

Solar PV and CPV Technology's Market Trends

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Despite the global financial crisis in 2009, the United States became the second largest photovoltaic (PV) solar energy market in the world, second only to Germany. This growth is credited mainly to the supportive policy implemented by both federal and state governments, particularly the Renewable Energy stimulus package as well as guaranteed financial incentives for the next eight years as introduced by the Obama administration.

This unprecedented growth in the US solar PV market also is attributed to the tremendous growth of the market in California, which accounted for more than 70% of the country's solar PV installations. The California solar PV market got its boost from strong policies implemented by the state government that heavily favored the solar energy industry, as well as statewide campaigns that encouraged use of solar power within the state.

The solar PV market is expected to grow much more rapidly in the coming years and will be considered the most cost-effective way of generating electricity. The market would eventually boom as more and more people realize that the advantages they can gain with solar energy are built into the upfront cost they invest for solar PV installations and would be more cost competitive and economical than conventional energy technologies.

Recent Updates on California's Solar PV Market

The solar PV market accounted for 677 MW in 2008, with California accounting for 468 MW from the total. To compete with more conventional energy technologies, the state of California made a major step in signing SB 32 into law in 2009, directing the California Public Utilities Commission to approve standard contracts based on wholesale energy prices for renewable energy resources. Contract prices also take into account inclusive benefits from renewable energy such as reduced carbon emissions, fewer transmission lines and other infrastructure requirements, and generation of electricity during peak hours.

Solar Panel Installation

This decisive action by the state aims to take advantage of its solar energy resources as a major step in addressing the state's energy challenges, thereby creating a market that favors the development of solar energy technologies. Now, the California solar PV market is the largest in the United States and has attracted a host of PV vendors to cater to it.

Existing energy utility companies in California also are jumping into the bandwagon by initiating programs

developing their own large-scale solar PV power plants. The Solar Electric Power Association or SEPA is seeing a considerable number of energy utility companies starting their own solar business models, and they have already tracked at least 1500 MW in solar PV initiatives across the country – with the California market going strong at the helm

Upcoming Trends and Market Outlook

Now that the United States is second in the solar PV market, experts see a potential growth of up to 50% annually for the country, which will put it at the top spot in less than a decade. Indicators are strong that the market will no longer be needing government aid and will eventually stand on its own feet – as marked by a strong growth potential and an unprecedented market in the coming years. California will play a big role in this market and is considered the leading indicator from which other states would follow suit.

It is projected that within three years, the solar PV market in California will grow to full maturity and eventually will generate cheaper electricity from what is generated from the Grid. At this stage, the California PV market is just a tenth of Germany's large solar PV market, but in the next four years the market is expected to leapfrog from its current concentration on the residential market and into the commercial sector where the big players – and energy spenders – are.

Game Changing PV Technology

The popularity of PV or photovoltaic solar panels make them quite familiar terms with the general populace, particularly in California. Some may also be familiar with solar thermal systems that make use of solar energy to create heat to generate power through turbines. However, many still do not see solar energy as viable alternatives to produce electricity due to high start-up costs and other issues related to the manufacture and use of photovoltaic panels.

A new technology is emerging that will change all that. Called concentrated or concentrating photovoltaic (CPV) technology, the system makes use of lenses or mirrors to concentrate solar energy onto tiny solar cells that are highly efficient in converting solar energy into electricity. Such arrangement is meant to address the number one problem with the use of solar PV systems – the expensive silicon-based solar panel.

Although many journals have already reported significant claims on how effective this technology is on a laboratory setting, the challenge remains on whether this technology will be viable in the commercial market. Several companies have taken up this challenge and are now making significant headway by bringing CPV panels out into the market.

Understanding Concentrated Photovoltaic Technologies and Its Benefits

Concentrated Photovoltaics

As mentioned earlier, the difference in CPV technologies with traditional solar PV cells is on the way sunlight is concentrated, up to 650 times onto high performance solar cells. This will increase the generated electricity, which can be maximized further by the use of tracking systems where the CPV panels can be mounted.

CPV panel efficiency considers the panels as a whole and is much lower than cell efficiency. Efficient CPV

panels can reach 25%, which is typically twice the efficiency of traditional PV cells. As this efficiency increases the cost for harnessing solar energy decreases, resulting in fewer raw materials required, lower manufacturing costs, and reduced land utilization.

The following discusses some of the additional benefits that can be realized with the use of concentrated photovoltaic solar panel technologies:

Dual Land Use: CPV panels are mounted on elevated tracking systems that can allow utilization of the land underneath for planting crops.

95% Recyclable: unlike traditional PV panels, CPVs use glass and aluminum as their two main materials, which can then be recycled. Useful life of solar panels is typically 30 years.

ROI in six+ months: early technologies used to manufacture solar panels require as much energy as they can produce over a 20-year period, resulting to poor net energy gain. These new CPVs are much more efficient in that users can realize payback within a short period of six months.

Similarity to the Auto Industry: The manufacture of CPV panels makes use of automated manufacturing systems similar to the very stringent auto industry. This manufacturability makes it more cost-effective than traditional solar panels.

California Companies Engaged in Developing Concentrated Photovoltaic Technologies

In California, several young or start-up companies are making waves in the development of concentrated photovoltaic technologies. These companies include but are not limited to:

SolFocus: This company is based in Mountain View, California, and has raised \$95 million in required funds that will be used for the deployment of its CPV systems for commercial use.

GreenVolts: Based in San Francisco, GreenVolts is now selling a concentrated PV system mounted on a sun-tracking mechanism, enabling it to increase sunlight concentration of up to 625 times, producing energy at half the cost of traditional photovoltaic cells.

Silicon Valley Soar: This company markets a flat plate internal concentrator for their CPVs, delivering twice the concentration while reducing 50% of the silicon usage requirements. Unlike other systems, this unit does not require a tracking system. This reduces the number for moving parts, which further reduces the cost.

Amonix: This company is a veteran in high concentration PV systems and has now received venture capital investments of up to \$129 million to hasten utility-scale deployment of its products to commercial and residential use.

Pyron Solar: This company based in San Diego now has a 6.6 KW prototype that floats in water as a cooling system to prevent panel damage.

Recent Developments in Concentrated Photovoltaic Technologies

This year, 2010, is when the Federal Bureau of Land Management has given its go signal for several giant solar energy projects in California that literally will make the state's deserts bloom with glass panels, steel blocks, and giant turbines to generate electricity harnessed from the sun. Many of these projects will make use of CPV systems to capture and concentrate solar energy.

Last May, the Victor Valley College and the company SolFocus completed the largest solar power plant in North America utilizing concentrated photovoltaic technologies. The power plant has a capacity of one megawatt, which is more than enough to provide Victor Valley College with clean and renewable energy.

Not only will this plant generate significant amounts of energy without significant impacts on land and water, it also can generate green jobs and be used as training facilities for future solar energy professionals – ensuring a bright future for all.

Conclusion

With the emergence of the PV markets in California and throughout the United States, the communities in which these projects are implemented are on a path towards receiving long-term community service and benefit. Public policy relating to environment and economic development can be the major benefactors of these projects. Never has the time for innovation and expansion been greater in our renewable energy history.

About the Author

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