

The Photovoltaic Thermal (PVT) Technology for Future Energy Challenges

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Editorial

The depletion of fossil fuels, bad impact of greenhouse gases and climate change needs to be addressed in every sector of life including design of a building, agricultural sector, industrial sector, transport sector, electricity need, heating and cooling applications, day lighting, greenhouse technology etc. It is important to mention that these problems are strongly connected and need to be resolved as a holistic solution. In USA, there is 48% energy consumption in building sector against 29% energy consumption in domestic sector in India (CEA 2009). This shows the strong requirement to design passive cooled/heated building across Indian sub - continent. In India, the energy consumed for cooling, artificial lighting and heating of the building is 28%, 27% and 6% respectively. Solar energy and derivatives of solar energy (renewable energy source), a clean and environment friendly energy can meet the clean energy requirement for better environment, better health, and a better life. Therefore one should prefer to use renewable energy sources in greater extent and more research should be done for the improvement of efficiencies of renewable energy systems.

In recent years, almost every conventional solar thermal technology has been integrated with photovoltaic (PV) technology. This combination known as photovoltaic thermal (PVT) is a self-sustainable renewable energy technology which enhances the overall efficiency and performance of the system. The PVT technology includes PVT water collectors, PVT air collectors, PVT dryers, PVT greenhouses, PVT concentrators; Building integrates PVT systems, solar distillation units using photovoltaic modules. This technology can be a boon for the

underdeveloped and developing countries as for as the energy security and environmental challenges are concerned. For technologically advanced part of the world use of PVT technology can significantly reduce the greenhouse gas emissions.

In agricultural sector, the PVT systems (PVT air collectors, PVT mixed mode dryers, PVT greenhouse dryer, PVT greenhouses for controlled environment of greenhouse) are beneficial for the farmers which can reduce post harvesting losses and increase return cost. The greenhouse aquaculture can be used in fish forming or any other sea food farming where return on invest is better than conventional farming. In industrial (PV operated heating and cooling units, distillation using PV technology, PV operated pre heating of high temperature applications, PV operated electronic devices and instrumentations, solar refrigeration) and transport sectors (PV operated vehicles), use of renewable energy sources replaces a considerable amount of conventional energy in addition to reduction of huge amount of GHG emission.

The vast research experience in the field of solar energy specifically solar thermal and photovoltaic thermal (PVT) systems accredited the idea of using these self-sustainable systems in the rural areas of undeveloped or under developed countries like India. These renewable energy systems do not require any grid connectivity which is a significant benefit to utilize these systems in the development of the rural areas. Commissioning of the PVT systems enables better opportunity for the employment of the youth in villages with very little training of handling these systems which can generate self-employment for the needy people.