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Solar Energy: Opportunities and Challenges

In the Green Spotlight

No longer on the distant horizon, technological advancements along with the increasing trends toward energy conservation and energy security, have caused Solar Energy to surge to the forefront. As the most abundent free renewable energy resource, we are seeing ready acceptance in the Energy Sector for every type of construction, and renewed interest in tackling the challenges in order to implement Solar Power systems.

The U.S. market for solar photovoltaic (PV) systems has grown exponentially in the last 7-8 years, and is showing no signs of abating. The Department of Energy (DOE) indicates that grid-connected PV is the fastest growing market, with growth of 40+% over the past five years, and projections of five times more growth over the next couple of years. The state of California has the lions share, with 70% of the PV installations in the US. According to published reports, the financial crisis and recession are not expected to impact the growth of the solar PV industry, although some analysts have slightly lowered their growth projections. Solar energy is projected to potentially capture 30% or more of market share for new capacity in the next 5-10 years. However, some company consolidation may occur as a result of the financial impact on smaller solar firms.

A newly released report from DOE's Lawrence Berkeley National Laboratory (NREL) shows a 4% decline in the average installed cost of US solar PV power systems in 2008, and more than a 30% decline from 1998-2008. This is primarily attributed to a decrease in PV module costs. A big shift began in 2008 with a decline in wholesale module prices, generated by the global financial crisis in combination with expanded manufacturing capacity. Installed costs vary widely by region and by installation type. The report concludes that PV costs can be driven lower through large-scale deployment programs.

Solar Systems

The base components for solar energy are well known, reliable, and have actually been in use for years. A series of photovoltaic cells mounted for sun exposure; an electronic inverter device which changes the d.c. current generated by the photo cells to an alternating current for practical use; and the commonly utilized array of switches, fuses, and wiring conductors make up a complete "Solar System" for electrical purposes.

Site Requirements

Infrastructure requirements and proximity to an existing energy grid are vital in planning and facilitating construction of solar PV farms. The selection of a site for commercial applications on or near a building is a key factor. The site must be of sufficient size and structural integrity to support or enclose the cells, and provide good access for component installation and maintenance.

Trends in the Mid-Atlantic Region

Solar power initiatives for residential and commercial development in the U.S. mid-Atlantic region are being fueled by incentives, stimulus funding, and industry trends. Projects are springing up from Delaware to Washington, DC. One of the largest solar power plants in the mid-Atlantic region is currently planned for Dover, DE while other projects are planned in Prince Georges County, MD, and Gaithersburg, MD. Rural Front Royal, VA is in the spotlight with what may be one of the largest solar plants on the east coast. The proposed $200M plant, which is expected to span more than 150 acres and generate twice the needs of the city, is on a fast track toward approval.

Weighing the Challenges

Initial Cost vs. Energy Savings – Solar Power is now experiencing similar cost reductions to those felt in the electronics industry when demand and use, as well as production soars. The costs are coming down. Where the rubber meets the road is in the higher initial cost versus long-term energy savings. Dramatic reductions in cost and increases in efficiency of PV have occurred over the past several years, however, according to (NREL) additional decreases of 50-70% in PV system prices are needed to achieve grid-parity nationwide (the point where photovoltaic electricity is as cheap as conventional electric power). Tax incentives such as the Investment Tax Credit (ITC) are expected to positively influence the trend toward lower cost and more efficient solar panels. Other factors influencing price include geographical location, necessary financial resources, and applications.

Among the implementation factors which present a challenge are integrating Solar with existing systems/buildings, with backup sources for weather interruptions. In addition a large area is required for installation to achieve a good level of efficiency.

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