SunSeed APV

Harvesting the Sun . . .twice`

Potential of AgroPV in India

Socio-Economic Prospects

Sustainability - India

India has 16% of global population | 2.4% of the land | 4% of global fresh water | Ranked 5th in global Climate Risk Index –Germanwatch

Land availability

-Decentralized renewables getting cheaper & compete for land with food production

Climate Change

-Impacts food, energy and water security

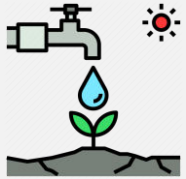
Higher temperatures and extreme weather events

Loss of arable land due to desertification

Energy Security

-Low penetration of low-cost renewable energy sources

IEA estimates 800 GW additional power needed by 2050



Water Security

Depleting aquifers with increased water alkalinity

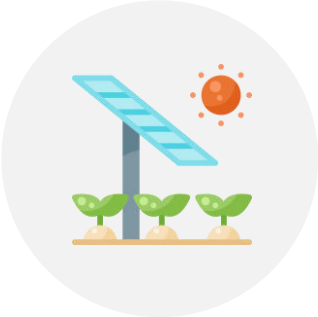
Reduced land productivity due to single crops in many arid regions

Food Security

-Higher temperatures leading to reduced crop quality & yields

As per CRIDA 4-5% impact on Agriculture each year

Agrivoltaics Solution for India



Dual use of Land

Farmland for both food and electricity

Mounting Structure Supports trellis crops

Higher Crop Yields

Controlled shading increases crop yields & arable land

Crop resilience to climate change

Higher Energy Generation

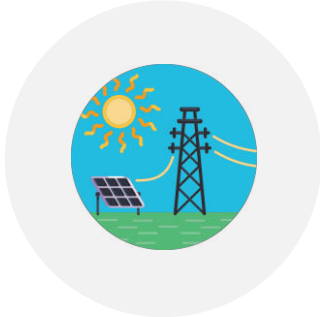
Panels up to 9 °C cooler leading to higher efficiency

Increased bifacial gain via high panel clearance & lower GCR

Water Savings

Up to 30% saving via lower evapotranspiration

Brings marginal land into farming

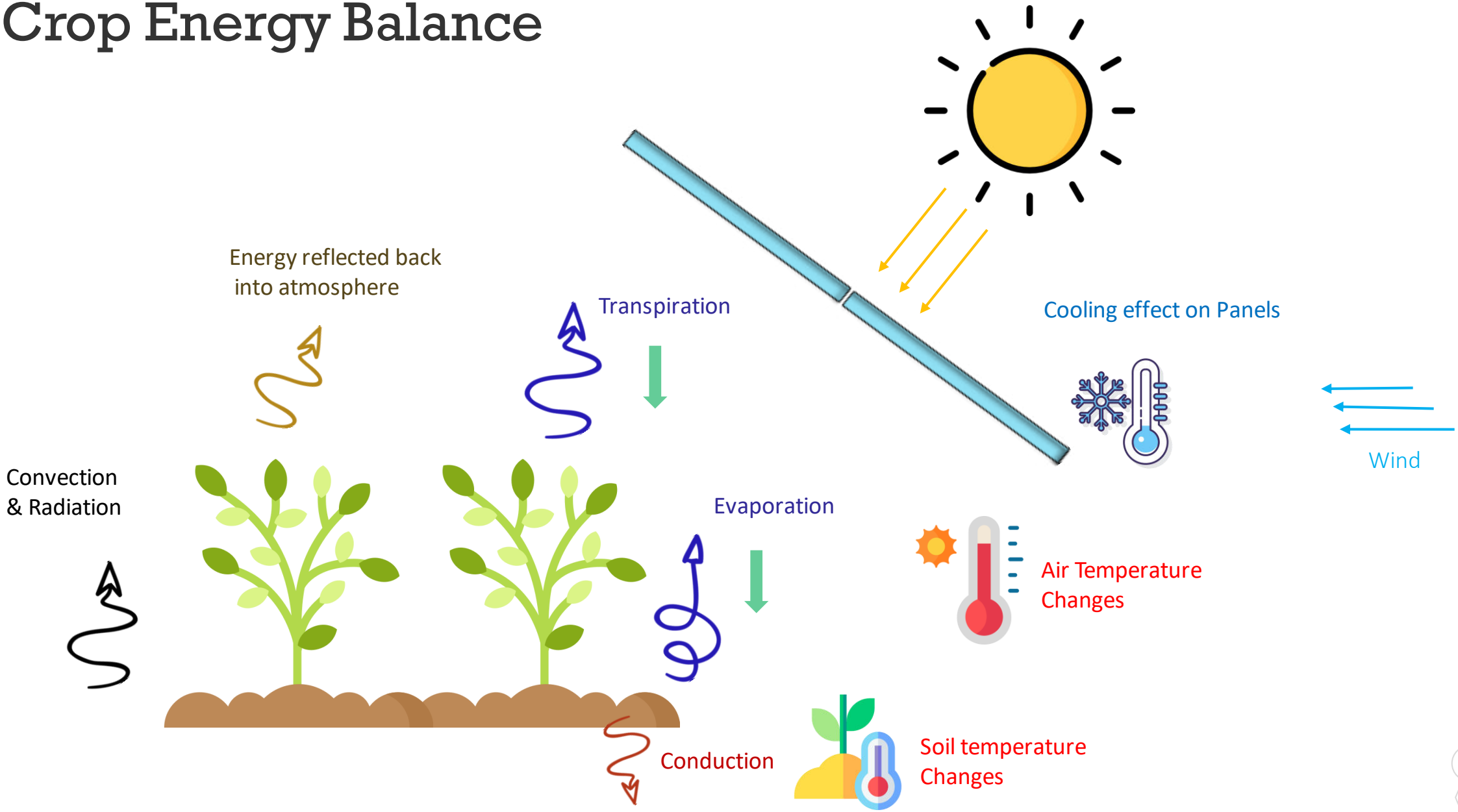


Energy Access

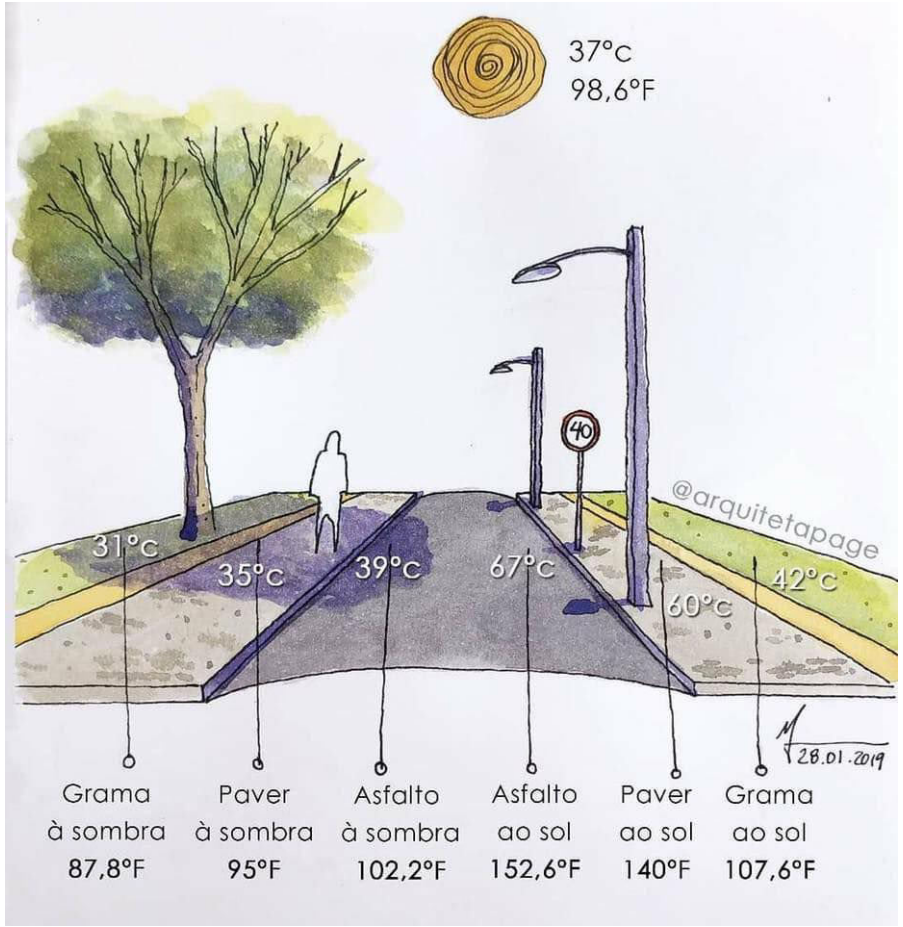
Makes distributed power available to the rural economy

Reduces need for grid infrastructure

Crop Energy Balance



Microclimate – Effect of Shade



The Microclimate of a farm has an effect on multiple physiological processes thereby significantly affecting the crop growth & yield. The most important parameters are:

Air temperature

Surface temperature

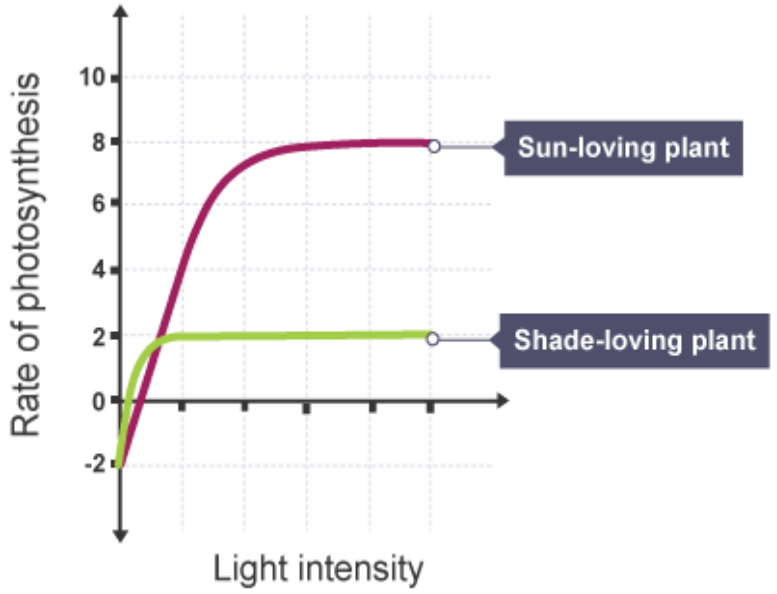
Processes Affected:

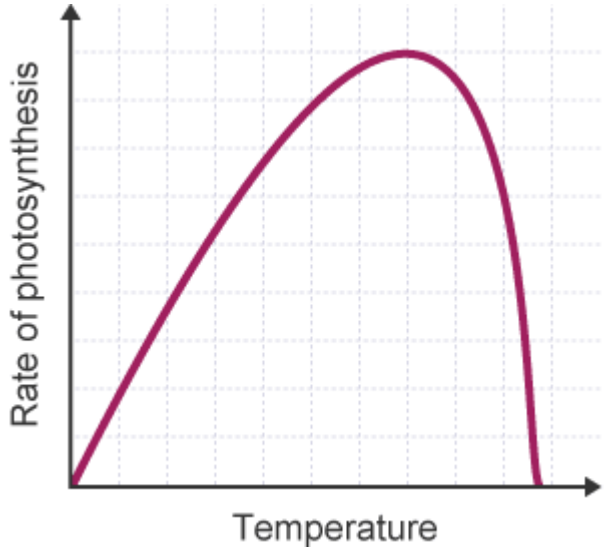
- Rate of photosynthesis
- Flowering
- Nutrient absorption via roots
- Quality of fruits

Photosynthesis – Effect of Light & Temperature

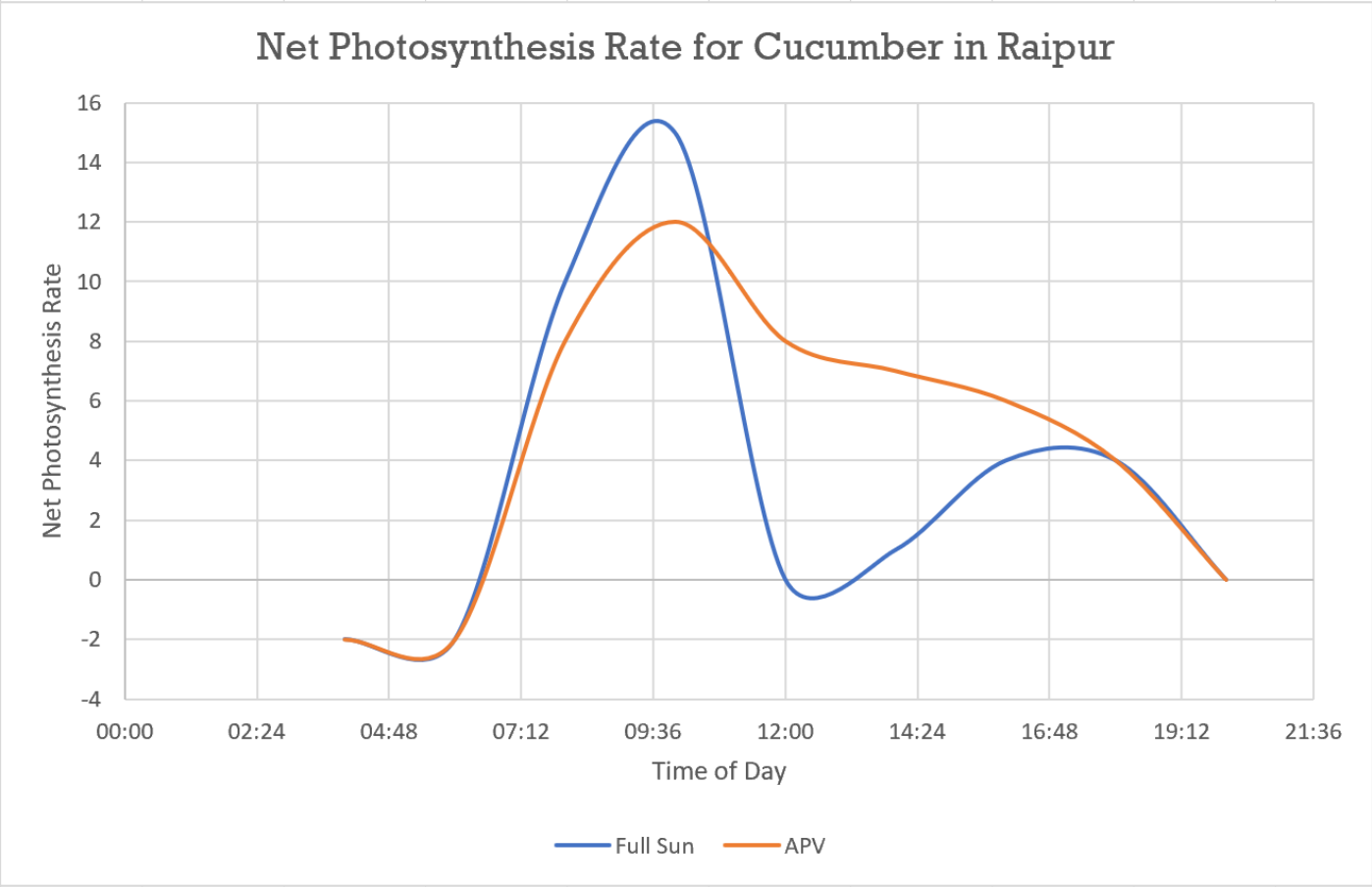
Carbon dioxide + Water —(Light, Chlorophyll)→ Glucose + Oxygen

$6\ CO_2 + 6\ H_2O \xrightarrow[\text{Chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6\ O_2$





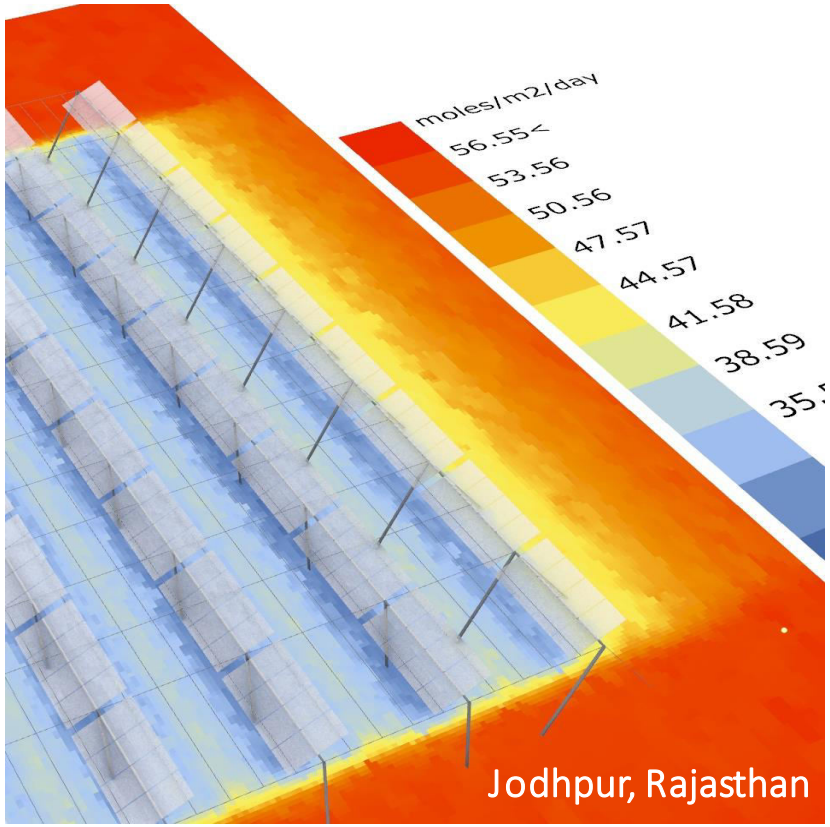
Photosynthesis – Sun Vs Shade



Crop	Optimum Temp (C)
Wheat	20-25
Rice	30-33
Tomato	21-24
Cucumber	17-22
Ginger	23-29

Light Requirements of Crops

Daily Light Integral of Photosynthetically Active Radiation (PAR) on the ground



Crop	DLI (moles/m2/day)
Grains	40-50
Tomatoes, Cucumbers	25-30
Green Leafy Vegetables	12-17
Herbs	10-15
Microgreens	6-12
Peppers	20-25

Farming Model – Additive Intercropping

Innovative farming models involving complex crop biophysics & agroecology fundamentals growing two or more vegetable crops simultaneously on the same land.

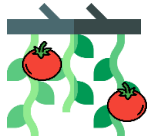
Higher Radiation use Efficiency

Crop Diversification lower risks

Water Savings

Soil Fertility

Higher Crop Yields and Ecological Sustainability



No Sunburn

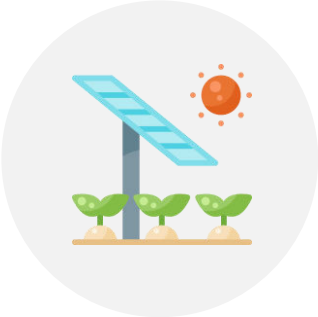
Higher Leaf Area Index

Offseason Growth

Economic Value Proposition – Solar Developers

- Capital Costs 12-15% higher
- Agriculture profits 1.25-1.75 lakhs per acre
- Synergies in civil infrastructure, mounting structure and panel cleaning
- Synergies in Panel cleaning costs
- Potential increase in solar generation – panel efficiency & bi-facial gain
- Adds up to a 3-4% higher return on equity

Socio-Economic Benefits



Dual use of Land

Farmland for both food and electricity

25 million acres of vegetable farms = 5000 GW

1000 GW additional energy needs by 2050

Higher Income for Farmers

Lease of land

Employment in farming

Risk free income

Thriving rural economy

Increase in Agri Productivity

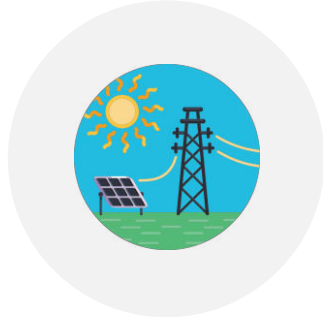
Increase in Agri exports – better balance of trade

Reduction in various farm subsidies

Water Savings

Up to 30% saving via lower evapotranspiration

Brings marginal land into farming

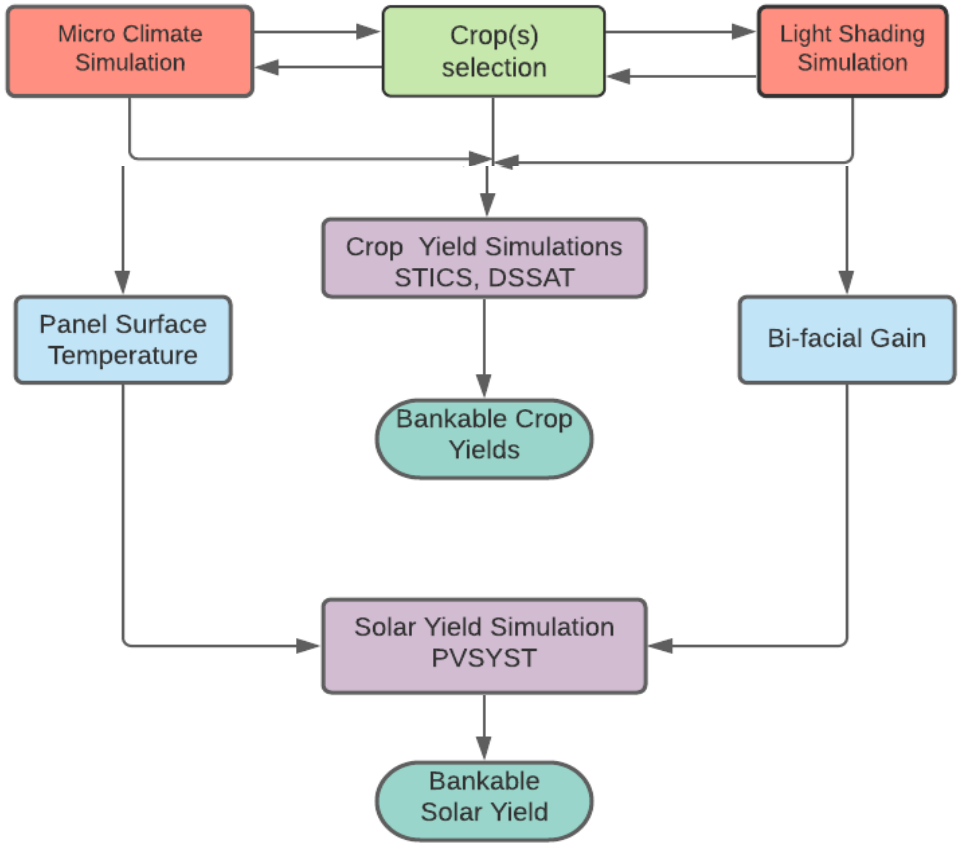


Energy Access

Makes distributed power available to the rural economy

Reduces need for grid infrastructure

Technology Platform - Yield Modeling Simulation



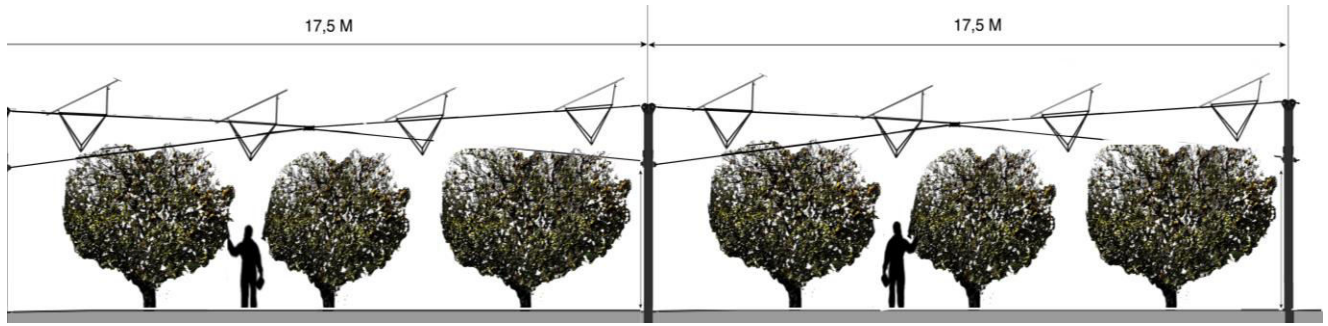
On-Going Operations

- Farming ops
- Solar O&M
- Agri Sales

Crop growth data from SunSeed installations will feed into a database. Once there is sufficient data, AI & ML techniques would be used to predict APV crop yields

Lightweight Cable Technology Mounting Structures

Cost 25-30% less than conventional structures of similar specifications



- Utilize “wire-rope” trusses – often used for retractable stadium roofs and suspension bridges
- Wind Tunnel Design compliant
- Economic Spans up to 20 m can be achieved – in tune with heavily mechanized farms and high clearances of 4-5m
- The wire ropes support the electrical cables and the trellis nets for supporting the crops
- Easy to construct system with unique foundations that do not require soil harming concrete piles

1MW project – Rajasthan, India

2.5 MW project – Punjab, India

Thank You

Vivek Saraf

+91 9717008910

Vivek.saraf@sunseedapv.com

www.sunseedapv.com

Co-founder & CEO