

Sundrive Farm

Agrivoltaics



Fig 1: Agrivoltaic infrastructure

It has long been known that there is an inverse correlation between the temperature of a solar panel and its electricity production: the cooler the panel, the higher the electricity output. In the case of the heat island effect – the phenomenon in which urban centers have higher temperatures than less built-up or undeveloped areas – it has also been observed that identical solar panels produce less electricity in urban areas.

Based on this knowledge, the question arose as to what extent it would be possible to install solar panels on agricultural land. Research on several prototypes showed that **not only did the solar panels generate increased yields, but they also had a positive effect on the growth of the underlying crops.** Shade-tolerant crops – such as potatoes, broccoli, radishes, and lettuce – require only 4 to 6 hours of direct sunlight per day. Any additional light can actually damage the plant and unnecessarily dry out the soil. Because the excess sunlight was captured by the solar panels, the daily average of sunlight received was closer to the crop’s optimal standard.

At the same time, the evapotranspiration of the underlying crops cooled the solar panels, resulting in higher electricity production. Solar panels installed on agricultural land can produce up to **10 to 15% more electricity** compared to solar panels on a roof in a built-up area.

Drip irrigation and fertigation



Fig 2: Agrivoltaic infrastructure with drip irrigation



Fig 3: Drip irrigation

Sundrive installs drip lines on the field. These lines are connected to a water tank in which fertilizers can be dissolved. Through the drip lines, the crops receive their water and nutrients, providing them with a more consistent supply of both. We equip the underside of the solar panels with a gutter, allowing part of the rainwater to be collected and stored locally. The captured rainwater is stored in a rainwater tank from which the drip lines originate. The drip lines are equipped with a pump controlled by a network of moisture sensors in the soil.



These sensors continuously monitor the condition of the soil and supply water and/or nutrients at the exact moment the crops need them. This results in both the automation and optimization of the agricultural process.

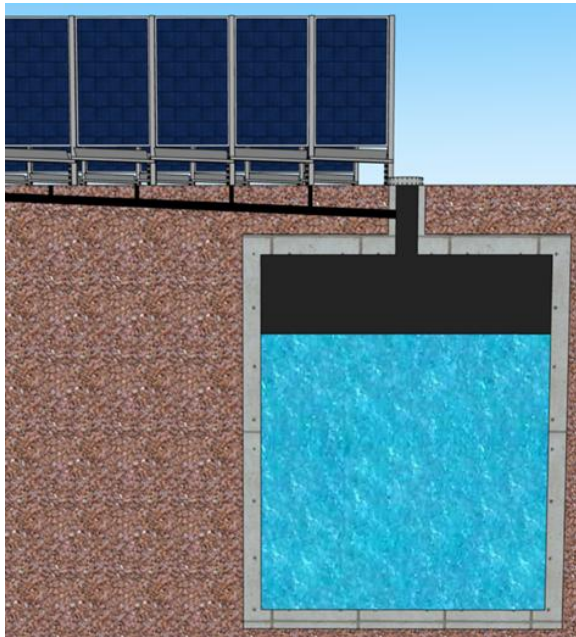


Fig 4: Rain water storage at a Sundrive Farm



Fig 5: Reflective gutter

The gutter underneath the solar panels is an aluminum plate bent into a V-shape. This design reflects incoming sunlight back onto the solar panels, making the gutter function as a reflector at the same time. This results in an additional increase in electricity production.



Fig 6: Results of a comparative experiment between conventional agriculture and fertigation on onions

Fertigation has the following benefits:

- ✓ Increased yield: **20 - 50% more biomass**, depending on the crop.
- ✓ **50% less water consumption.**
- ✓ **30 - 60% less nitrogen emissions.**
- ✓ **Decreased GHG-emissions:** Fertigation eliminates the need for deep tilling, allowing the CO₂ captured by the crops to remain stored in the soil.
- ✓ **Soil recovery:** Fertigation eliminates the need for plowing, allowing the soil structure to recover. This reduces the risk of erosion and restores the soil's water absorption capacity, making it more resistant to prolonged rainfall.



Agriculture vs & biodiversity

By installing solar panels on fields, part of the land surface becomes unusable for cultivation. Sundrive aims to dedicate this portion of the infrastructure to serving nature. Specifically, we plan to use this area to help restore local biodiversity in a targeted way that also benefits agriculture. This will be achieved through the following two measures:



Fig 7: Protective plants under the solar panels

Protective plants

By introducing soil-supporting plants such as marigold, phacelia, and tagetes, soil fertility is improved, leading to better growth of agricultural crops. These plants also provide protection for crops against nematodes and fungi. In addition, they attract beneficial insects such as bees and bumblebees, which support the pollination of agricultural crops. Furthermore, they contribute to natural pest control by attracting predatory insects.

Insect hotels

By providing habitats for predatory insects such as lacewings and ladybugs, these are attracted to the field, where they feed on pest insects such as aphids. In this way, pest control is carried out

naturally, with agriculture helping to restore local biodiversity rather than putting it at risk. These measures also enable farmers to **save on expenses on pesticides**.

An additional benefit for biodiversity is that, even if the farmer chooses monoculture, the presence of additional plants under the solar panels creates an effect on the soil and surrounding nature as if it were not a monoculture.



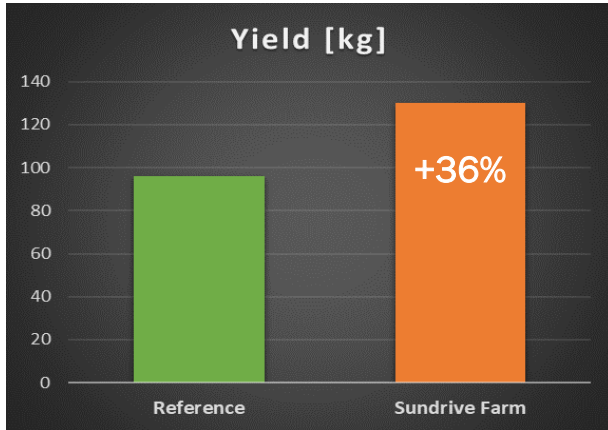
Fig 8: Insect hotel



Fig 9: Biological pest control



Results

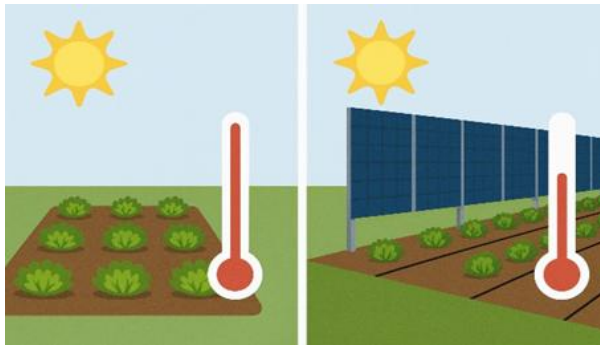


Sundrive and AgrifoodTEF (Test & Experiment facility of ILVO) carried out a small-scale field trial. In this experiment, potatoes were grown on a Sundrive farm and on an adjacent reference field. On the Sundrive farm test field, the first year drip irrigation was applied without fertigation. Results after the experiment? The Sundrive farm gained **36% more yield!**

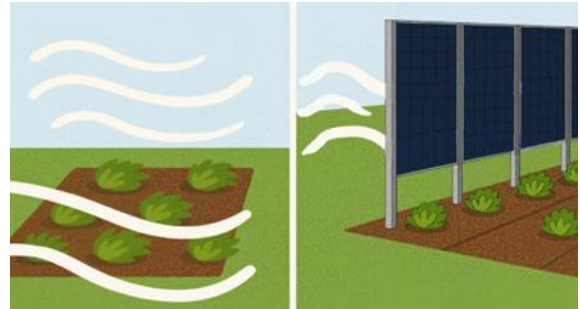
Weather protection

With a Sundrive farm you can **save on your weather insurance**. A Sundrive farm offers protection against:

1. Heat waves



2. Wind



3. Continuous rainfall

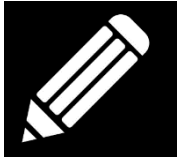


4. Drought





Services of Sundrive



Sundrive is a project developer that manages the construction of agrivoltaic infrastructure from A to Z. **Sundrive takes care of the design, permit administration, preparation, construction, installation, and maintenance of your Sundrive Farm.** We also consistently guide and support our clients in obtaining the various **subsidies** they are eligible for. In addition, Sundrive always prepares a cost-benefit analysis for its clients. This enables our customers to achieve the highest possible return on their investment in a Sundrive Farm. This cost-benefit analysis can also be presented to the bank to support the client in securing the necessary loan. If you are interested in a solar panel installation from Sundrive, you can contact us via the phone number or email address at the bottom of this page. Sundrive responds both to inquiries from farmers who want a solar panel installation that also supports their agricultural operations, as well as from other parties wishing to invest in solar energy, where agricultural land can now be used for energy production. Since a Sundrive Farm contributes to the productivity of the agricultural plot and generates additional savings, the land can be used for energy production at a reduced rent. With a Sundrive Farm, the climate and environmental impact of solar energy is maximized. For all types of clients, Sundrive guarantees the greenest and most sustainable energy possible.



Medegefinancierd door
de Europese Unie

provincie
Oost-Vlaanderen



Fig 10: Sundrive Farm



www.sundrivebv.com



+32 488 25 59 54



info@sundrive-charge.be