Fraunhofer Experiments In Chile And Vietnam Prove Value Of Agrophotovoltaic Farming

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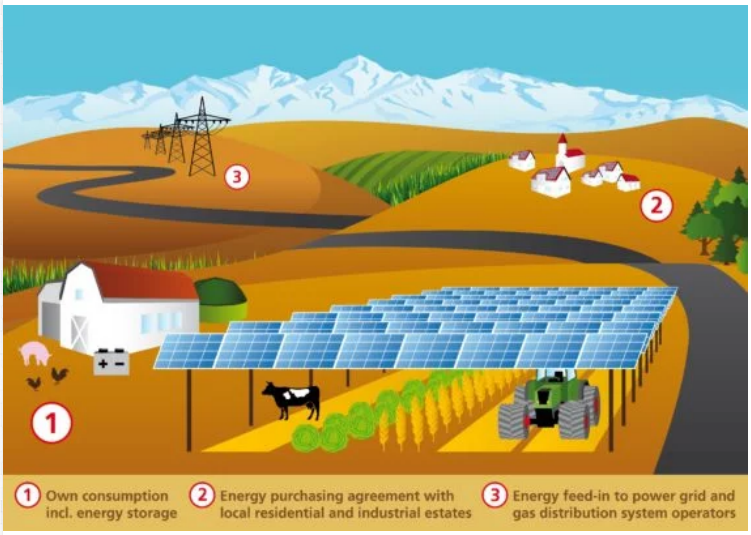
Last November, *CleanTechnica* brought readers news of an experiment by Fraunhofer Institute For Solar Energy Systems that **combined solar panels with agriculture**. Fraunhofer calls its unique installation, which mounts the solar panels high enough to allow farm equipment and animals to move freely underneath, agrophotovoltaics or APV. The results from the first experimental program near Lake Constance in southwestern Germany found combining agriculture and farming increased the output of the land by 60% over what it would be if the same land was devoted 100% to farming or 100% to solar panels.



"From the perspective of agricultural science, agrophotovoltaics is a promising solution for increasing both the land use efficiency and the share of renewable energy provided by the agricultural sector," says professor Iris Lewandowski, who heads up the department of biobased products and energy crops at the University of Hohenheim.

Since last year, Fraunhofer has applied the lessons learned from the Lake Constance experiment to three agricultural environments in Chile and a shrimp farm in Vietnam. In all cases, the benefits suggested by the first pilot project in Germany have been confirmed.

Three Experimental Farms In Chile

According to a Fraunhofer **press release**, three identical 13 kWp APV systems were constructed in various locations in Chile. Researchers were interested in finding out which plants benefited from the shading from the APV array. Sensors measured meteorological data like solar radiation, humidity, soil moisture, and ground temperature.

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The first APV system was installed on a farm using very professional methods to grow broccoli and cauliflower. The solar electricity was used in the production process to clean, package and cool the produce. The second APV was installed on a family run farm that grows herbs and other crops.

The third system was set up in a remote region where access to the electricity grid is available but service is frequently interrupted. The APV plant provided electricity for seven families while providing power to an incubator for hatching chicken eggs, among other things.

The three pilot farms will be monitored for three years. Different types of crops will be grown to determine which ones adapt best to the APV environment. "At the beginning of the project, there was a transfer of technology and know-how from Germany to Chile. In the meanwhile, the transfer is taking place at the same level in both directions. Fraunhofer ISE is profiting from the new experiences with APV in Chile and vice versa," reports Stephan Schindele, project head of Agrophotovoltaics at Fraunhofer ISE.

The partial shading of crops planted beneath the APV scaffolding can reduce the need for irrigation. Various fruits which normally do not grow well in dry climates with high solar radiation can flourish when shaded by an APV system and livestock can benefit from less exposure to the sun. The electricity generated can power water pumps or desalination systems. In addition, it can be used for cooling and processing crops, making them preservable and therefore more profitable.

In remote regions, the quality of life is improved by access to electricity that provides improved access to information, education, and better medical care. In sub-Saharan Africa, about 92% of the rural population have no access to electricity. APV offers new sources of income to the local population and at the same time reduces the dependence on the fossil fuels that are often used to run diesel generators.

Aquaculture in the Mekong Delta

Fraunhofer ISE is exploring whether APV techniques are applicable to aquaculture at a shrimp farm located in the Mekong Delta where there is increasing competition for land between farmers and renewable energy advocates. Why not make the land support both?

The results of the pilot project at Bac Liêu indicate that APV can significantly reduce carbon emissions while slashing water usage by up to 75%. "By combining aquaculture and photovoltaics, the land use rate increases by at least 65 percent compared to an open field PV plant," says Max Trommsdorff of Fraunhofer ISE. The APV system provides other benefits, particularly improved working conditions due to the shading provided by the solar panels together with a stable, lower water temperature that helps the shrimp grow faster and healthier.

If APV technology and techniques are expanded to developing countries around the world, it could make "a lasting contribution to improving resource-efficient land use and regenerating parched soil," claims Stephan Schindele of Fraunhofer ISE. Lower emissions, site specific electrical power, more efficient and profitable farming — APV systems could be the answer to the need for renewable energy in many parts of the world.

Tags: Agriculture, agrophotovoltaics, Fraunhofer Institute, Renewable Energy, Solar power

About the Author

Steve Hanley Steve writes about the interface between technology and sustainability from his home in Rhode Island and anywhere else the Singularity may take him. His muse is Charles Kuralt -- "I see the road ahead is turning. I wonder what's around the bend?" You can follow him on Google + and on Twitter.

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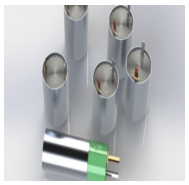

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