

Solar Photovoltaics- Indian Scenario

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Abstract

Solar photovoltaics is a several billion dollar global sun- rise industry which has been growing by well over 37% every year for the last several years (before the global meltdown). Global production capacity of solar cells per year has already crossed 12000 MW equivalent. Photovoltaics now find widespread applications from small stand- alone power supplies to large (60 MW or more) power stations and in green buildings, among other applications. The technology continues to be primarily (over 90%) dominated by the standardized and reliable monocrystalline and multicrystalline silicon based. Large scale production in China has resulted in price of crystalline Si cells below \$1/ W. Major industrial efforts are being made to manufacture thin-film microcrystalline, nanocrystalline and hybridized Si - based solar cells. Amorphous Si thin-film technology ,which at one time was considered the most promising one ,contributes less than 3% to the global production today .. Nevertheless, such cells on flexible substrates find applications in special areas as defence and building integrated photovoltaics. After considerable research and development efforts, thin-film CdTe based solar cell technology has finally reached a large scale production of over 160 MW at production cost of over \$1 /W by a single manufacturer. The thin-film CIGS based solar cell technology, though more complex, has also advanced considerably and may be able to compete with CdTe technology on \$/W basis. Recent reports of reasonably high efficiency large area CIGS cells manufactured roll-to-roll by a printing technology process on flexible metallic/plastic substrates are very promising developments. Presently, intensive research is being carried out to develop novel organic /polymeric materials, organic-inorganic composites, and dye-sensitised materials for flexible solar cells. The economic viability and possibility of grid parity of any one or more of such PV technologies will ultimately be determined by the criteria of materials used, manufacturability, cell efficiency, stability and life of the cells and , ultimately, by the overall production cost per watt. The Review will discuss the present status of the various PV technologies and major applications of SPV in India.