

Watt's Happening? #234

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Agrivoltaics

Solar farms can be farms too!



Sustainable agriculture and sustainable energy can work hand in hand to improve the bottom line for both. With solar grazing (left) and crop agrivoltaics (right) the solar energy is essentially used twice on the same land: once for the crop or forage and animals, and once for the solar electricity.

Solar energy has now taken the lead as the fastest growing energy source on the planet while rapidly becoming the least expensive form of energy, ever. This means just one thing: we are going to see a lot more solar!

Ground mounted solar farms are commonly built on rural, relatively flat farmlands. Studies show that constructing solar farms on just 1% of the world's farmland is enough to generate electricity for the entire planet.

But hey, what about all that farmland being taken out of production? That's where the growing trend (pun intended) of combining agriculture with solar photovoltaics comes in. And it works!

This is a true win-win: the production of some crops can be improved when grown under solar panels, soil water retention is increased while "solar grazing" reduces the maintenance on solar farms,

increasing revenues for all parties while reducing the environmental impacts of both.

SOLAR GRAZING

It can cost real money to keep the vegetation under control in solar farms: as grass grows it can shade solar panels, reducing energy production. Herbicides are sometimes used under the panels where it is hard to mow, and mowing between the rows of panels can damage the panels.

Solar grazing to the rescue! Solar grazing is the practice of allowing livestock to graze under and around solar panels, with sheep being the most common grazers used. Farmers are contracted to supply and manage the sheep, providing farm income, while costs to maintain the solar farm are reduced.

Sheep enjoy eating many types of weeds and invasive species and are well suited to grazing underneath the panels where it is difficult to mow.

The solar panels provide the sheep shelter from rain, wind and direct sunshine on hot days, and the solar farm's perimeter fence contains the sheep and protects them from predators.

Solar farms require very little maintenance, so repair crews usually visit only a few times each year. A shepherd visiting more regularly can spot problems and report them to the solar farm operator, another benefit.

Sheep manure increases the fertility of the solar farmland, and specific seed mixes are now being used to improve vegetation for grazing (and also for bee keeping, another great solar/agri combo).

CROP AGRIVOLTAICS

Agrivoltaics involves combining crops with solar panels. The plants are protected from the worst of the midday sun, and in turn provide evaporative cooling under the panels. This cooler microclimate improves panel efficiency (they like to run cool) while protecting the plants from sunburn and dehydration. Plants grown under the panels require less water.

The end result: a better crop yield and more efficient performance of the solar array

For the farmers, they can farm and use the same space to generate income from solar electricity production. Essentially, having solar panels on the same land where crops are grown allow the growers to

harvest the power of the sun twice: once for the crop and once for the solar energy produced.

The solar farm's energy production also improves. A study by the Oregon State University College of Agricultural Sciences has shown that panels positioned above plants produce up to 10% more electricity.

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DUAL FARM INCOME

Of course the panels have to be raised higher to provide growing and equipment space, and this will increase costs, but overall the dual incomes, crop plus electricity, make up for it.

Using some of the solar energy to power electric tractors and other farming equipment also reduces farming costs.

Agrivoltaic crops now being tried across Europe and North America include wheat, potatoes, celery, blueberries, raspberries, strawberries and grapes, but that list is growing rapidly.

Water, energy and agriculture are the foundations of our modern civilization. The rapidly growing fields of crop agrivoltaics and solar grazing reduce the use of water, supply energy to run the farm and provide additional revenue while improving food production, and for a solar farm, higher energy production, reduced environmental impact, reduced operating costs and better public acceptance.

Yes, solar farms really can be farms!