友巨新能源
HUGE ENERGY

Agri-PV / Agrivoltaics

The Future of Farming

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CONTENTS

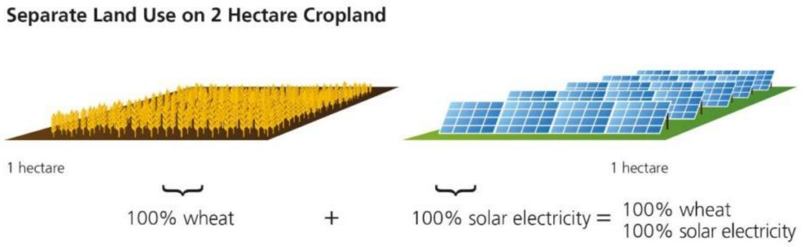
PART 01 Introduction

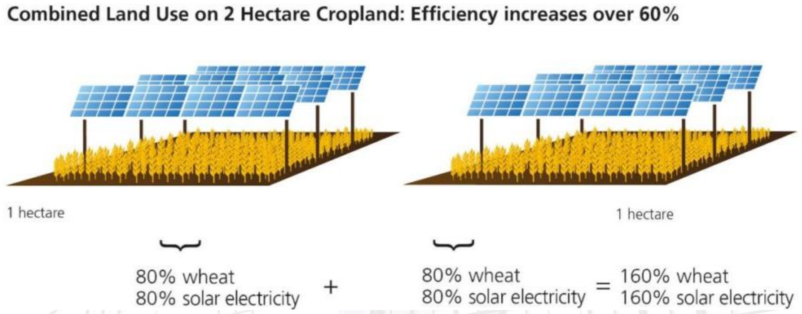
Introduction

Agrivoltaics (agrisolar/agri-PV) is the simultaneous use of areas of **land for both solar panels and agriculture**. It is important for decarbonization as less barren land is available.

Because solar panels and crops must share the sunlight, **the design of agrivoltaic facilities may require trading off** such objectives as **optimizing crop yield, crop quality, and energy production**. In some cases crop yield increases due to the shade of the solar panels mitigating some of the stress on plants caused by high temperatures and UV damage.

The technique was originally conceived by Adolf Goetzberger and Armin Zastrow in 1981. Agrivoltaics can refer to different methods of combining crops with solar panels: crops and solar side by side, solar above crops, and greenhouses made of (semi-transparent) PV panels.





Benefits

Energy

Agriculture

There are many **benefits** for the co-location of PV and agriculture:

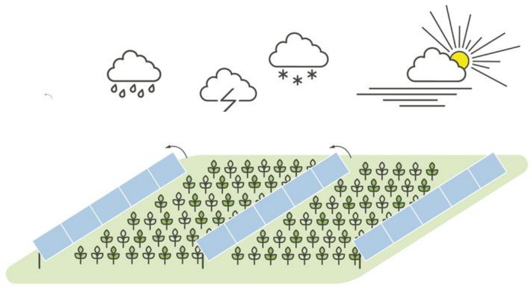
Income Diversification	Food Production	Efficient Water Consumption	Improved Renewable Energy Production
• Profit from investment in solar energy overcompensates for the reduction of crop yield.	• In some cases crop yield increases due to the shade of the solar panels. • Based on climate change and increasing drought and extreme weather events, agrivoltaics offers key advantages such as the protection of crops from drought and damage caused by hail or heavy rain.	• PV arrays help reduce water evaporation.	• The agrivoltaic PV arrays were cooler by approx. 9°C during the day thanks to the plant-based understory, allowing for better performance.

Agri-PV System Designs

➢ **Interspace PV**

With interspace PV, crops grow between large-spaced, ground-level rows of module rows, making room for machinery to pass through.

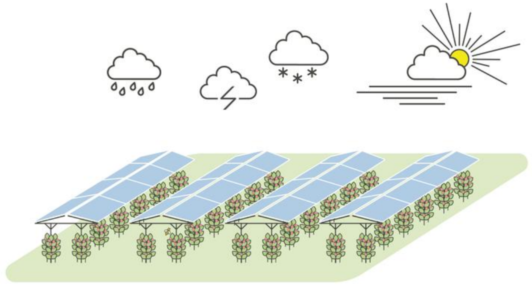
Source: https://www.baywa-re.es/en/solar/projects/agri-pv#interspace-pv



➢ **Overhead PV**

With Overhead PV, crops are cultivated underneath elevated solar modules.

Source: https://www.baywa-re.es/en/solar/projects/agri-pv#overhead-pv



➢ **Greenhouse PV**

There are some cases. However, in one study, greenhouses with half of the roof covered in panels were simulated, and the resulting crop output reduced by 64% and panel productivity reduced by 84%.

Source:
https://en.wikipedia.org/wiki/Agrivoltaics#:~:text=The%20technique%20was%20originally%20conceived,of%20semi%2Dtransparent%20PV%20panels.

PART 02 Agri-PV Today

Agri-PV Today

What crops are suitable for agrivoltaics?

Current studies indicate that most crops tolerate shading up to 15% without significant yield loss, with berries, fruiting crops, and some vegetables benefiting from shading. Leafy vegetables, tubers, root crops, and certain cereals experience minimal yield reduction.

Source: https://www.pv-magazine.com/2023/05/26/agrivoltaics-can-mitigate-effects-of-drought/


Raspberries

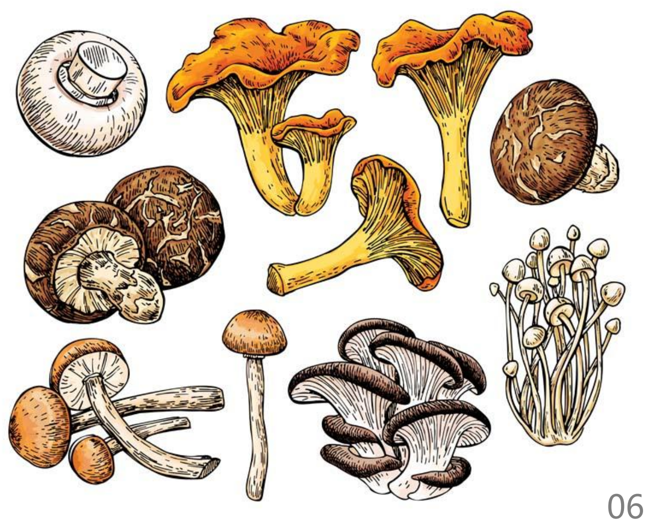

Strawberries


Blueberries


Apples


Pears


Cherries

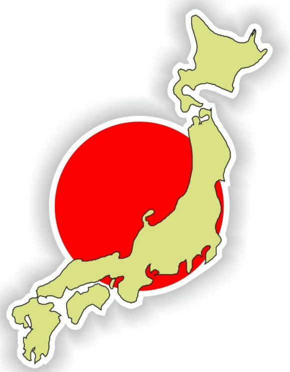


Agri-PV Today

Japan

Over 120 kinds of crops have been grown in the Japanese agrivoltaic farms. **Top ten popular crops** includes mioga ginger (65 farms), Sakaki or Japanese cleyera (41 farms), paddy rice (35 farms), shiitake mushroom (31 farms), and blueberry (20 farms), fuki or butterbur (18 farms), tea (15 farms), green onions (14 farms), pasture grass (13 farms), and pumpkin (13 farms).

Source: Evolution of agrivoltaic farms in Japan, *Makoto Tajima; Tetsunari Iida*



First Country 2012

Agrivoltaic development in Japan took off after the introduction of feed-in tariff (FIT) in **2012**.

Development of agrivoltaics in Japan **started in 2004** in Chiba Prefecture initiated by Akira Nagashima. He coined the term "solar sharing (synonymous to agrivoltaics)" in 2003 and made its patent free for public use in 2005.

Two directives from the Ministry of Agriculture, Forestry and Fisheries (MAFF), one in **March 2013** and another in May 2018, institutionalized agrivoltaics and promoted its development.

Agri-PV Today

More in research ...

In December 2022, the US Department of Energy (DoE) has announced the Foundational Agrivoltaic Research for Megawatt Scale (FARMS) funding, which has allocated $8 million for six solar energy research projects across six states and the District of Columbia.

Iowa State University (Ames, Iowa): This project will study horticulture and beekeeping at solar sites, produce decision support tools, and provide agrivoltaics training programs for farmers and other stakeholders. (Award Amount: $1.6 million)

RutgersUniversity (Piscataway, N.J.): This project team will conduct crop and grazing trials at two solar array testbeds, study community perceptions of agrivoltaics, and create a regional agrivoltaics network for agricultural extension staff in the Northeast, beginning with their partnership with Delaware State University, a historically black land-grant university. (Award Amount: $1.6 million)

Solar and Storage Industries Institute (Washington, D.C.): This project team will partner with the agriculture and utility sectors to identify barriers to implementing agrivoltaics and produce case studies and guides for solar developers, farmers, and decision-makers. (Award Amount: $500,000)

The Ohio State University (Columbus, Ohio): This project will conduct grazing and hay production trials using precision agriculture technologies and study the impacts on soil health at an operating utility-scale solar site. (Award Amount: $1.8 million)

University of Alaska Fairbanks (Fairbanks, Alaska): This project will research agrivoltaics specifically adapted to the food and energy needs of high-latitude underserved communities. (Award Amount: $1.3 million)

University of Arizona (Tucson, Ariz.): This research will pilot grazing and climate-smart agriculture under a traditional utility-scale solar site to maximize energy, food, and water benefits in the arid Southwest. (Award Amount: $1.2 million)

Agri-PV Today

More in research ... BayWa r.e.

BayWa r.e. is deploying many plant-based agrivoltaic experiments – growing strawberries, apples, and red currents – and it has plans to develop tens of megawatts of solar facilities in 2023. It has also been experimenting with agrivoltaic operations involving livestock, like bees and sheep. (Source: https://pv-magazine-usa.com/2022/11/04/baaaaa-wa-optimizes-its-business-model-for-agrivoltaic-sheep/)

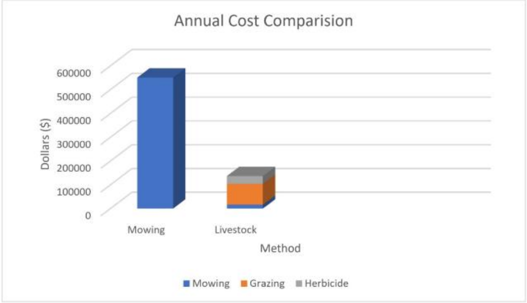


Image from the Solar Corazon report, provided by BayWa r.e.
Image: BayWa r.e.

Agri-PV Today

Major Players in Agrivoltaics

According to Allied Analytics, major agrivoltaic market developers include BayWa, Insolight SA, JA Solar, Enel Green Power, Sunseed APV, Mirai Solar, Namaste Solar, Ombrea, Sun' Agri and Next2Sun.

BayWa r.e.
https://www.baywa-re.com/

enel Green Power
https://www.enelgreenpower.com/

JA SOLAR
https://www.jasolar.com/

insolight
https://insolight.ch/

SunSeed APV
https://www.sunseedapv.com/

MIRAI SOLAR
https://miraisolar.com/

ombrea
https://www.ombrea.fr/

Next 2 Sun
https://next2sun.com/

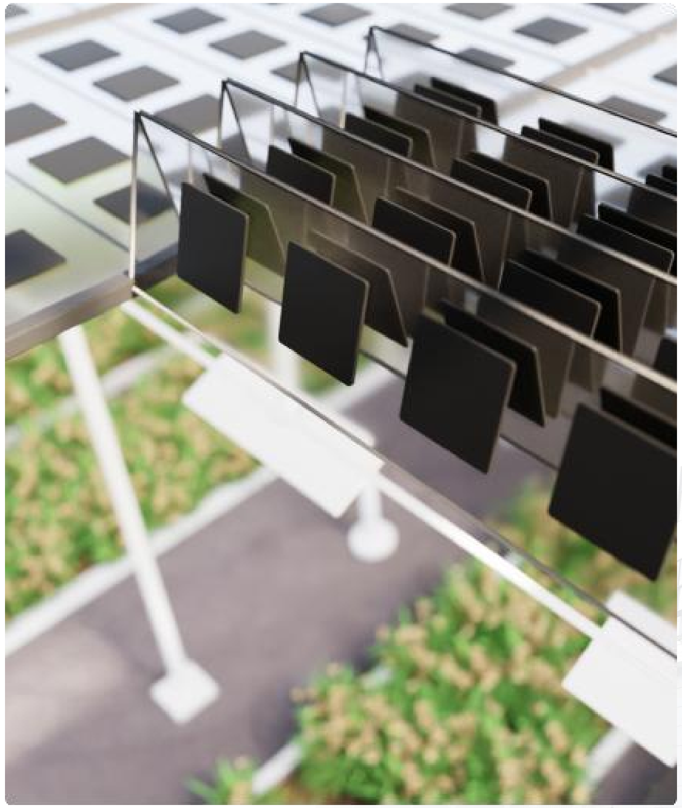
Sun'Agri
https://sunagri.fr/

namaste solar
https://www.namastesolar.com/

Agri-PV Today

Mirai Solar

Semi – Transparent PV Modules with Bifacial Solar Cells



Agri-PV Today

BayWa r.e. & Insolight SA

Semi – Transparent PV Modules with Bifacial Solar Cells

insolagrin Replacing Plastic Tunnels

Replacing plastic tunnels in berry production with transparent solar modules can have multiple benefits. It provides a protected growing environment for the crops while allowing for natural diffused light optimised for crops' needs. It also generates renewable energy for self-consumption, reducing the carbon footprint of the operations.

plastic tunnel

insolagrin

Agri-PV Today

Namaste Solar

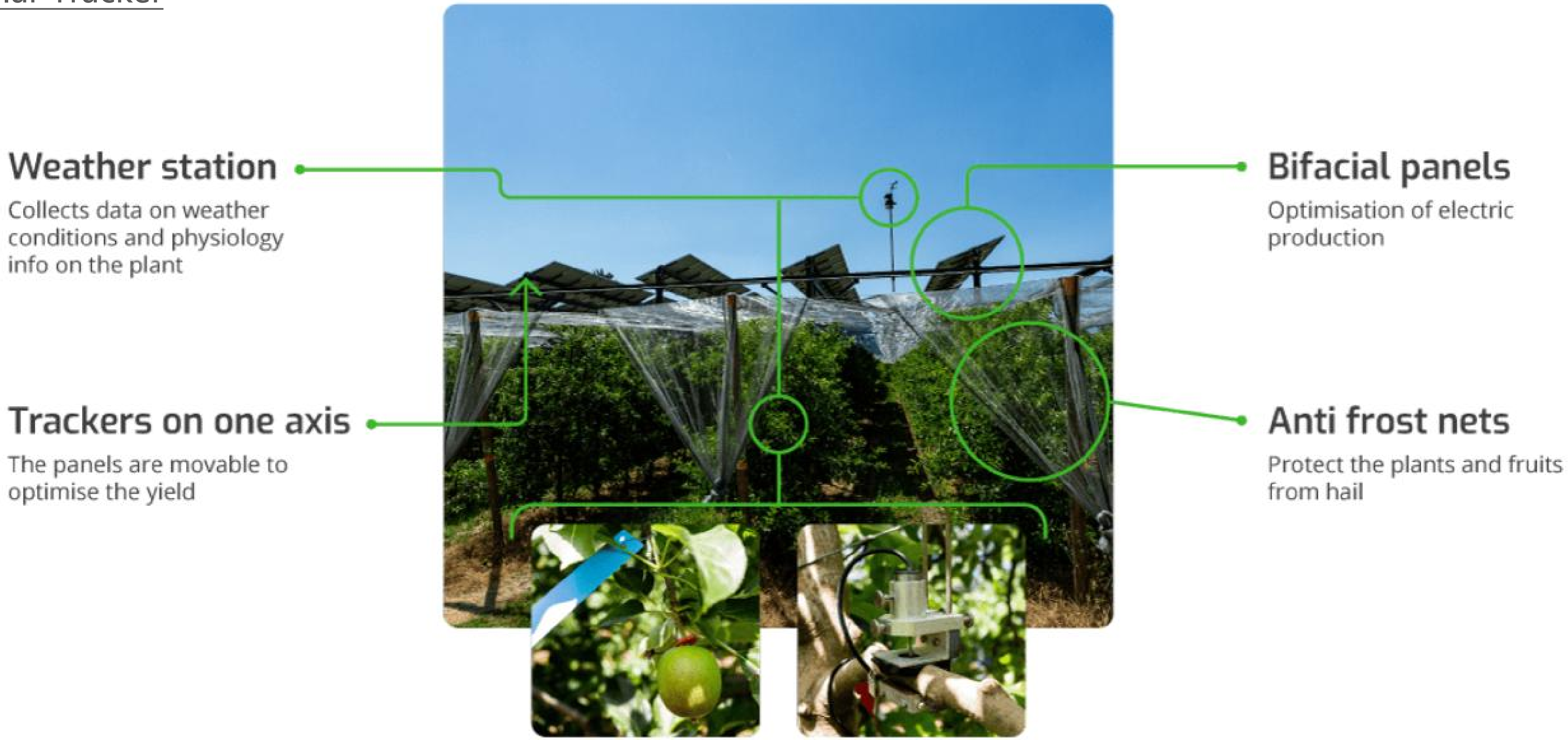
JACK' S SOLAR GARDEN

the largest commercially active agrivoltaics system researching a variety of crop and vegetation growth under solar panels in Colorado, U.S.A.

Agri-PV Today

Sun’ Agri

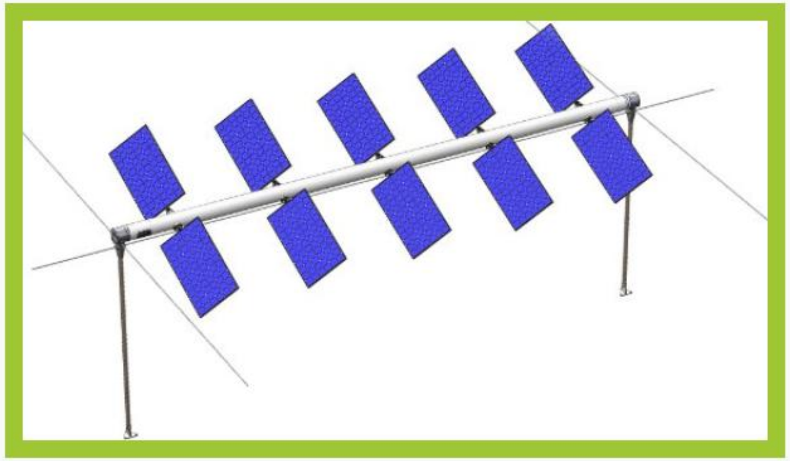
Single-Axis Solar Tracker



Agri-PV Today

REM TEC

Dual-Axis Solar Tracker



TRACKER 10

POWER FROM 2.5 TO 4.35 KWP PER TRACKER
10 PV MODULES INSTALLED ON EACH TRACKER
TRACKER LENGTH. 12 M
HEIGHT 4-5 M

TRACKER 2.1

POWER UP TO 16.8 KWP PER TRACKER
24 PV MODULES 78 CELLS PER TRACKER (MONO- OR BI-FACIAL)
TRACKER LENGTH 14 M
HEIGHT 4-5 M

Agri-PV Today

Next2Sun

Vertical Racking

Agri-PV Today





PART 03 Huge Energy’s Agri-PV Systems

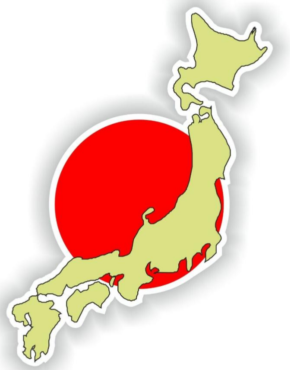
Background and Findings

1. Aluminum Agri-PV Racking

HUGE ENERGY

Startup 2008

Huge Energy has focused on Japanese market since its **startup in 2008** and supplied **300MW+ agri-PV** racking systems to Japan.



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Two directives from the Ministry of Agriculture, Forestry and Fisheries (MAFF), one in **March 2013** and another in May 2018, institutionalized agrivoltaics and promoted its development.

1. Aluminum Agri-PV Racking

As of **March 2019**, total number of 1,992 agrivoltaic farms (560.0 ha) is registered under the Ministry of Agriculture, Forestry and Fisheries (MAFF). A reasonable estimate of the installed capacity of agrivoltaics in Japan would be **500 to 600 MW** based on the total installed area of officially registered agrivoltaic farms.

Source: Evolution of agrivoltaic farms in Japan, *Makoto Tajima; Tetsunari Iida*

March 2019

TABLE 1. The number of officially registered agrivoltaic farms in Japan by prefecture[a]

AAB[b]	Prefecture	Agrivoltaic farms	AAB[b]	Prefecture	Agrivoltaic farms	AAB[b]	Prefecture	Agrivoltaic farms
Hokkaido	Hokkaido	6		Shizuoka	264	**Shikoku**	Okayama	9
Tohoku	Aomori	10	**Hokuriku**	Niigata	27		Hiroshima	31
	Iwate	13		Toyama	0		Yamaguchi	2
	Miyagi	29		Ishikawa	3		Tokushima	131
	Akita	12		Fukui	16		Kagawa	45
	Yamagata	34	**Tokai**	Gifu	46		Ehime	32
	Fukushima	75		Aichi	47		Kochi	6
Kanto	Ibaraki	111		Mie	36	**Kyushu**	Fukuoka	15
	Tochigi	19	**Kinki**	Shiga	17		Saga	6
	Gunma	196		Kyoto	17		Nagasaki	3
	Saitama	100		Osaka	4		Kumamoto	36
	Chiba	298		Hyogo	39		Oita	6
	Tokyo	4		Nara	30		Miyazaki	10
	Kanagawa	31		Wakayama	23		Kagoshima	9
	Yamanashi	67	**Chugoku**	Tottori	6	**Okinawa**	Okinawa	19
	Nagano	34		Shimane	18	**Total**		**1,992**

[a] Reference 3.

[b] AAB = Agricultural Administration Bureau

1. Aluminum Agri-PV Racking

Over 120 kinds of crops have been grown in the Japanese agrivoltaic farms. **Top ten popular crops** includes mioga ginger (65 farms), Sakaki or Japanese cleyera (41 farms), paddy rice (35 farms), shiitake mushroom (31 farms), and blueberry (20 farms), fuki or butterbur (18 farms), tea (15 farms), green onions (14 farms), pasture grass (13 farms), and pumpkin (13 farms) (Table 4).

TABLE 4. Crops grown in agrivoltaic farms in Japan[a] March 2019

Number of cases	**Common name** (*Scientific name*) [number of cases]
>10	***mioga*** **ginger** (*Zingiber mioga Rosc.*) [65], **Japanese cleyera** (*Cleyera japonica*) [41], **paddy rice** (*Oryza sativa*) [35], ***shiitake*** **mushroom** (*Lentinula edodes*) [31], **blueberry** (*Cyanococcus spp.*) [20], ***fuki*** **/ butterbur** (*Petasites japonicus (Siebold et Zucc.) Maxim.*) [18], **tea** (*Camellia sinensis (L.) O. Kuntze*) [15], **green onions** (*Allium fistulosum L.*) [14], **pasture grass** [13], **pumpkin** (*Cucurbita maxima*) [13], **sweet potato** (*Ipomoea batatas*) [11], **persimmon** (*Diospyros kaki*) [11]
9	**orange** (*Citrus unshiu*)
8	**soybean** (*Glycine max*), **potato** (*Solanum tuberosum L.*), **taro** (*Colocasia esculenta (L.) Schott*)
7	**asparagus** (*Asparagus officinalis L.*), **wood ear mushroom** (*Auricularia auricula-judae*), **lettuce** (*Lactuca sativa*), **peanut** (*Arachis hypogaeaii*)
6	**cabbage** (*Brassica oleracea L. var. capitata.*), ***senryu*** (*Sarcandra glabra*)
5	**bracken fern** (*Pteridium aquilinum (L.) Kuhn.*), **Japanese horseradish** (*Eutrema japonicum (Miq.) Koidz.*), **carrot** (*Daucus carota subsp. sativus*), ***ashitaba*** (*Angelica keiskei (Miq.) Koidz.*), **onion** (*Allium cepa*), **radish** (*Raphanus sativus var. hortensis*), **dwarf mondo grass** (*Ophiopogon japonicus 'Tamaryu'*), **tomato** (*Solanum lycopersicum*), **Chinese cabbage** (*Brassica rapa var. pekinensis*), **Japanese star anise** (*Illicium religiosum Siebold & Zucc.*), **garlic** (*Allium sativum*)
4	**Grape** (*Vitis spp.*), **Japanese chestnut** (*Setaria italica*), **young soybean** (*Glycine max*), **barroom plant** (*Aspidistra elatior*)
3	**buckwheat** (*Fagopyrum esculentum Moench*), **wheat** (*Triticum aestivum*), ***komatsuna*** (*Brassica rapa var. perviridis*), **citron** (*Citrus junos*), **spinach** (*Spinacia oleracea*), **Chinese chives** (*Allium tuberosum. Rottler ex Spreng.*), **chameleon plant** (*Houttuynia cordata*), **lemon** (*Citrus limon*), **kiwifruit** (*Actinidia chinensis*)
2	**fig** (*Ficus carica*), **mini tomato** (*Lycopersicum esculentum*), **potato** (*Solanum tuberosum L.*), **ginger** (*Zingiber officinale*), ***udo*** (*Aralia cordata*), **broccoli** (*Brassica oleracea var. italica*), **Japanese pepper tree** (*Zanthoxylum piperitum*), ***shiso*** **(Japanese basil)** (*Perilla frutescens var. crispa*), **cucumber** (*Cucumis sativus L.*), ***dekopon*** (*Citrus unshiu x reticulata Siranui*), **garden peas** (*Pisum sativum L.*), **sesame** (*Sesamum indicum*), **red clover** (*Trifolium pratense L.*)
1	**hascup** (*Lonicera caerulea var. emphyllocalyxi),* **maitake (hen-of-the-woods)** (*Grifola frondosa*), **Jerusalem artichoke** (*Herianthus tuberosus L.*), **garland chrysanthemum** (*Chrysanthemum coronarium L.*), **water convolvulus** (*Ipomoea aquatica Forsk.*), **leaf lettuce** (*Lactuca sativa var. crispa*), **Blackberry** (*Rubus fruticosus*), ***sudachi*** (*Citrus sudachi*), **ostrich fern** (*Matteuccia struthiopteris*), **Hydrangea** (*Hydrangea macrophylla*), **pak choi** (*Brassica rapa var. chinensis*), **Christmas rose** (*Helleborus spp.*), **turf grass** (*Zoysia spp.*), **bulb**, **black squirrel** (*Ilex rotunda*), **yacon** (*Smallanthus sonchifolius*), ***rakkyo*** (*Allium chinense G.Don*), **dichondra** (*Dichondra spp.*), **holly** ***nanten*** (*Mahonia japonica (Thunb.) DC.*), **rape** (*Brassica campestris L.*), **trefoil** (*Cryptotaenia japonica*), ***fukinoto*** (*Petasites japonicus (Siebold et Zucc.) Maxim.*), **cauliflower** (*Brassica oleracea var. botrytis*), **mugwort** (*Artemisia spp.*), **apple** (*Malus pumila var. domestica*), **high moss** (*Hypnum plumaeforme. Wilson.*), **currant** (*Ribes spp.*), **flowers**, **maize** (*Zea mays*), ***kiboshi*** (*Hosta spp.*), **strawberry** (*Fragaria ×ananassaDuchesne ex Rozier*), ***shimeji*** (*Hypsizygus marmoreus*), **moss**, **herbs**, **eggplant** (*Solanum melongena*), **watermelon** (*Citrullus lanatus*), **June berry** (*Amelanchier canadensis*), **prickly pear** (*Anredera cordifolia*), **Japanese apricot** (*Prunus mume*), ***jabara*** (*Citrus jabara hort. ex Y. Tanaka*), **moss phlox** (*Phlox subulate*), **coralberry** (*Ardisia crenata*), **plantain** (*Plantago asiatica*), ***shibuki*** (*Myrica rubra*), **turnip** (*Brassica rapa L.*), **okra** (*Abelmoschus esculentus*), **senna tea** (*Senna obtusifolia*), ***kiyomi*** **tangor** (*Citrus unshiu × sinensis*), **cherry** (*Prunus spp.*), **giant elephant ear** (*Colocasia gigantea*), **Chinese milk vetch** (*Astragalus sinicus L.*), **fodder**, ***hanashiba*** (*Illicium religiosum*), **mulberry** (*Morus spp.*), ***hyuganatsu*** (*Citrus tamurana*), **kumquat / cumquat** (*Citrus japonica / Fortunella japonica*), **Solomon's seal** (*Polygonatum spp.*), **dracaena** (*Dracaena spp.*), **coffee** (*Coffea spp.*), **bitter gourd** (*Momordica charantia*), **turmeric** (*Curcuma longa*)

Source: Evolution of agrivoltaic farms in Japan, *Makoto Tajima; Tetsunari Iida*

1. Aluminum Agri-PV Racking

Shade tolerance of a crop or **shading rate** is one of the major factors to determine agrivoltaic system. Average shading rate ranges from 31.1% for rice to 100% for mushroom, ginseng, and bracken fern.

TABLE 5. Crops grown in agrivoltaics by classification[a]

Classification	Major crops	Number of cases	Ratio (%)	Number of crop change cases[b]	Crop conversion rate (%)
Land use crops	rice (*Oryza sativa*), wheat (*Triticum aestivum*), soybean (*Glycine max*), buckwheat (*Fagopyrum esculentum Moench.*)	173	9	26	15%
Vegetables	Vegetables: *komatsuna* (*Brassica rapa var. perviridis*), Chinese cabbage (*Brassica rapa var. pekinensis*), green onions (*Allium fistulosum L.*), pumpkin (*Cucurbita maxima*), etc.; Root crops	713	37	592	83%
Unique crops	mioga ginger (*Zingiber mioga Rosc.*), *fuki* / butterbur (*Petasites japonicus (Siebold et Zucc.) Maxim.*), *udo* (*Aralia cordata*), *ashitaba* (*Angelica keiskei (Miq.) Koidz.*), bracken fern (*Pteridium aquilinum (L.) Kuhn.*), chameleon plant (*Houttuynia cordata*), red clover (*Trifolium pratense L.*)	*403*	*21*	*358*	89%
mioga	mioga ginger (*Zingiber mioga Rosc.*)	*209*	*11*	*180*	86%
Fruit tree	citrus (*Citrus spp.*), blueberry (*Cyanococcus spp.*), persimmon (*Diospyros kaki*), grape (*Vitis spp.*)	211	11	122	58%
Flowers	lily (*Lilium spp.*), pansy (*Viola × wittrockiana*)	12	1	8	67%
Ornamental plants	Japanese cleyera (*Cleyera japonica*), Japanese star anise (*Illicium religiosum Siebold & Zucc.*), *senryo* (*Sarcandra glabra*), dwarf mondo grass (*Ophiopogon japonicus 'Tamaryu'*), etc.	553	29	447	81%
Others	-	252	13	129	51%
Pasture	Italian ryegrass (*Lolium multiflorum*), sorghum (*Sorghum bicolor*), Chinese milk vetch (*Colocasia gigantea*)	*68*	*4*	*24*	35%
Mushrooms	shiitake mushroom (*Lentinula edodes*), wood ear mushroom (*Auricularia auricula-judae*)	*98*	*5*	*68*	69%
Tea	tea (*Camellia sinensis (L.) O. Kuntze*)	*65*	*3*	*28*	43%
	TOTAL	1,914	100	1,324	69%

Source: Evolution of agrivoltaic farms in Japan, *Makoto Tajima; Tetsunari Iida*

1. Aluminum Agri-PV Racking

The **crop conversion rate** is particularly high for mostly shade tolerant crops in the unique crops and the ornamental plants category (Table 5) and they are ranked in the upper tier of popular agrivoltaic crops (Table 4).

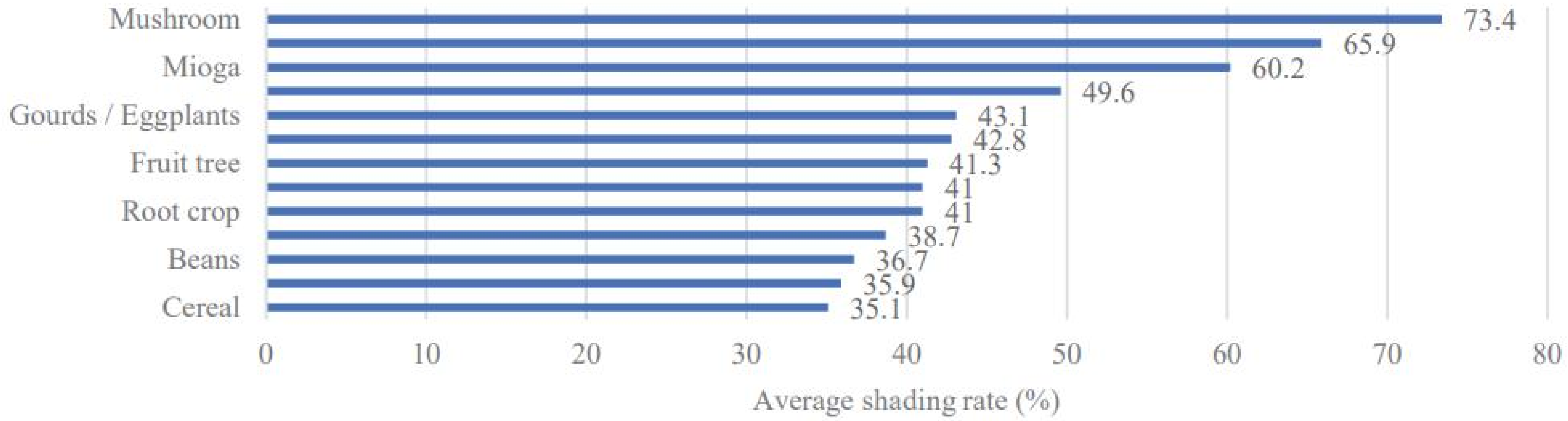


FIGURE 2. Average shading rate by crop classification. Plotted from reference 15. n=1,174 out of 1,465 (80.1% response rate). 100% shading rate for shiitake mushroom (*Lentinula edodes*), ginseng (*Panax ginseng*), and bracken fern (*Pteridium aquilinum (L.) Kuhn.*) and some shiitake mushroom farm with photovoltaic panel installed at 60 cm above ground reported.

Average shading rate ranges from 31.1% for rice to 100% for mushroom, ginseng, and bracken fern.

Source: Evolution of agrivoltaic farms in Japan, *Makoto Tajima; Tetsunari Iida*

Huge Energy Agri-PV Solutions

1. Aluminum Agri-PV Racking


Tea


Sakaki (さかき)


Orange


Crop

1. Aluminum Agri-PV Racking

1. Aluminum Agri-PV Racking

✓ Suitable for crops with different shade tolerances

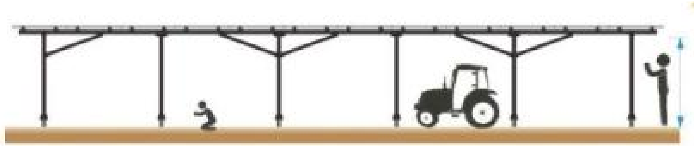
Adjustable Shading Rate Design

Features

Innovation since 2013

✓ Allow farm machinery and farmers to work underneath

Height (2.3-3.5 meters)



Large Span of Posts

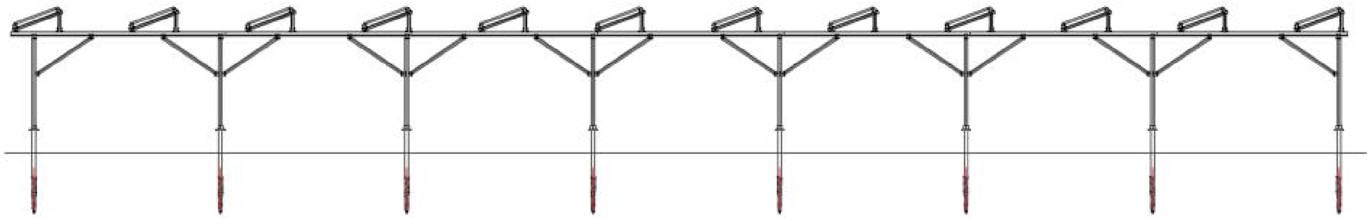
(Approx. 5 meters)

✓ Allow farm machinery to work underneath

✓ Resistance to heavy snow load (2.4kN/m2) and wind load (46m/s)

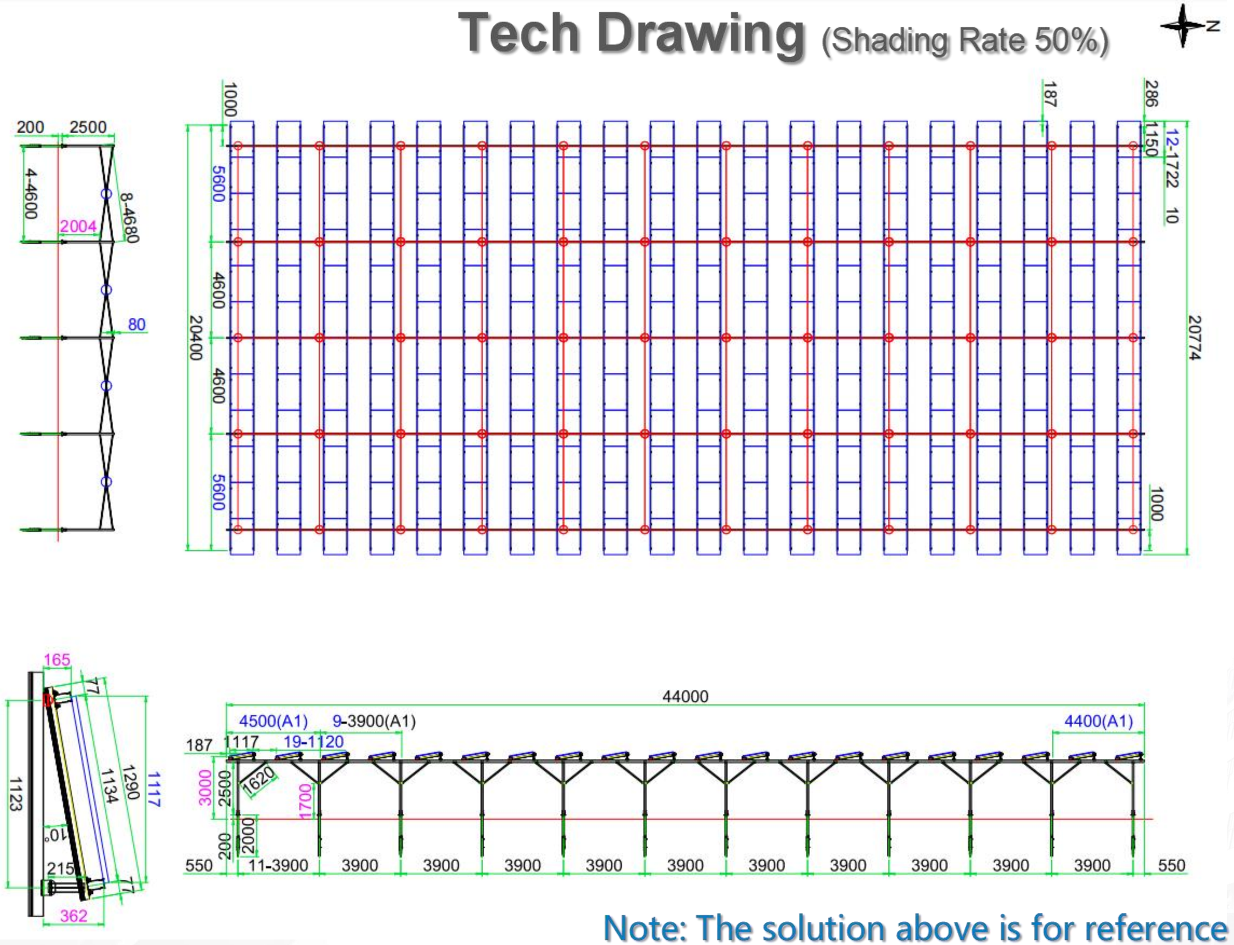
Light Weight for Installation

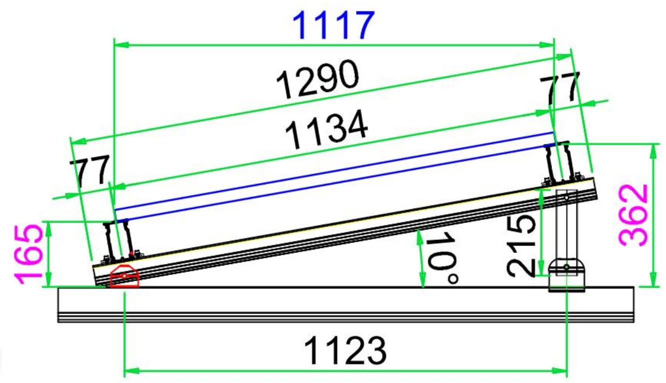
(Compared with Steel Structure)

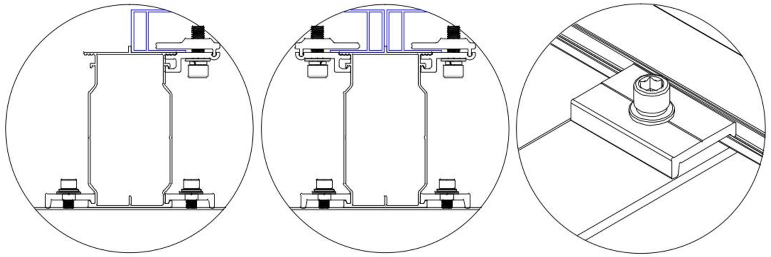


1. Aluminum Agri-PV Racking

Tech Drawing (Shading Rate 50%)







Note: The solution above is for reference only. The aluminum Agri-PV is customizable.

1. Aluminum Agri-PV Racking

Features of Main Materials

Adjustable Shading Tripod

- Adjustable angle
- Adjustable shading rate
- Pre-assembled

Connector for Bracings
(Vertical Adjustable along Posts)

- Using T-bolts, the position can be freely adjusted
- Easy to install, saving construction time

Universal Post
(Modular, Adjustable and All Direction)

- Using T-bolts, the position can be freely adjusted
- Easy to install, saving construction time

Connector for Post and Beam
(Adjustable)

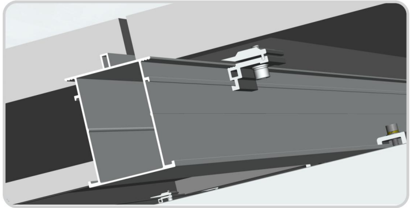
- Round solitary hole design, error-free construction
- Adjustable angle

1. Aluminum Agri-PV Racking

Features of Main Materials

Back Clamp

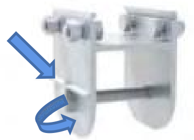
- ✓ Faster installation and more safety
- ✓ Easier O&M



Ground Screw Foundation

- ✓ Applicable to soft soil and replace concrete as foundation

Connector



- Limit setting to prevent bolt misassembly
- Improved construction efficiency

1 Aluminum Agri-PV Racking

2 Flexible (Pole and Wire) Solar Racking

3 Fixed Tilt Racking

4 Others

2. Flexible (Pole and Wire) Solar Racking




2. Flexible (Pole and Wire) Solar Racking

2. Flexible (Pole and Wire) Solar Racking

Features

Low Cost

Compared with the traditional steel solar racking structure, it uses less steel.

Maximize Space Usage

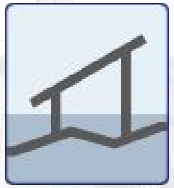
Applicable to large-span scenarios and no limitation on space.

Fast to Install

Ramming machines usage is drastically reduced because it needs to be done only at the extremities of long arrays.

Land preparation and soil leveling are drastically reduced

Because its flexibility, the tensile structure is easy to adapt to land profile, so it doesn’t required GPS or Laser Point machine to be installed.

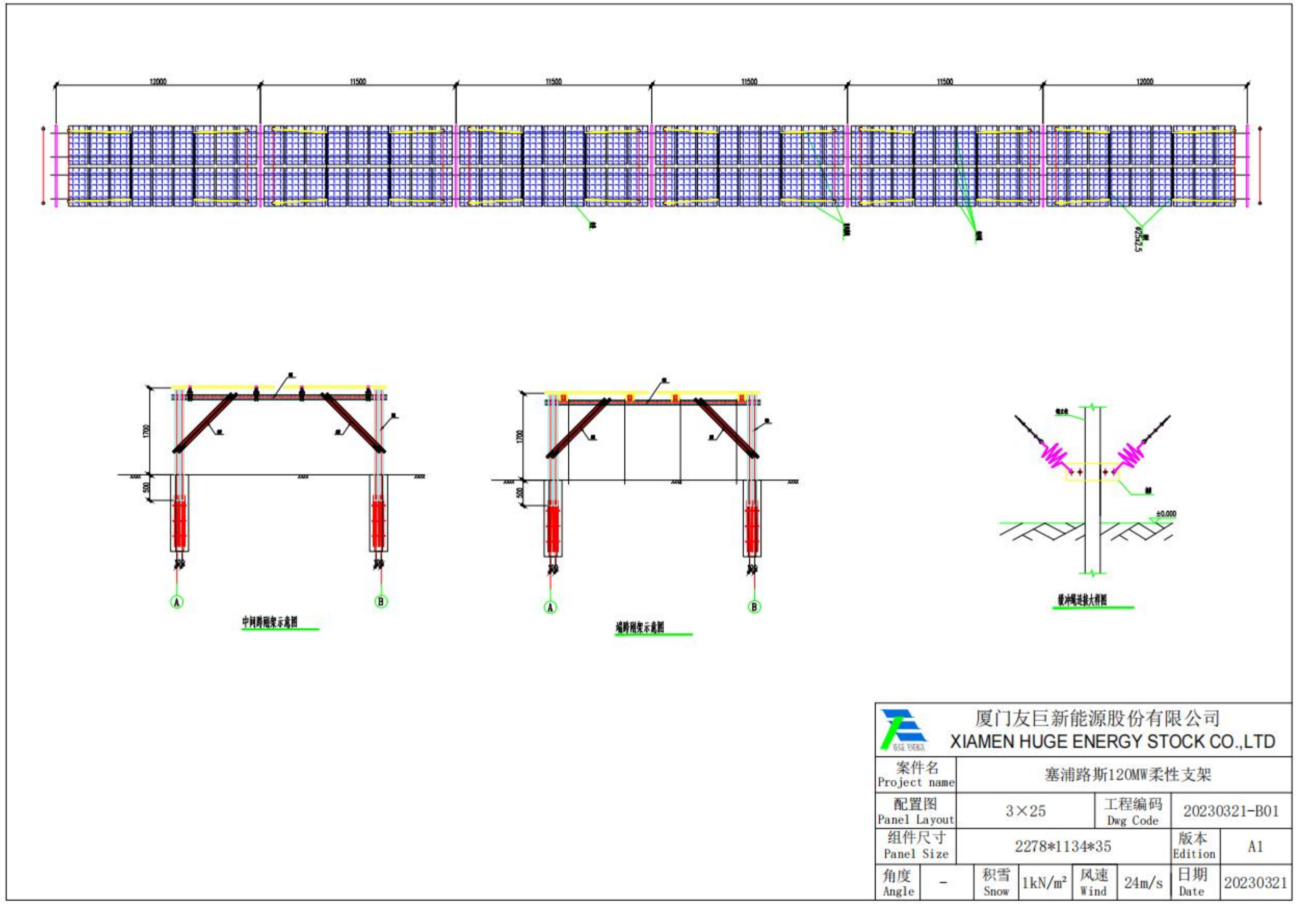


Easily adaptable to the contour of the land

NOT require machines with GPS or Laser Pointers to install anchors.

2. Flexible (Pole and Wire) Solar Racking

Tech Drawing (Span 11.5 meters)



2. Flexible (Pole and Wire) Solar Racking

Huge Energy implemented 1MW flexible PV project with **span up to approx. 40 meters** for a sewage treatment plant in Fujian, China.

It withstood **super typhoon** with speed up to **50.9m/s** in July, 2023.

Its design can also be applied to agrivoltaics.

2. Flexible (Pole and Wire) Solar Racking



1MW Guanyinpu Sewage Treatment Plant, Fuqing City, Fujian Province

2. Flexible (Pole and Wire) Solar Racking

Features

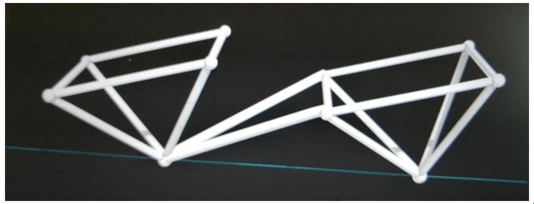
By applying prestress to the cable, the cable can obtain rigidity.

By stabilizing the cable and the quadrangular pyramid, the system can resist wind vibration under the action of wind load.

Efficient control of disturbance of cable

The use of special connectors makes the construction adopt the sliding method, which effectively solves the vibration impact on the cable during installation and maintenance, and avoids the occurrence of hidden cracks.

2. Flexible (Pole and Wire) Solar Racking



Quadrangular Pyramid

As the rigid fulcrum of the system, a geometrically stable space system is formed by arranging tie rods, horizontal connecting cables and longitudinal stabilizing cables through the quadrangular pyramid.

Key Components for Wind Resistance

Tie Rod

Its function is to connect the array of components into a whole, and form a spatial whole with the horizontal connecting cable, improve the overall spatial rigidity, and effectively resist wind vibration.

Longitudinal Stabilizing Cable

There are two types of longitudinal connecting cables, which bear the downward (upward) wind load caused by south wind (north wind) respectively. At the same time, the deflection of the main cable can be adjusted, and it can withstand the snow pressure of blizzard weather. Fix the spatial position of the quadrangular pyramid and effectively control the amplitude of the component.

1 Aluminum Agri-PV Racking

2 Flexible (Pole and Wire) Solar Racking

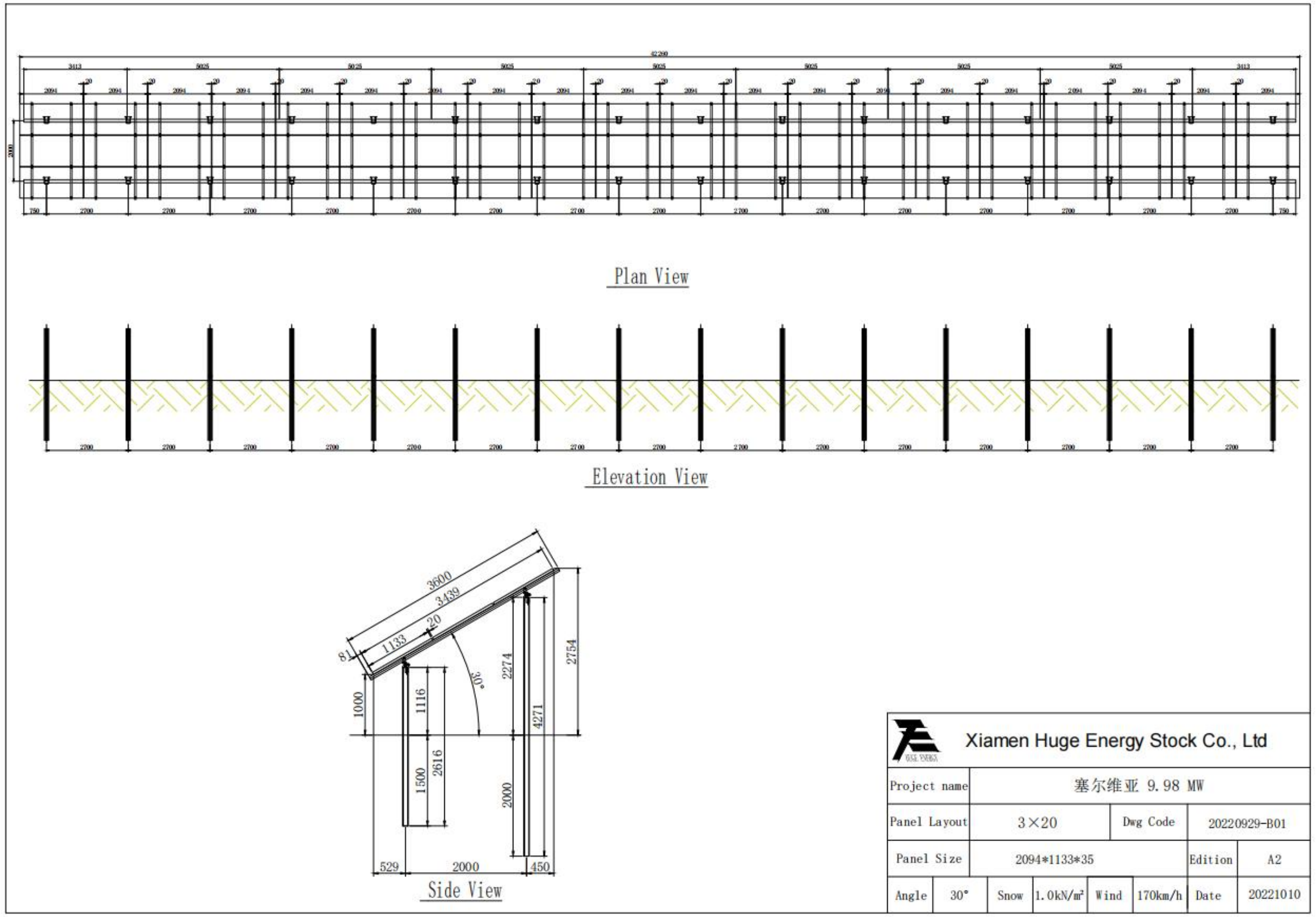
3 Fixed Tilt Racking

4 Others

3. Fixed Tilt Racking

3. Fixed Tilt Racking

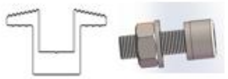
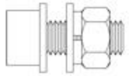
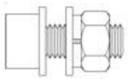
Tech Drawing (Ground Clearance 1 meter)



3. Fixed Tilt Racking

Bill of Materials (Regular)

Main Parts				
No.	Product	Part Number	Picture	Specifications
1	Rail	C100-50-12-2.0-5520		Q355(HDG)
2	Rail	C100-50-12-2.0-4050		Q355(HDG)
3	Front Bracing	C60-40-10-2.0-825		Q355(HDG)
4	Rear Bracing	C60-40-10-2.0-1590		Q355(HDG)
5	Post	13-UZ-2540		Q355(HDG)
6	Post	13-UZ-3220		Q355(HDG)

Spare Parts				
No.	Product	Part Number	Picture	Specifications
1	Splice for C Steel	C88-43-3.0-320		Q235(HDG)
2	Angle bracket	L75-50-5.0		Q235(HDG)
3	Diagonal Joint	L100-4		Q235(HDG)
4	End Clamp	HE-18-EC3560-C45		AL6005-T5
5	Inter Clamp	HE-17-IC1940-C50		AL6005-T5
6	HexBolt	HE-36-G10-25-Q		HDG
7	HexBolt	HE-36-G12-40-Q		HDG

3. Fixed Tilt Racking

Huge Energy’ s fixed tilt racking systems (steel) are almost the same as traditional ones except that higher ground clearance or larger distance between each array may be required. Fixed tilt racking can be applied to **traditional crops** as well as **livestock grazing** and **pollinator gardens, etc**.

4. Others

Huge Energy is a project-oriented solar racking designer and manufacturer and can also offer other agrivoltaics racking systems.

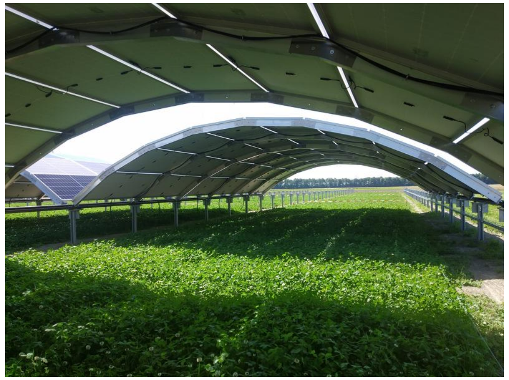

Vertical Racking

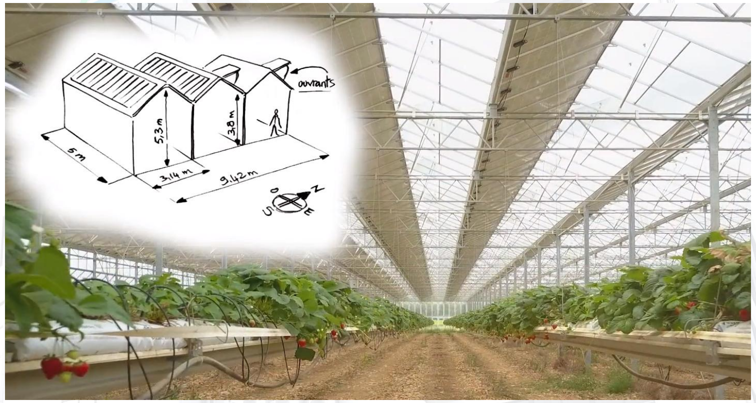
Solar Tracker


CPP Wind Tunnel Test

4. Others

Huge Energy is a project-oriented solar racking designer and manufacturer and can also offer other agrivoltaics racking systems.





Thank you!