



Photovoltaic Agriculture

(*Nitesh Kumar Tanwar and Lokesh Kumar)

Ph.D. Scholar, Department of Extension Education, MPUAT, Udaipur

* nitesht160@gmail.com

Photovoltaic agriculture is an efficient system, that supports the enhanced production of electricity and crop within the same land. Here, it is not only focused on power generation but also on getting quality yield from the agricultural components of the system. The components may range from shade tolerant crops to livestock under a roof fitted with solar modules. Photovoltaic agriculture can effectively alleviate the contradiction between more population and less land, powerfully promote the development of controlled environmental agriculture, evidently increase economic benefits of farmers, and significantly improve environment due to emissions reduction in India. In recent years, photovoltaic agriculture has a rapid development in India due to powerful support policies, flourishing controlled environmental agriculture, policy-oriented rural electrification and promising electric machinery for greenhouse.

Why to shift from the conventionals?

This is the question that arises when the conventional practice is comfortable but we have evidently created a global discomfort in the form of climate change by burning fossil fuels over the limit resulting in increased average global temperature. This leading to glacier melts and sinking of small islands due to rise in sea level. Lose of biodiversity from coral reefs to all the life forms under and above water. The bigger picture is definitely the concern that is accumulated by individual domestic house holds. One of the major concerns of small and medium farmers is the cost spent on fossil fuel that can be saved by altering to the renewable source. It is a good source of power generation that also reduces the noise and air pollution from the diesel motors and fumes of generators in the field. Spill contaminations in the field is polluting the horizons during the transportation of fuel can be deteriorating the humus and beloved. With ever increasing fuel cost and electricity bill the remedy is the need of the hour.

Applications of photovoltaic in agriculture

- The array of solar panel with well planned arrangements can be very effective for achieving the goal. These arrangements and installations vary depending on the need and application.
- Photovoltaic agricultural greenhouse is one of the main applications where the roof of the green house is either substituted with solar modules or solar modules are fitted over the rood leaving a gap ema mount. The solar modules if placed with the conventional greenhouse roofs one has the options to choose among the transparent one and the opaque one based on the crops to be grown under the roof.
- Photovoltaic livestockare those that get benefitted from both the power generated and the shade the panels provide Madly these panels are mounted on concrete pillars that occupy the least ares. Pasture lands of sheep and even over the ponds of fishery. The

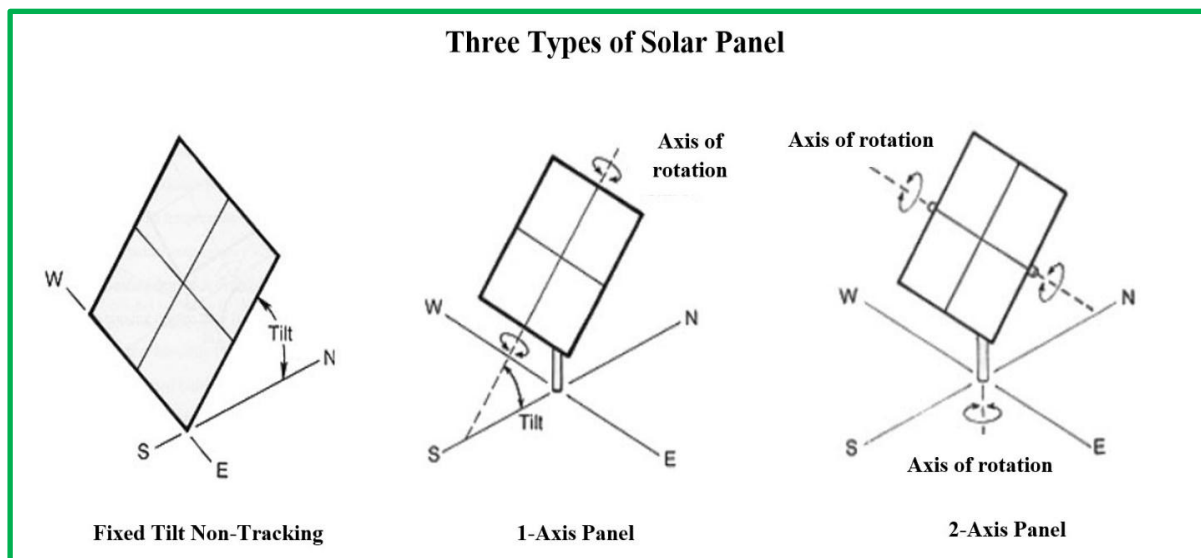
microclimate created by these structures favorable as the air is cooler during day and warmer during the nights.

- Photovoltaic wastewater treatment involves treatment of HF removal, pH neutralisation and the discharge containing propanol (the production of cells based in mono crystalline silicon). This is an effective method is removing undesirable substances from the waste wester.
- Photovoltaic pumping is again a simple and effective application where the water is drawn up to the water reservoir with the power generated from the solar radiation and once the water reaches an elevation good enough to distribute to cover the entire system, irrigation is achieved.
- The one main concern with the predictable weather conditions can be mitigated to an extend with batteries of capacities to sustain the period of solar absence.

Types of arrangements of solar panels

The three most common types of solar panels are:

- 1. Fixed Tilt Non-Tracking Solar Panel:** The fixed tilt solar panel mount is a non-tracking mount, meaning that it does not move mechanically on it's own. Once you set the panel in it's place it will remain pointed to the same point in the sky unless you manually move it. When using a Fixed Tilt solar panel you want to position the face of the panel so it get's the most sun exposure throughout the entire year.
- 2. 1-Axis Solar Panel:** The 1-Axis mounts has mechanical features that allow for limited automatic movement and tracking. This is usually more expensive than the Fixed Tilt panel. The 1-Axis Solar Panel, as you would expect from its name, can move on 1-Axis to track the suns movement throughout the day.
- 3. 2-Axis Solar Panel:** 2-Axis solar mounts allow fore the most mechanical movement and usually are more expensive. Living up to their name, they have the ability to move on both the X and Y axis, so they are able to track the suns movement throughout the day and year.



Global Initiative

The International Solar Alliance (ISA) is an initiative launched by India in the year 2015 for the promotion of solar energy utilization, under United Nations Conference on Climate Change in Paris. After the virtual meetings held in the month of February, 2021 there are talks of solar bank. The Solar bank will be a financial agency that pools resources from around the globe to finance the member countries in budding solar grids. So far there are 121

ratified members, who are all expected to join the OSOWOG (one sun, one world and one grid) to make it into a successful change.

Conclusion

Photovoltaic agriculture is a mutualistic relationship between man and machine as these modules are sensitive to temperature they tend to have PID losses (Potentially Induced Degradation) when reaches its temperature coefficient and remains there for a prolonged period. To avoid this, they should be kept among or near vegetation to have the required moisture to prevent itself from completely drying out India being in the solar rich belt and the current president of ISA, as a citizen it is our duty to take part in the initiative. So far India has achieved building solar structures with a capacity of 32GW. With feed in tariff systems each individual can generate and contribute to the national and the global grid.