



Doubling up crops with solar farms could increase land-use efficiency by as much as 60%

by Emma Bryce | Dec 1, 2017

What if we grew crops beneath a swarm of levitating solar panels—thereby using the same area to farm food *and* generate renewable energy?

This isn't just a hypothetical concept: researchers from the University of Hohenheim are currently testing the idea, alongside farmers, and a local energy utility company, on a life-size research plot in Germany. The concept is based on a technology called **agrophotovoltaics (APV)** which has actually existed for about four decades and is now gaining footing, with trials of the technology underway at **many farms** around the world.

On the plot in Germany, for the past year the research team has been growing swathes of potatoes, wheat, celeriac and clover grass, above which there are 720 solar panels,

held aloft by huge scaffolds that stand in the fields. The solar panels are bifacial, enabling them to detect sunlight and produce energy from both sides, so sunlight that's reflected off the ground isn't wasted.

The inherent risk posed by this set-up is that the shade cast over the crops by the solar panels and scaffolding could reduce yields. So to test the effects, the researchers have also established a control plot alongside the solar farm: here, the same crops are being cultivated, but without the solar panels casting shade across their growing area.

Based on comparisons between the two plots of crops after one year, the researchers have gathered their first insights into how well the system is working. Some crops, it seems, are faring better than others. For instance, clover grass experienced only a 5.3% dip in productivity under the solar panels, whereas for potatoes, celeriac, and wheat, the losses were higher—hovering around 18 to 19% as a result of the shading.

But despite this, the researchers report that the yield from the farm still made a profit. And what's more, the solar panels offset some of the costs of farming, by generating energy to power the farm's electric vehicle fleet and its crop processing plant. Overall, the researchers calculate, the dual-use farming system increased land-use efficiency by 60%.

The benefits of this system aren't just that it drastically cuts land use, but also that it could solve another growing problem: the use of valuable land to grow non-food biofuel crops, which can threaten food security. If on-farm solar panels could supplant the need for biofuel crops, more land would be left available to grow food, instead of being used solely to produce fuel.

But the project is still in its infancy. In the future, the German researchers plan to test other crops to see how they fare under this system. They're also looking into how differently-structured solar panel systems could reduce the shading area on crops. "If the APV system proves itself," says Sebastian Sladek, who is involved in the project, "we are hoping [it] will overcome the present 'either/or' situation, by achieving both power generation and agricultural yield."

Source: University of Hohenheim

Image: **Weihenstephan-Triesdorf University of Applied Sciences**