INNOVATIVE USES OF SOLAR ENERGY IN UDAIPUR

Introduction

Although most research into the use of solar energy in recent years has been on photovoltaic technology, where sunlight is converted directly into electricity, there are many applications of solar thermal energy such as heating, drying and water distillation. Many solar thermal technologies have existed for centuries and are well understood. They have established manufacturing bases in many sun-rich countries. Unlike photovoltaic technologies manufacturing can be done on a small scale without using expensive equipment. More sophisticated solar thermal technologies do exist that generate electricity (often on a large scale). Solar technologies that rely entirely on energy absorb from the sun and have no moving components, are referred to as passive solar technologies where as active solar technologies may have some additional input such as a pump to drive the system.

The global environmental, financial and political issues necessitate the use of renewable resources to meet the fast growth in energy demand. Among renewable resources, PV systems have received considerable attentions and it is expected that the penetration of PV energy generation will increase steadily to become a significant proportion of total energy generation.

This study will focus on the combination of PV panels, MPPT controller; to operate the PV panel at its maximum power point, and battery storage device. As the PV panel output power varies with the solar radiation a battery storage device can be integrated with the photovoltaic system to ensure that the system performs under all conditions.

USES OF SOLAR ENERGY

With so many different gadgets and technologies that could leverage solar power in the modern era, many are wondering “how is solar energy used?” Whether it’s powering renewable transportation or charging a wireless speaker

What is solar energy used for?

Solar energy uses captured sunlight to create **photovoltaic power (PV)** or **concentrated solar**

power (CSP) for solar heating. This energy conversion allows solar to be used to power auto

motives, lights, pools, heaters and gadgets. There’s no doubt that the solar-powered products

available on the market are increasingly complex. Here's top five list for examples of solar energy: solar transportation, solar tech, solar lighting, solar heating and our favorite – rooftop solar.

Solar Powered Transportation: A New Use of Photovoltaic Energy

An innovative practice to effectively make use of the sunshine is with transportation powered by photovoltaic (PV) energy. Railroads, subways, buses, planes, cars and even roads can all be powered by solar, and solar transit is becoming a popular offering in the renewable energy sector. Recently, the solar powered-aircraft Solar Impulse 2 made its way around the world, soaring across the Pacific and making big splashes in iconic photographs. Meanwhile, solar buses are helping China reduce its carbon footprint while simultaneously maintaining efficient mass transit in densely populated cities like Beijing. Finally, solar cars are starting to play a role in racing competitions around the world, especially in Australia where the SolarSpirit model has gained major recognition. With these advances and more, there's no question that solar power is the transforming transportation sector around the world.

Wearable Solar Tech: A Personal Way to Use Solar Power

Powering consumer electronics has become a common solar power use in today's world – solar-powered chargers like Anker's Powerport can charge anything from a cell phone to a tablet or e-reader. There are even solar-powered flashlights that can be charged by being exposed to sunlight. For those curious about the top products in solar tech, check out this top 10 list of uses for solar devices:

- Cell phones
- Wearables
- Music speakers
- Solar air conditioning
- Tablets
- Thermostats
- Solar dryers
- Solar visor radios
- Freezers/mini-fridges
- Rechargeable flashlights

As the world moves away from fossil fuels and seeks renewable sources for everyday electronics, there's no doubt that solar will continue to be adopted by the masses for any product that can be exposed to sunlight. For example, wearable solar could soon make Apple Watches and Fit bits much more appealing to consumers – unlike their standard counterparts, solar powered smart watches don't need to be plugged in to recharge every night. The real question is, will these large technology companies be able to integrate wearable solar technology into their products before an emerging brand beats them to it?

Solar Lighting: A Popular Example of Solar Energy

One of the easiest ways to improve home efficiency is to add outdoor solar lighting to your property. Unlike traditional exterior lights, solar lighting requires no complicated setup as the lights are wireless and harness sunlight during the day to circumvent the need for grid-supplied electricity at night. Though solar lights are not yet as common as solar panels, they are quickly joining the likes of LED lightbulbs and smart home thermostats as a cheap product that can reduce electric bills and improve the efficiency of your home.

Additionally, the aesthetic of modern solar lighting can significantly improve the outdoor decor of a property. Elaborate lighting arrays can improve the exterior design of a property, are often as cheap as $20 per light, and are available at major home retailers

such as Home Depot. The availability and low cost of these lighting products are one reason why it's so common to see solar powered street lights – keep your eye out for those like the one pictured above.

Solar Heating: Using PV for Thermal Energy

Many homeowners are unaware that solar water heaters and solar space heaters are an effective way to heat one's home without making the larger investment of installing solar panels. Solar space heaters harness sunlight and convert it into thermal energy with the use of liquid or air as a medium, while solar water heaters use water as a method for thermal transfer. These solar heating systems can either be passive or active – while passive systems utilize natural circulation, active systems use pumps to circulate water and generate heat. Homeowners who install a thermal solar array on their roof can expect 5 to 10 percent returns with a system that costs a fraction of a full solar panel installation.

A major benefit of solar thermal technology is the ability to heat your pool at a more cost-effective rate than conventional alternatives such as oil and gas pumps. According to the U.S. Department of Energy, "solar pool heating is the most cost-effective use of solar energy in many climates." Wondering how solar heated pools work? At its simplest, the technology uses a solar collector that harnesses sunlight and converts it into heat. Water is then drawn through the collector as a means of heating the pool. This technology can also be used to cool the water at night

Rooftop Solar used by Hotels and Institutes in Udaipur

With so many amazing gadgets and devices available under the sun in 2016, it's easy to overlook the most important use of solar energy: rooftop solar. While solar energy

can be used to fly an aircraft and charge a battery, it can also be used to save homeowners thousands of dollars every year by cutting their energy use, carbon footprint and utility bills.

As you consider the various ways to go solar, make sure to first estimate your potential solar savings and see what a solar investment could do for your household finances. Utilizing smaller products and home improvements to improve the efficiency of one's home is a great practice, but at the end of the day, the ultimate opportunity to improve one's carbon footprint and electric bill is with a home solar panel installation. If you're starting to think about going solar, join the Energy Sage Solar Marketplace for free in order to start comparing multiple installation offers from the top pre-screened solar companies in your area

OBJECTIVES OF STUDY

The main objective of the study is to make a comprehensive research on Solar Power Plant performance in Udaipur City.

REVIEW OF EXISTING LITERATURE.

Over recent years many research has been carried out on photovoltaic and battery storage. Among them, Kim et al. [2], developed a grid-connected photovoltaic model using PSCAD/EMTDC for electromagnetic transient analysis. El-Shatter et al. [3], employed fuzzy logic control to find the maximum power point tracking for both PV and wind 25th InternationalCongressonConditionMonitoringandDiagnosticEngineering IOP Publishing Journal of Physics: Conference Series **364** (2012) 012122 doi:10.1088/1742-6596/364/1/012122 Published under license by IOP Publishing Ltd 1 energies. Tremblay et al. [4], developed a generic battery model for the dynamic simulation of hybrid electric vehicles; they used only the battery state-of-charge (SOC) as a state variable in order to avoid the algebraic loop problem. Arriba's et al. [5], proposed a PV/WT hybrid system performance assessment procedure; based on the existing one for PV systems (IEC-61724). Pietruszko et al. [6], summarized one year of monitoring of a roof-mounted 1kW grid-connected PV system in Poland. Omer et al. [7], presented monitoring results of two examples of building integrated PV (BIPV) systems in the UK. Tsai [8], implemented an insolation-oriented PV model using MATLAB/SIMULINK software package. Gow et al. [9], developed a general PV model which can be implemented on simulation platforms such as PSPICE or SABER. Chayawatto et al. [10], developed a mathematical model of a dc/ac full-bridge switching converter with current control for PV grid-connected system under islanding phenomena; this phenomena occur when the grid system is disconnected for any reason and the distributed generation still supplies to any section of local loads. Thus, it is difficult to analyze and simulate in the generic modelling of PV power system. Adding to that, as PV systems age it would be expected that their overall efficiency would decrease, and

currently there is few monitoring system available to diagnose faults as they occur. Consequently, these gaps gave the researchers the motivation to evaluate the performance of solar power plant based on a developed model comprises photovoltaic array, battery storage, controller and converters.

RESEARCH METHODOLOGY

The proposed study will undertake a comprehensive study of the existing uses of solar energy in Hotels and educational institutions in Udaipur. On basis of personal visit to selected units, where innovative uses of solar energy have taken place, information will be collected. The main emphasis will be on identification of cost, merits and demerits of the innovative techniques used.

SAMPLE SELECTION

The study will concentrate on evaluation of performance of at least two solar power uses in sample units. The sample will be selected on basis of convenience where units will be prepared to supply information.

CHAPTER SCHEME

The study will have the following framework of thesis:

1.The first chapter will highlight Introduction which includes importance of solar power in view of energy crisis, objectives of study, review of existing literature, methodology, sample selection and chapter scheme.

2.The second chapter will depict solar energy and their mechanics .

3.The third chapter will reveal a total conceptual framework of solar energy with reference to researches going on world over.

4.The fourth chapter will be detailed research work in relation to two solar power applied to sample units ,their performance and lessons for future.

5.The fifth chapter will be devoted to conclusion and suggestion with major findings of the research work.

6.At the end Bibliography will be given.

Conclusions

Innovative uses of solar energy has to be evaluated based on a developed model for further applications. Excellent performance is obtained from such innovative uses of solar energy .The outcome of such developed model will be validated and supported

by a case study carried out in sample units in Udaipur. The study will be carried out through monitoring that system and seeking information on performance

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