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A STUDY ON ENERGY CONSERVATION

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ABSTRACT

Energy is the most fundamental requirement of every society or nation to development. Energy is the lifeline to every nation. More than seven billion people on the earth need a lot of energy for the basic needs, comforts and development purposes. Hence, the demand of renewable and non-renewable resources is very high. Alarming threat is that the non-renewable resources like oil, coal and natural gas are getting depleted very fast. Eventually, the renewable energy items like solar, wind, bio-mass and tidal are the alternative to solve the energy crisis. Among the renewable energy sources, solar is the best, because it has sustainability in utilization. The present study focuses on solar street lighting system and solar lantern in terms of energy conservation.

KEYWORDS: *Energy, Resources, Solar, Solar Lantern, Conservation, Development.*

INTRODUCTION

Fortunately, India is situated in the sunny region of the world and receives abundant sunshine India is blessed to be located between 8°4'N to 37°6'N in the northern hemisphere of the earth and receives sunlight almost throughout the year. Solar energy is utilized I three ways, they are direct uses, thermal power and Photovoltaic (PV) conversion. Sunlight is directly used to dry out the agricultural produce, cloths, bricks etc. Solar water heaters, solar cookers are thermal systems, solar street lighting system, solar lantern, and solar motor pumps are functioning

through photovoltaic (PV) system. This study focuses about the Solar Street Lighting system (SLS) and solar lantern (SL) related to energy conservation.

ENERGY CONSERVATION

Energy conservation refers to reducing energy through using less of an energy service. Energy conservation differs from efficient energy use, which refers to using less energy for a constant service. For example, driving less is an example of energy conservation. Driving the same amount with a higher mileage vehicle is an example of energy efficiency. Energy conservation and efficiency are both energy reduction techniques. Even though energy conservation reduces energy services, it can result in increased, environmental quality, national security, and personal financial security.[1] It is at the top of the sustainable energy hierarchy.

SOLAR PHOTOVOLTAIC TECHNOLOGIES

Utility-scale solar photovoltaic technologies convert energy from sunlight directly into electricity, using large arrays of solar panels. Solar photovoltaic technologies convert solar energy into useful energy forms by directly absorbing solar photons—particles of light that act as individual units of energy—and either converting part of the energy to electricity (as in a photovoltaic (PV) cell) or storing part of the energy in a chemical reaction (as in the conversion of water to hydrogen and oxygen).

SOLAR CELLS

Solar cells are devices that convert sunlight directly into electricity. Solar cells are made of layers of semiconductor materials similar to those used in computer chips. When sunlight is absorbed by these materials, the solar energy knocks electrons loose from their atoms, allowing the electrons to flow through the material to produce electricity. A brief animation titled “Sunlight to Electricity” that shows how a solar cell works is available on the Animations page of the Department of Energy Solar Energy Technologies Web site.

Solar Arrays

Solar cells are generally very small, and each one may only be capable of generating a few watts of electricity. They are typically combined into modules of about 40 cells; the modules are in turn assembled into PV arrays up to several meters on a side. These *flat-plate* PV arrays can be mounted at a fixed angle facing south, or they can be mounted on a tracking device that follows the sun, allowing them to capture more sunlight. For utility-scale electricity generating applications, hundreds of arrays are interconnected to form a single, large system.

Concentrated PV (CPV) Systems

Concentrated PV (CPV) systems concentrate sunlight on solar cells, greatly increasing the efficiency of the cells. The PV cells in a CPV system are built into concentrating collectors that use a lens or mirrors to focus the sunlight onto the cells. CPV systems must track the sun to keep the light focused on the PV cells. The primary advantages of CPV systems are high efficiency, low system cost, and low capital investment to facilitate rapid scale-up; the systems use less expensive semiconducting PV material to achieve a specified electrical output. Reliability, however, is an important technical challenge for this emerging technological approach; the systems generally require highly sophisticated tracking devices.

THE GLOBAL SCENARIO

Solar photovoltaic (SPV) systems, a source of clean power, have grown world wide at an annual rate of about 25 per cent during the past decade, touching nearly 45 per cent in 2005. Solar photovoltaic cell production in the recent past has been at a peak in Japan makes 40 per cent of the $ 6 billion solar market, and it was touched $ 40 billion by 2010. The price of SPV cells has fallen considerably over the past decade. In Japan, the cost of photovoltaic declined 8 Per cent a year. In California, the cost dropped 5 per cent annually.

Solar powered homes are common in Germany and united stats of America (U.S.A), give power to the grid during the day (the matters run backwards) and draw power at night. This lowers the net electricity consumed by the grid. Global capacity was augmented by 1727 megawatts in 2005 alone. Some scientists argue that with sufficient investment on a grand solar plan, the U.S.A could meet as much as 69 per cent its electricity demand and 35 per cent of all its energy demand (including transport) by 2020 through solar, with provision for demand, growth and at prices comparable with those of fossil fuels.

The photovoltaic utilization across the globe is getting momentum in recent years. The advantage of PV system are;

- Use of clean, cheap, noiseless, safe renewable solar energy to produce electric energy at the location of utilization, conservation of non-renewable fuels.
- Suitable for remote loads away from main electrical network and at places where other fuels are scarce and costly. Cost of installation of long distribution lines distribution substations etc. are eliminated.
- Suitable for portable or mobile loads e.g. radio sets, cars, buses, space crafts.
- Reliable service, long life (minimum 15 years).
- Modest maintenance.

However, by PV system has some limitations, They are:

- Irregular, and intermittent supply of solar energy.
- Need for storage batteries.
- High capital cost.
- Not economical for central power plants of MW rating due to very large area of PV panels and very large storage battery system.

CO_2 REDUCTION BY A SOLAR LANTERN

Ritu mathur and kartik ganju's study found that on an annual basis, the Led lantern could result in savings of 93 kg co_2 compared to keerosene lantern. With these result the amount of co_2 lantern can be calculated and it is shown in Table-8

A Led solar lantern avoids 1,780 kg co_2 in terms of brightness indians are using 6,84,565 solar lanterns (2009-20trend) and it would avoid 60,926 tonnes co_2 emission in a years. Hence, the solar lantern has a tremendous impact in the protection of environment and checking the climate change.

SUGGESTIONS

Local bodies, may take more initiatives to install many solar street lighting system for the energy conservation. Solar lantern can be used in each and every houses, because the price is moderate. Government may issue solar lantern on free of cost to the people who are living in hills and the houses which are not electrified. Each year, national solar mission may have a separate target to distribute the solar lanterns to the people. The youth could be given training to market and repair the solar devices.

Government may encourage all colleges of technical education to install several solar devices. Media should focus some awareness programmed to the people about the programmed to the people about the uses and

For that, the panel should have multipurpose connectivity as and when required. Above all, every citizen should think off environmental protection by utilizing the solar devices.

CONCLUSION

Among the renewable energy devices solar street lighting system and solar lantern are the best devices in terms of price, utilization, economic, sustainability and energy conservation. The use of solar lights will definitely improve the standard of living, educational status and fostering light facilities to the people. In india,

the main goal of national solar mission of is to generate 20,000 MW by 2020 through solar energy, certainly, the widespread consumption of solar lights would have greater impact to meet out the energy crisis. For any devices, social acceptability is the important aspect. Among the renewable energy items, utilization of bio-mass energy nuclear plants, there is a human cry everywhere due to disasters and radio-active emission. Wind energy is only seasonal, tidal energy is not popular and hydro energy is the best among all the renewable energy items, because it is clean, green and social acceptability and of course, the solar light is Aladdin's Magic lamp.

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