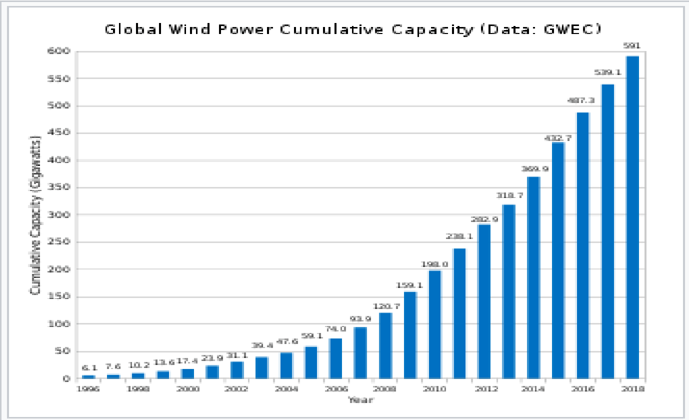

Chart -1: Global Wind Power Capacity

3. CONCLUSION

Rural electricity access in India is currently inadequate for needs of the rural population, and there is observed and revealed willingness to pay for better electricity supply. The Indian government is pursuing large scale initiatives towards greater access mainly through grid expansion. Renewable energy distributed generation projects, if widely replicated, can ease the burden on both electricity supply shortfalls and reduce the urgency of costly grid extension. Needless to say,"renewables" will have a big role to play in meeting rural electrification targets in the country. Grid connection will not be a viable option for at least 20 per cent of the un electrified villages, which will have to opt for renewable energy solutions. There are signs of the attitude changing. Be it the policy-backed fine-tunings or the new programs launched by the government, the RE-based remote village electrification drive is certainly poised for better times. A policy paradigm shift is needed to make electrification integral to all rural development plans.

REFERENCES

[1] N. M. Ijumba; C. W. WekesahAFRICON, 1996., IEEE AFRICON 4thYear: 1996, Volume: 2Pages: 720 - 723 vol.2
[2] B. K. Blyden; Wei-Jen Lee2006 IEEE Power Engineering Society General MeetingYear: 2006

[3] Amit Soni; C. S. OzverenProceedings of the 41st International Universities Power Engineering ConferenceYear: 2006, Volume: 3Pages: 974 - 977

[4] Ajai Gupta; R. P. Saini; M. P. Sharma2008 International Conference on Electrical and Computer EngineeringYear: 2008Pages: 19 - 24

[5] Subrata Mukhopadhyay; Bhim Singh ,2009 IEEE Power & Energy Society General Meeting ,Year: 2009Pages: 1 - 7 .