

A Review- Hybrid solar photovoltaic panel

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Abstract- In today's era telecommunications industry has the greatest coverage among all utilities. The rapid increase in energy costs and diminishing of non-regenerative energy sources, it is essential to make our radio mobile communication base transceiver station on renewable sources or green BTS. The Green Base Station which is introduced is equipped with the regenerative energy sources wind power and photo-voltaic energy to reduce the power consumption taken out of the public grid to a minimum, whenever sunlight or wind is present. As every technology has pros and cons, green BTS has two most important challenges to overcome, cost and reliability. This paper depicts the names of different industries, companies and communities effort done in making green BTS and revenue expenditure in making green BTS.

Keywords- Expansion in wireless network, Need of renewable energy sources, solar energy, List of Companies name

I. INTRODUCTION

In 20th century every country electricity generation depends only on the reliable and conventional non-renewable or fossil fuel energy sources which are goes on terminating in upcoming couple of decades. The abundance of conventional energy sources has introduce a new concept called green energy in electricity network. Since the existence of this technology need a large revenue amount in its initial state such that government has to deploy a policy framework that will give chance for private investors to develop hybrid projects. The steady increase in energy costs and disappearance of fossil fuels need to face challenges and to find out a new solution for continuous supply for base transceiver stations. Also growing environmental awareness and demand for reduction of greenhouse affected gasses like CO₂ provide enthusiasm to develop alternate power supply sources.

To achieve the goal of a green Base Station, various factors have to be considered. Like as the phrase indicates the best energy is the one which is not used. Making of green BTS can be done by using equipment's having lowest possible energy consumptions. Each BTS needs power source but the utilization of vacant energy will be reuse for another purposes. Further energy conservation, some facts have to be considered for a green base station, such as low emissions of pollution and low noise. Forensic intelligence and their

innovative ideas like system cooling have great influence in preservation of energy and in reduction of toxic components. New design solutions that avoid critical materials, toxic components and consider easy disassembly are mandatory in the Green BTS [1]. Terrestrial GSM networks now cover more than 80% of the World's population [2]. By running and cooling electrical equipment's in telecommunications industry, tower industries are greatly effected and looking forward to preservation and utilization of energy into base transceiver station equipment's. For example, Garmin Phone is the largest mobile phone service provider in Bangladesh, covering 99% of the country's population and 89% of the land area. There are 13,000 base stations in 7,200 sites around the country, as of December 2010 [2]. In comparison, only 48% of the population have access to grid electricity [3].

II. EXPANSION IN WIRELESS NETWORKS

Dramatically decrease in graph has been concluded in last decade. At the end of 2003, the number of subscribers were only one billion which is fewer than one in six people who had subscribed to mobile services, after one decade 2013, the figure boomed to 3.4 billion unique subscribers which was less than half of the population in the world. World widely there were 6.9 billion SIM connections allotted, with an average of 1.8 active SIM cards per unique subscriber in the end of 2013. Meanwhile subscribers growth rate in market is very slow right now but untapped potential remain in the market. As per enhancement and reliable services, introduction of high speed 3G and 4G technology will raise the number of subscribers to 880 million individually in year 2020. Also according to survey, new technology LTE will be implemented in 128 countries all across the world which will cover fifth of the world population in mid of 2017. The number of broadband connection in 2008 were 200 million which booms to two billion in 2013. Further the number of mobile and smart phone users will be almost 4 billion in year 2020, all over the world if the growth in broadband technology should remain so strong. However high speed networking technology and advanced devices are enabling the growth of data hungry applications like internet browsing, media download, video buffering [4].

III. NEED OF RENEWABLE ENERGY SOURCES

The consumption of energy all over the world annually is 131666667000000 kilowatt hours per year which is nearly 85% coming out from fossil fuels which is disreputable inefficient (over 30% efficiency). on other hand utilization of hybrid sources like wind, tidal etc., are nearly 80% efficiency. Revenue \$0.12 per kilowatt hour which is mean in US and consumption of energy by British people is \$1.6 trillion which is estimated amount. Similarly \$1.3 trillion are spending on fossil fuel energy by British people. cost amount comes to \$500(30 to 80 % efficiency switch) as compared to earlier amount \$1.3 trillion as a result of switching all energy to renewable energy which is assumed 3 fold energy efficiency. As Fuel cells works on converting a fuel, as like hydrogen, into electricity without combustion. Fig.3 illustrates an Individual Fuel Cell while there are different types of hydrogen fuel cells, proton exchange membrane (PEM) cells which are efficiently used in ICT applications. A polymer electrolyte fuel cell named from PEM fuel cell offers advantages of low weight, volume and high power density as compared to simple fuel cells. Working temperature of PEMFC is low and provides 40-60% efficiency. A valuable aspect of fuel cells is the silent operation means that potential theft will be less likely such that no indication is conducted where power source is operating on the cell site. In wireless communication, the average amount \$5000 per site can be saved if fuel cell is deployed instead of diesel generators. Similarly In a 100-site network, the annual savings will be \$500,000 nearly. As a result over one million site, energy cost can be reduce [5].

IV. SOLAR ENERGY

Solar photovoltaic technology uses the light (photons) from the sun to produce DC electricity. As shown in figure 2, a photovoltaic cell is a light-sensitive semiconductor device which, when exposed to sunlight, releases electrons to produce DC current.

Fig2. Electricity generation in a solar photovoltaic cell [7]

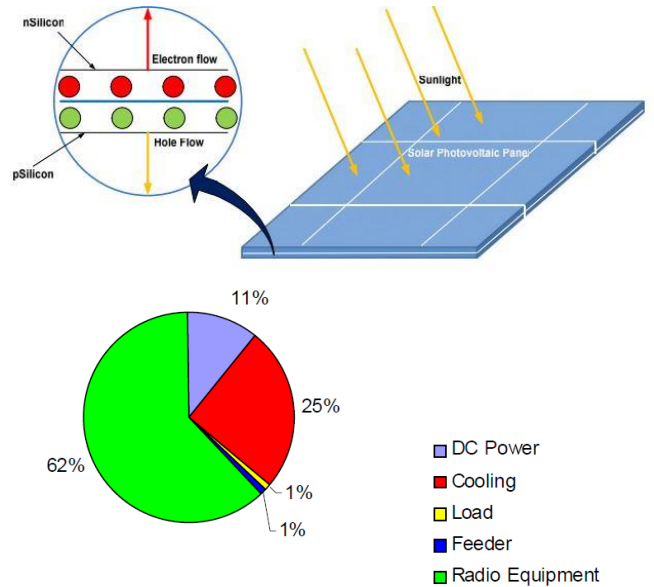


Fig.1. Power consumption on the BTS [6]

V. USE OF SOLAR ENERGY IN WIRELESS NETWORKS

Efficient power generation or emanation free procedure makes solar photovoltaic technology a desirable power backup technology. Meanwhile for solar power generation requires a 10 square metres for a 1kWp panel deployment. according to recent research, stand alone and hybrid solar photovoltaic applications are deployed. Solar energy applications mostly based on the site load profile, grid outage scenarios, space are available at sites and other configuration aspects including average sunshine availability throughout the trial. Also some applications are based on power storage configuration for non-sunshine hours. Figure 5 illustrate the hybrid application used in solar photovoltaic technology. New hybrid inventions can be concluded by combining solar photovoltaic technology and energy sources like wind turbine, fuel cell, biomass, fuel cells. The usage of augmented battery bank not considered to be hybrid source, although it is a part of solar photovoltaic solution [8].

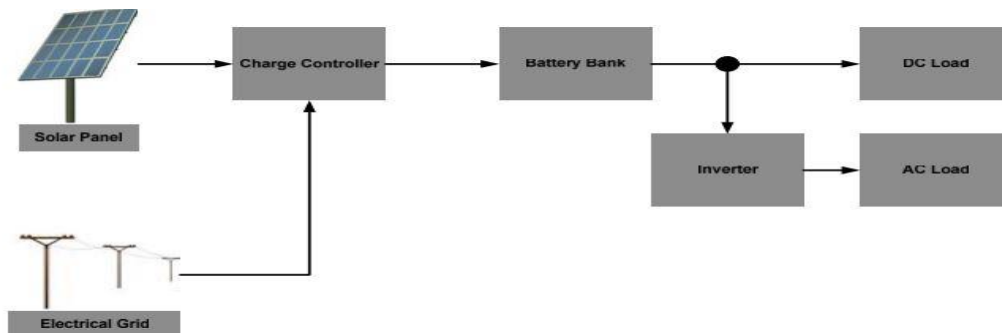


Fig. 2. Hybrid solar photovoltaic application [8]

VI. COMPANIES IMPLEMENTING RENEWABLE IN BTSS

Sunkalp energy

SunKalp Energy is a unit of BD Khanna Estates, a BDK Group Company whose motive is to make sustainable development possible for our customers by ensuring effective engineering, procurement and construction services for rooftop solar powerplants. Sunkalp includes film solid state technologies which gives power to AC as well as DC loads and system with variable power backups. Also for better or accurate decision outcomes, Sunkalp provides real time energy data logging. [9]

Global group enterprise

Their core service offerings revolve around Networks and Network related services - for Utilities, Telecom service providers and OEMs. This company provides network services to telecom operators and in power sector it offers services like EPC services for distribution Franchisee and smart solution. The company is serving the leading service providers and utilities across Asia Pacific, Americas, Europe, Middle East and Africa. GTL limited also shows revenue details by different operator companies on 30 Sep 2014. [10]

Kotak

KotakUrja Private Limited is an Indian company dedicated to promote eco-friendly and environmentally safe renewable energy technologies. The KOTAK family is working in India as well as globally in the areas of Exports-Imports of Textile raw materials & finished products, Energy solutions. KotakUrja has developed expertise in Design, Engineering, Manufacturing, Integration & Installation of a broad range of solar thermal & solar photovoltaic systems and aspires to achieve a dominant position in the growing PV market in both India and globally.

Sunelco

Sunelco is a sun electric company 1985, who gives reliable renewable energy system to their customers to build their own system or for homes purpose. They have more than 4000 systems working throughout all in 50 states and on every continent except Antarctica. Their system varied in accordance to residential home owner's or even by federal or many state government. [12]

Cambridge energy resources

CER is a leading Green Telecom Infrastructure Company 2009 that particularises in development of innovative energy efficient products and services for telecom cell sites. CER's enthusiastic work has been seen in providing efficient power to telecom cell site infrastructure in off grid or on grid situations and products made by CER reduced the power

consumption up to 30-40%. CER is the only company who offers fixed cost and guaranteed availability of operating tower. It has a renewable power solution for telecom tower running for more than 20 months in India with 100% up-time. CER has a global presence in Gurgaon (India), Cambridge, MA (USA) and Venezuela [13].

F. Luminous energy resources

This company was established in 2007 and it deals with manufacturing of whisper and Windstar wind turbines. Working largely in North /South America, Europe, Australasia and Africa has greatly influence on other companies. This company is capable of making hybrid parts like blades, charge controllers and alternators and their extreme work in field making of hybrid sources has greatly affected the telecom industry. [14]

G. Elgris

A German company named Elgris designs integrated solar power systems for site loads requiring 12/24/48VDC or 110V-240V, 50Hz/60Hz AC voltage. Their remarkable work in product designs like BTS Telecom power solutions with solar, BTS Telecom power solutions with generator, Advanced centralized remote site monitoring, HYBRID Diesel-PV controllers and GRID controllers to optimize self-consumption has change the phase of telecom sector. This company provides significant services to their customers like telecom solar power systems, off grid power supply, hybrid system controller, remote site monitoring as company comes in existence. [15]

Renewable energy world.com

Averox has been providing telecom services on a turnkey basis for some years to mobile operators to enable them to rapidly deploy base stations. Averox is a American company which concluded that wind generator equipment are cheaper than diesel generators. Also Averox illustrate is work that in upcoming years there will be installation of wind and solar power generators for telecom base stations which will reduce consumption of fossil fuel up to 90%. [16]

VII. GOVERNMENT INITIATIVES (BSNL) – HYBRID (SOLAR+WIND)

In Oct 2010 In certain areas of western Uttar Pradesh, BSNL has collaborated and bagged a tender with Indian company Tarvo technologies Pvt to initiate some telecom cell sites on solar power and it was promoted by SMP (Sonoma management partners). This project was comes to existence and all the telecom sites has been working on solar energy rather than diesel generator. After the completion of this project western up government said that guzzling fuel worth crores every year and dumping carbon emissions in the air

can be terminated by using renewable sources in mobile communication system.

VIII. CONCLUSION

Energy is the lifeline of an economy. The choice of energy will determine whether or not an economy will sustain. Thus, we must make the transition toward renewable energy as soon as is humanly possible in order to achieve the energy efficiency and environmental sustainability, through diversity of the renewable energy technologies in field of mobile communication. In this paper we exhibit paramount need of mobile communication working on renewable sources and extravagant work done by some worldwide companies to preserve our environment.

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