



# soltec

Improving yield and system flexibility through Trackers in various applications

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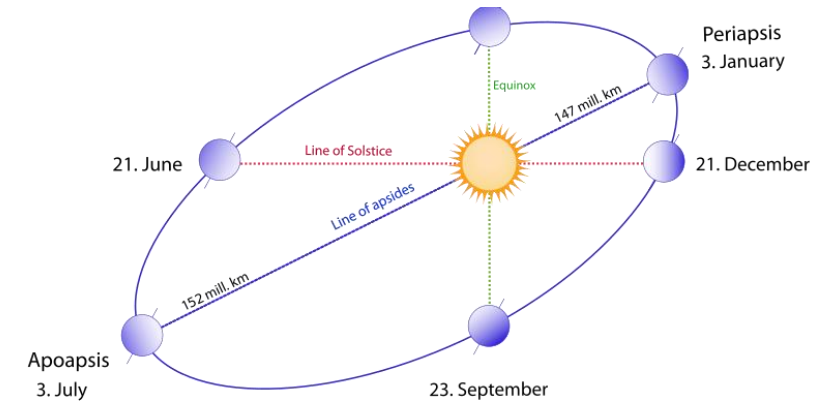
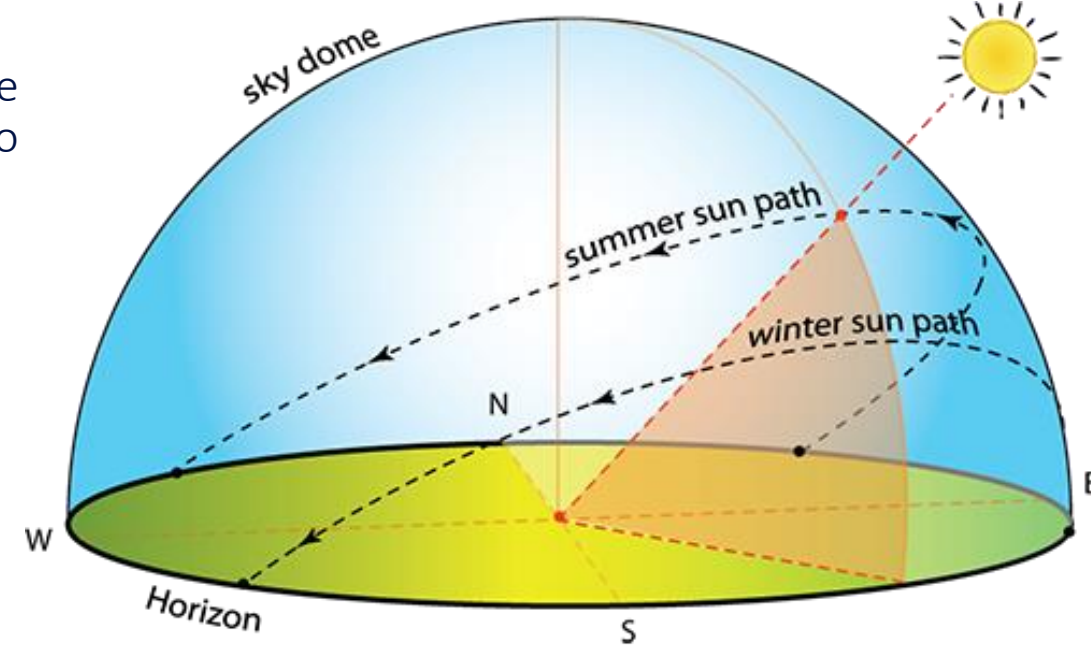
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# Solar Energy

- **Solar Radiation.** Throughout the year, the Sun will emit toward the Earth four thousand times more energy than we are going to consume.
  - Rotational movement: Every 24 hours.
  - Translational movement: Every 365,25 days.
- **Solar Hights.** Angle from the ground.
- **Azimut (A).** Angle from the solar plane with origen to the south.

## Hemisfers.

- **North.** Sun at south, shadows mostly to the north. Larger shadows the 21st of december.
- **South.** Sun at north, shadows mostly to the south. Larger shadows the 21st of june.



# Photovoltaic solutions

- **Fixed structures:**

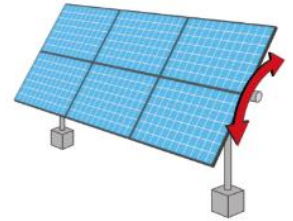
- On the roof or on the ground (tilted structures)
- Low cost, high reliability

- **Solar trackers:**

- Increases production by 15% to 40%, (depending on latitude and time of the year)

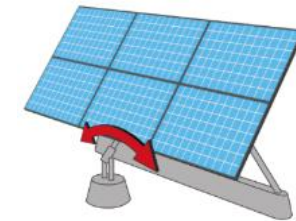
- **Tracker vs. Fixed structures:**

- HSAT (Horizontal single axis tracker) (Tracking E-W, N-S) -> +15%
- Azimuth tracking -> +30%
- Polar tracking -> +35%
- Dual-axis tracking -> +40%



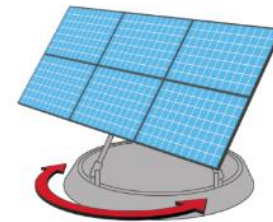
### **Horizontal single-axis tracker (HSAT)**

Rows of modules are usually oriented in north/south line rotating from east to west.



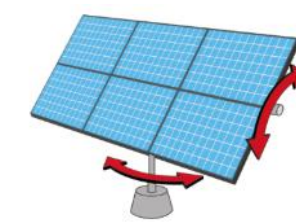
### **Tilted single axis tracking**

The elevation of the axis improves the amount of power to be produced depending on the latitude.



### **Azimuth tracker**

A single tracker that rotates around a vertical axis facing east in the mornings and west in the evenings.



### **Dual-axis tracker**

Rotates around a vertical axis. The elevation drive adjusts the modules to the altitude of the sun.



# Photovoltaic solutions - Ground Cover Ratio

## ▪ 2 axis tracker



## ▪ Fixed structure



## ▪ 1 axis tracker



# Photovoltaic solutions – LCOE comparative

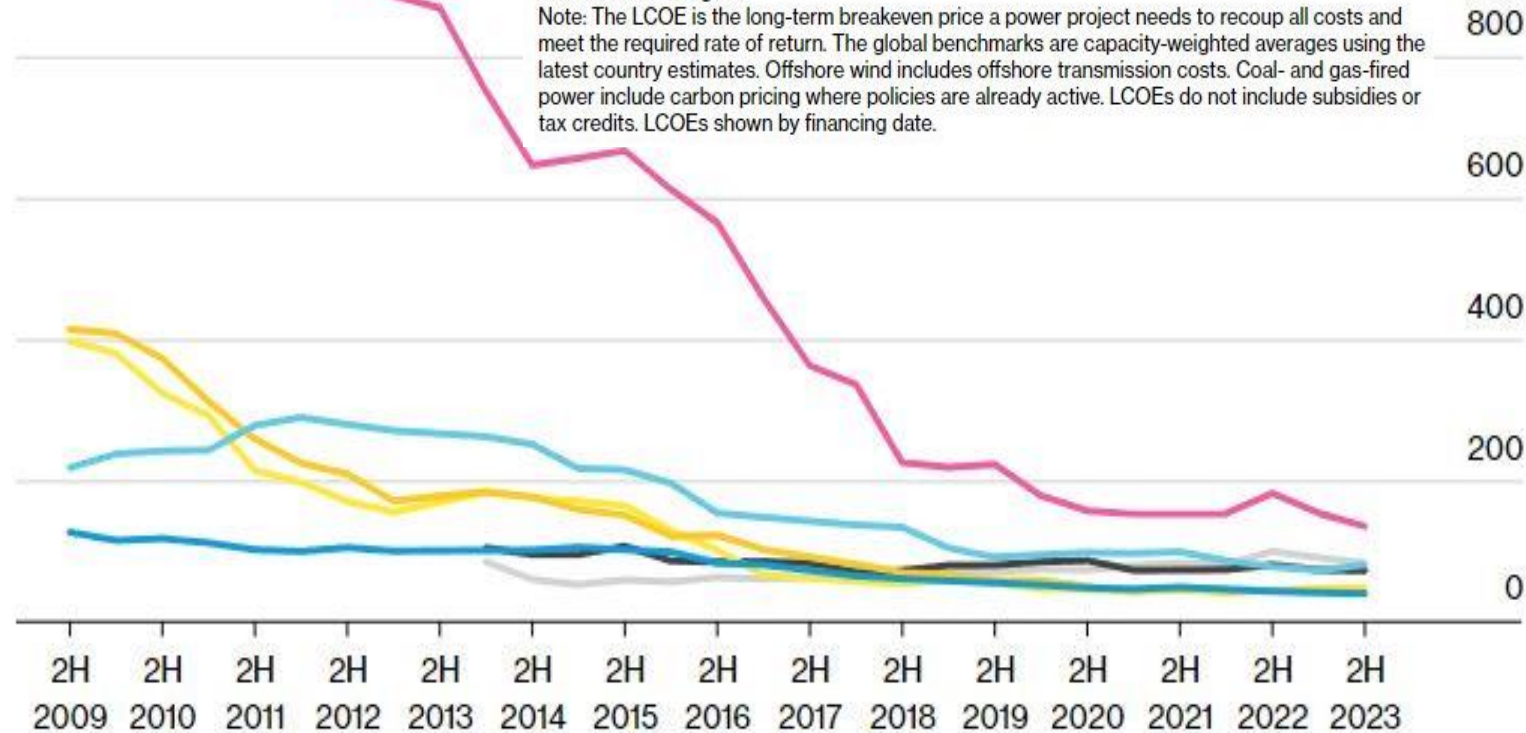
## Global levelized cost of electricity (LCOE) benchmarks, 2H 2023

Onshore wind Offshore wind Fixed-axis solar Tracking solar Battery storage (four hours)  
Coal Gas

\$1,000 per megawatt-hour (real 2022)

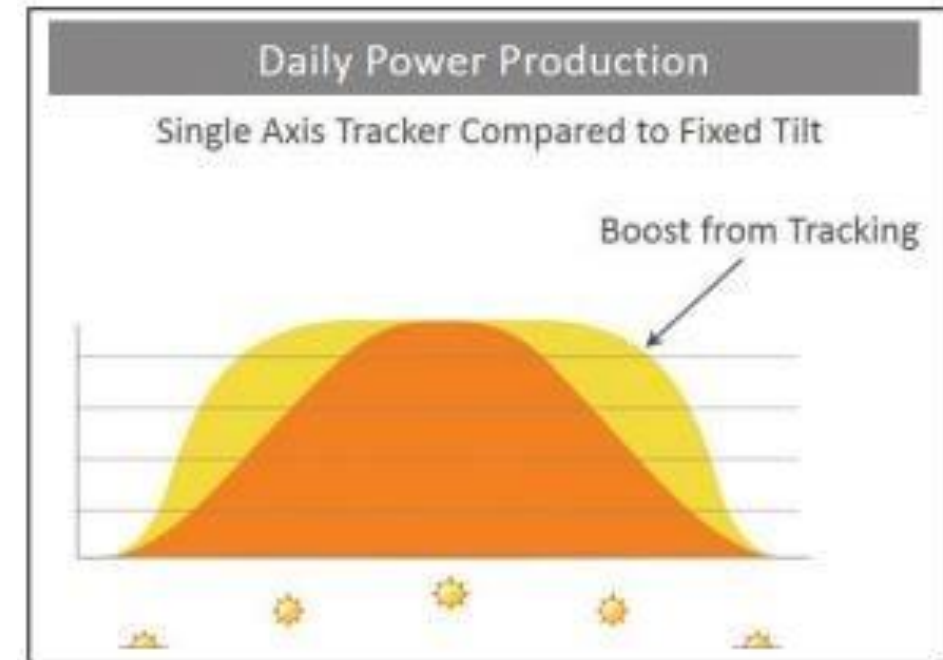
Source: BloombergNEF

Note: The LCOE is the long-term breakeven price a power project needs to recoup all costs and meet the required rate of return. The global benchmarks are capacity-weighted averages using the latest country estimates. Offshore wind includes offshore transmission costs. Coal- and gas-fired power include carbon pricing where policies are already active. LCOEs do not include subsidies or tax credits. LCOEs shown by financing date.

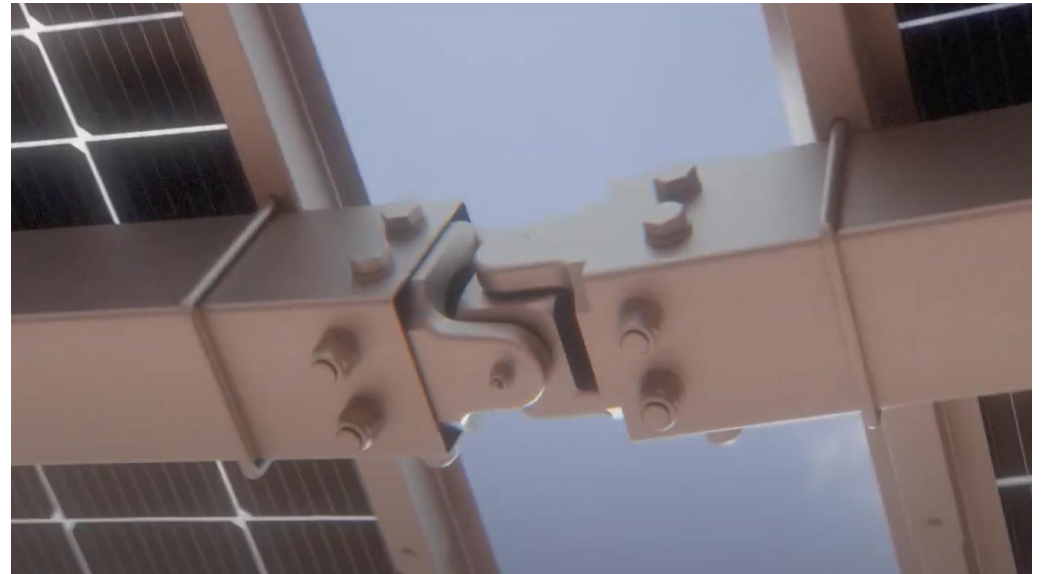
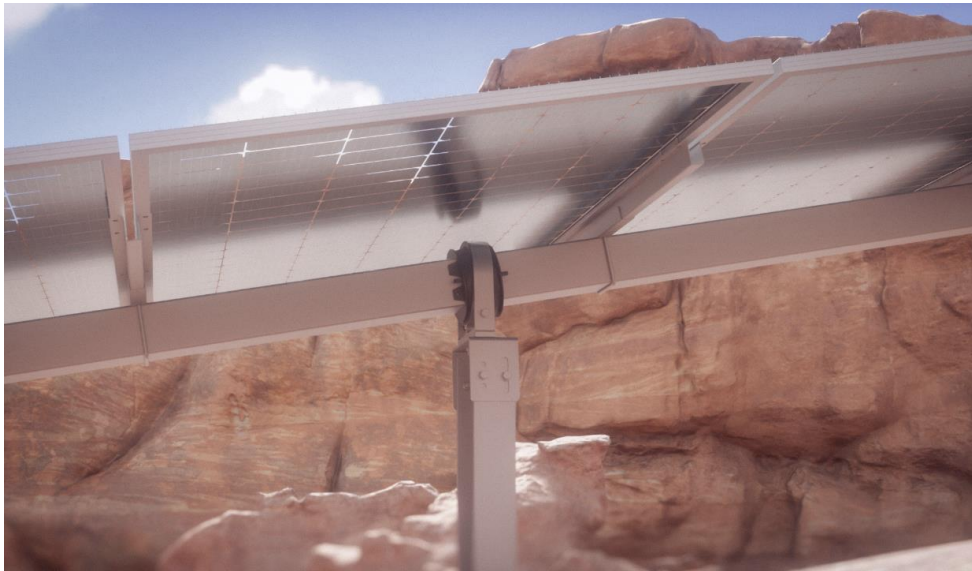
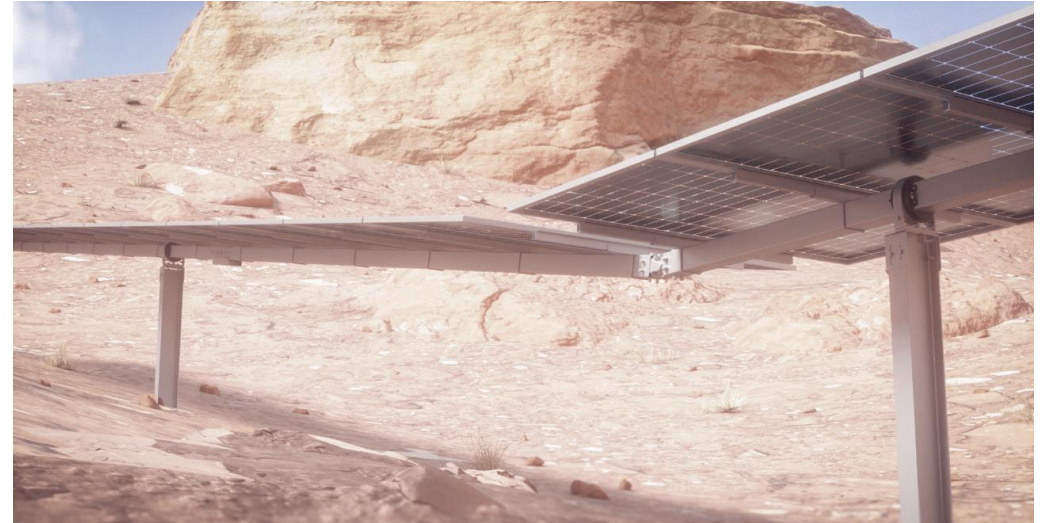


## Fixed vs Tracking

- 30% more CAPEX
- 16-20% more annual production



# Single axis tracking flexibility - Terrains



# Single axis tracking flexibility - Algorithms

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## ➤ BOOST – PRODUCTION OPTIMIZATION

BACKTRACKING

+2%

DIFUSSE RADIATION

+0,8%



## ➤ SHIELD – DEFENSE ORIENTED

SNOW & HAIL

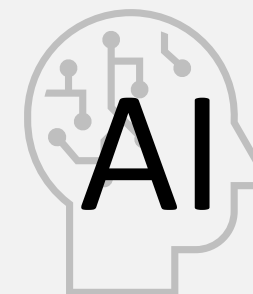
FLOOD



## ➤ MAINTENANCE – REDUCE OPEX COSTS

RAIN CLEANING

FACE2FACE FOR MACHINERY



**Agility in commissioning** through the application of machine learning techniques, making our fields much faster to commission.

**Predictive maintenance** Early detection of tracker failures by using neural networks trained to identify tracker failures before they occur based on the telemetry incorporated in our electronics.

**Digital models** to improve the efficiency of our clients' plants.

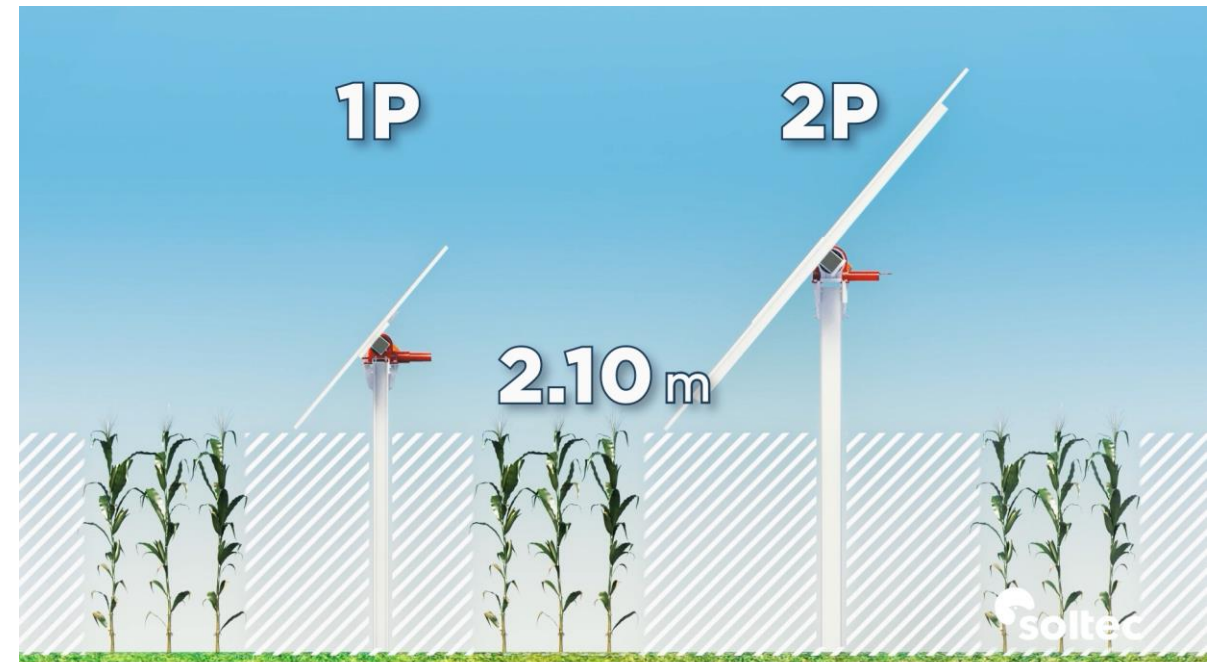
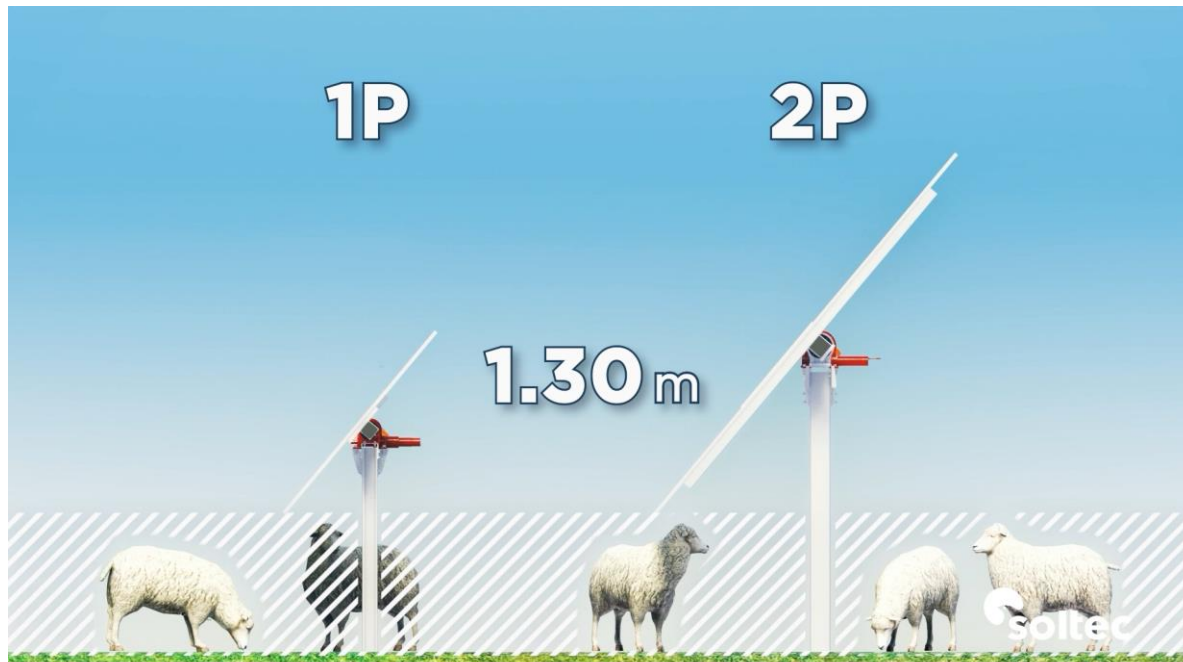
**Increasing the capabilities of our safety algorithms** in the face of weather events with the application of classifiers that, together with prediction services and sensors, offer more refined information when establishing a risk mitigation strategy.

# Single axis tracking flexibility - AgriPV

## Why AgriPV?

**AgriPV** brings together the best of both worlds: **agriculture** + **renewable energy**. Designed to seamlessly integrate with your land, our solar trackers enable **crops to thrive, livestock to graze freely, and machinery to move without obstruction**.

At Soltec, we tailor our systems to meet the **specific requirements of each country's regulations**. The **advanced AgriSun functionality** allows clearance to be adjusted **from 0.50 m to 1.30 m for livestock and up to 2.10 m for crops**.



# AgriPV - Soltec AgriSun trackers

## Smart Modes

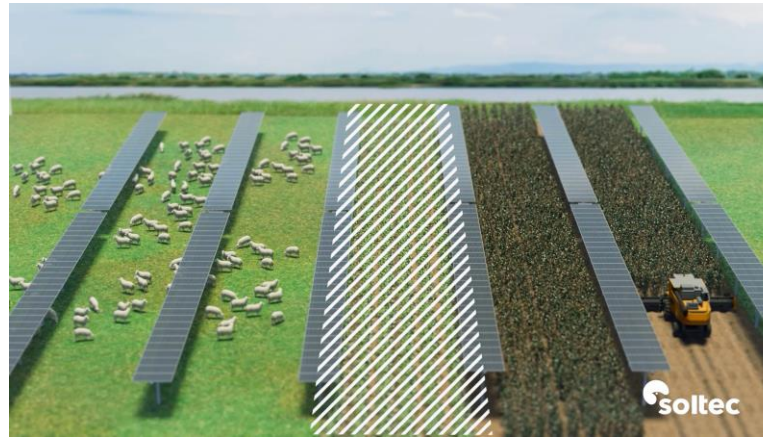


### Livestock Mode



When combining **Livestock + PV trackers**, production increases by **14%** if compared with fixed tilt.

### Crops Mode



When combining **Crops + PV trackers**, production increases around **12-13%** if compared with fixed tilt.

### Machinery Mode



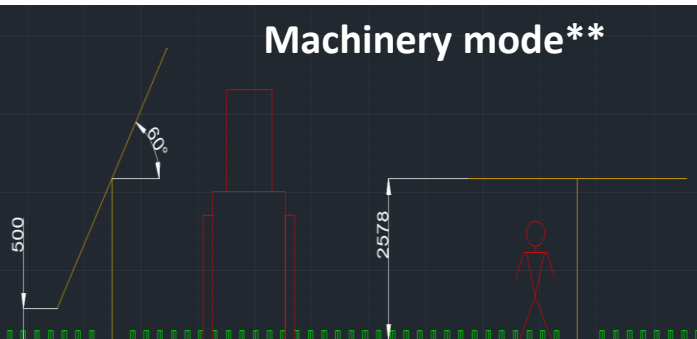
# AgriPV - Soltec AgriSun trackers

## Study Case 1: SF7 vs. Advanced Agro with vegetables (lettuce)


SF7 with tracking angle of  $\pm 60^\circ$



Machinery mode\*\*



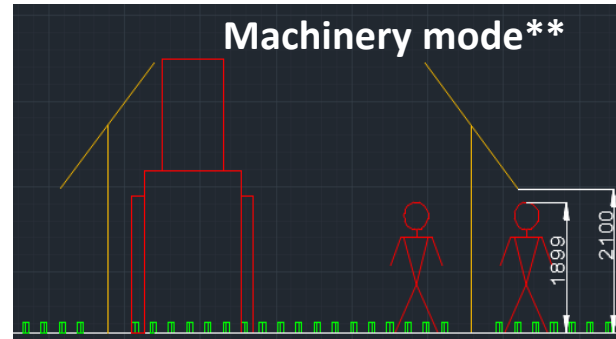
Tracker produces **13,3% more** than fixed tilt -  
> 17986 MWh/year.

Not comply with advanced AgriPV regulations 

SFOne AgriSun with *Sharing the Sun mode\**



Machinery mode\*\*

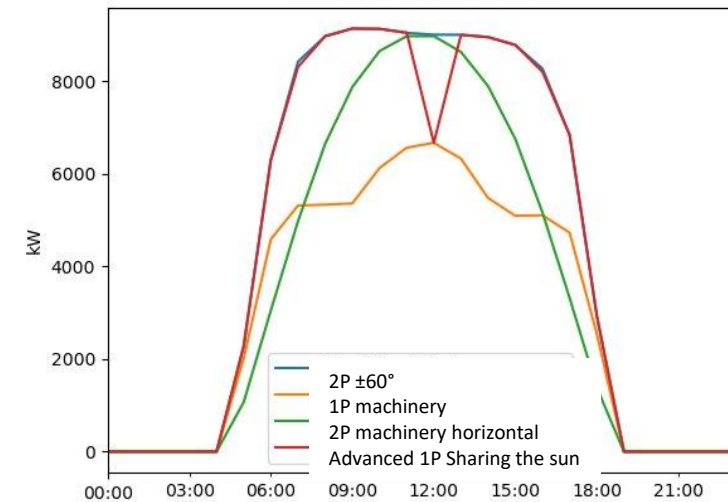


Tracker produces **12,4% more** than  
fixed tilt -> 17843 MWh/year

*\*Sharing the Sun mode* adjusts the panel tilt to maximize sunlight exposure for plants.

*\*\*Just rows of trackers in which the machinery is present, are set to maximum or horizontal tracking angle.*

Modes for CASES 1 and 2



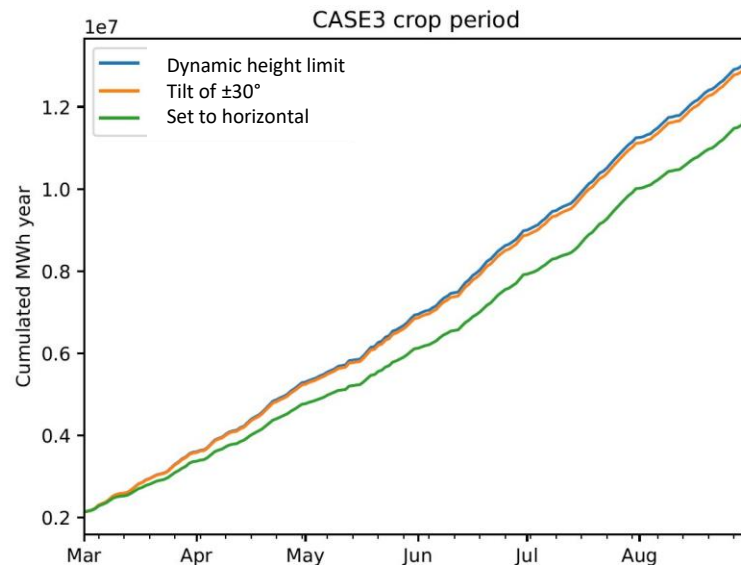
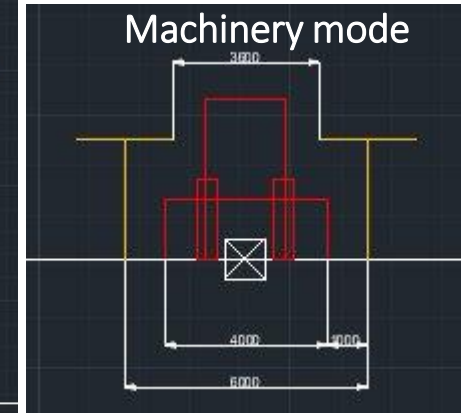
SF7 with tilt  $\pm 60^\circ$  produces 0,74% more than Sharing the Sun 1P.

Trackers produce 1,5% less if the machinery mode in advanced 1P is set to all trackers.

# AgriPV - Soltec AgriSun trackers



Study Case 2: Advanced AgriSun adapt their tilt progressively to match crop height (corn)



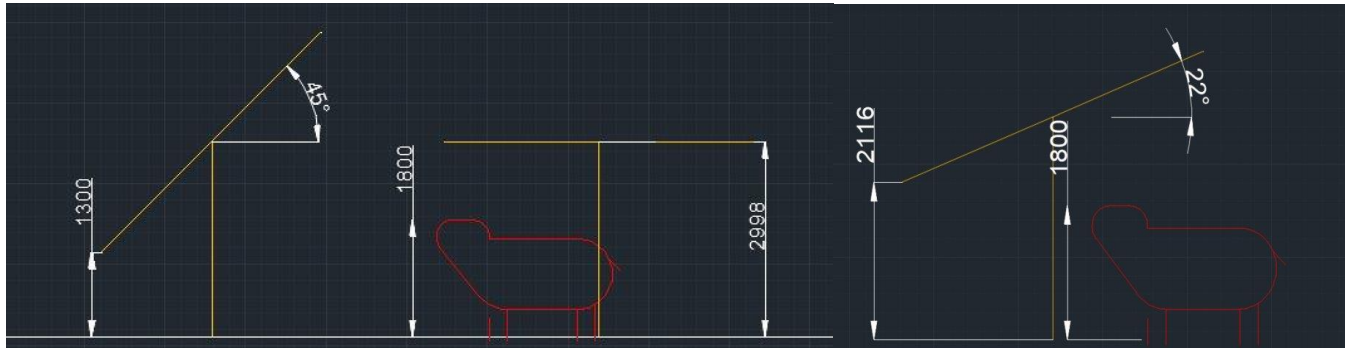
- **Tracker produces 13,5% more than fixed tilt -> 18017 MWh/year.**
- **AgriSun tracker with adapted tilt to crop height produces 1% more than trackers with not adaptation (tilt of  $\pm 30^\circ$ ).**



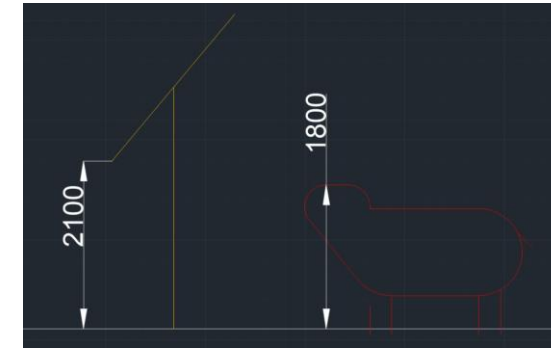
# AgriPV - Soltec AgriSun trackers

## Study Case 3: Advanced SF7 vs SFOne AgriSun for livestock (cows)

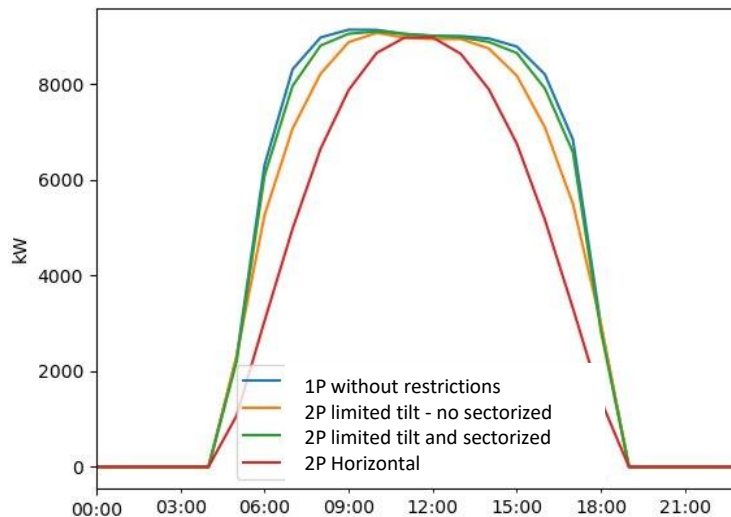
### Advanced SF7 with tilt of $\pm 45^\circ$ (1,3m clearance)



### SFOne AgriSun



Modes for livestock



- Tracker produces **13,2% more than fixed tilt** -> 17976 MWh/year.
- SFOne AgriSun trackers produce 1% more than 2P.
- During **normal operation**, trackers are set to  $\pm 45^\circ$ . When cows are present, trackers **tilt is  $\pm 21^\circ$**  to ensure 2,1 m clearance. If it is set to **horizontal position**, the productions is **reduced by 1%**.
- If trackers adapt to the **presence of cows in subdivision areas**, they produce **6,73% more**.



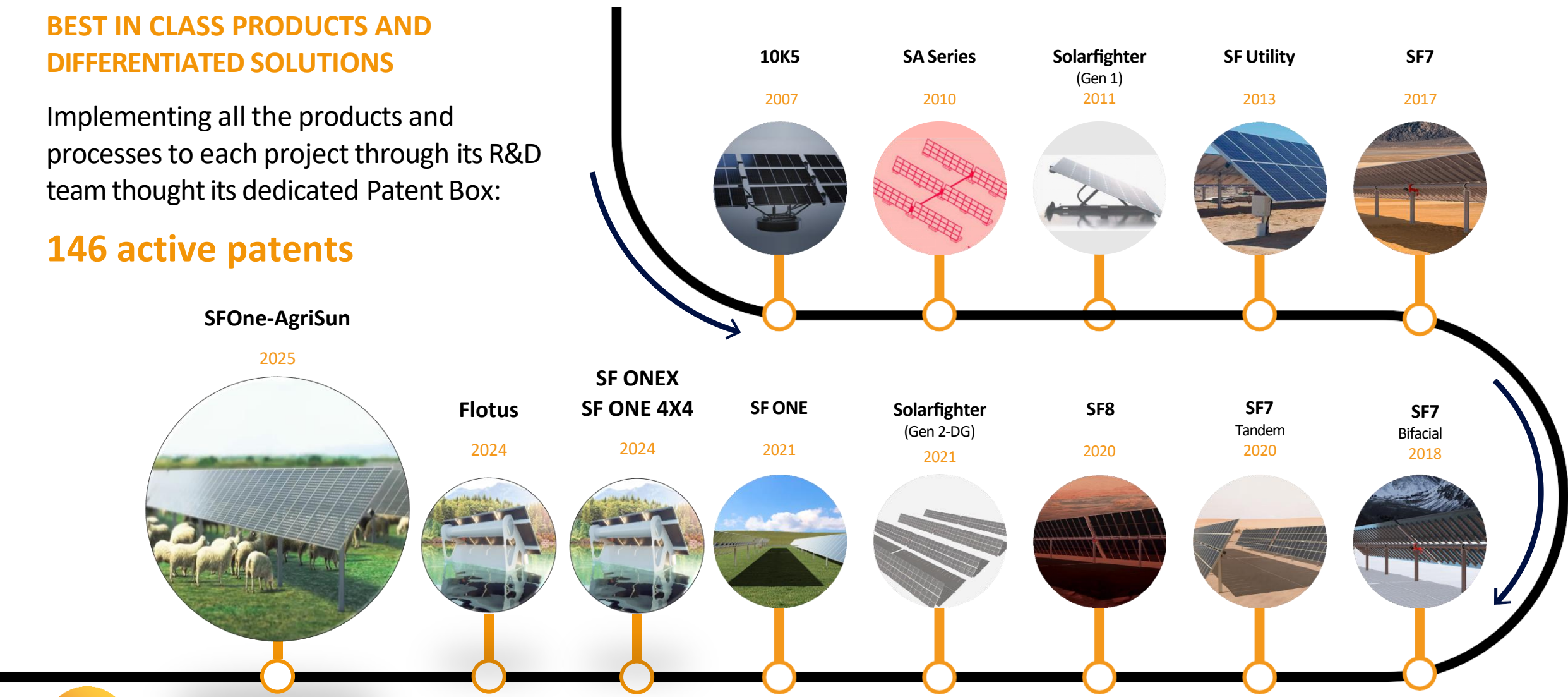
# Soltec trackers Evolution



**BEST IN CLASS PRODUCTS AND  
DIFFERENTIATED SOLUTIONS**

Implementing all the products and  
processes to each project through its R&D  
team thought its dedicated Patent Box:

**146 active patents**





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