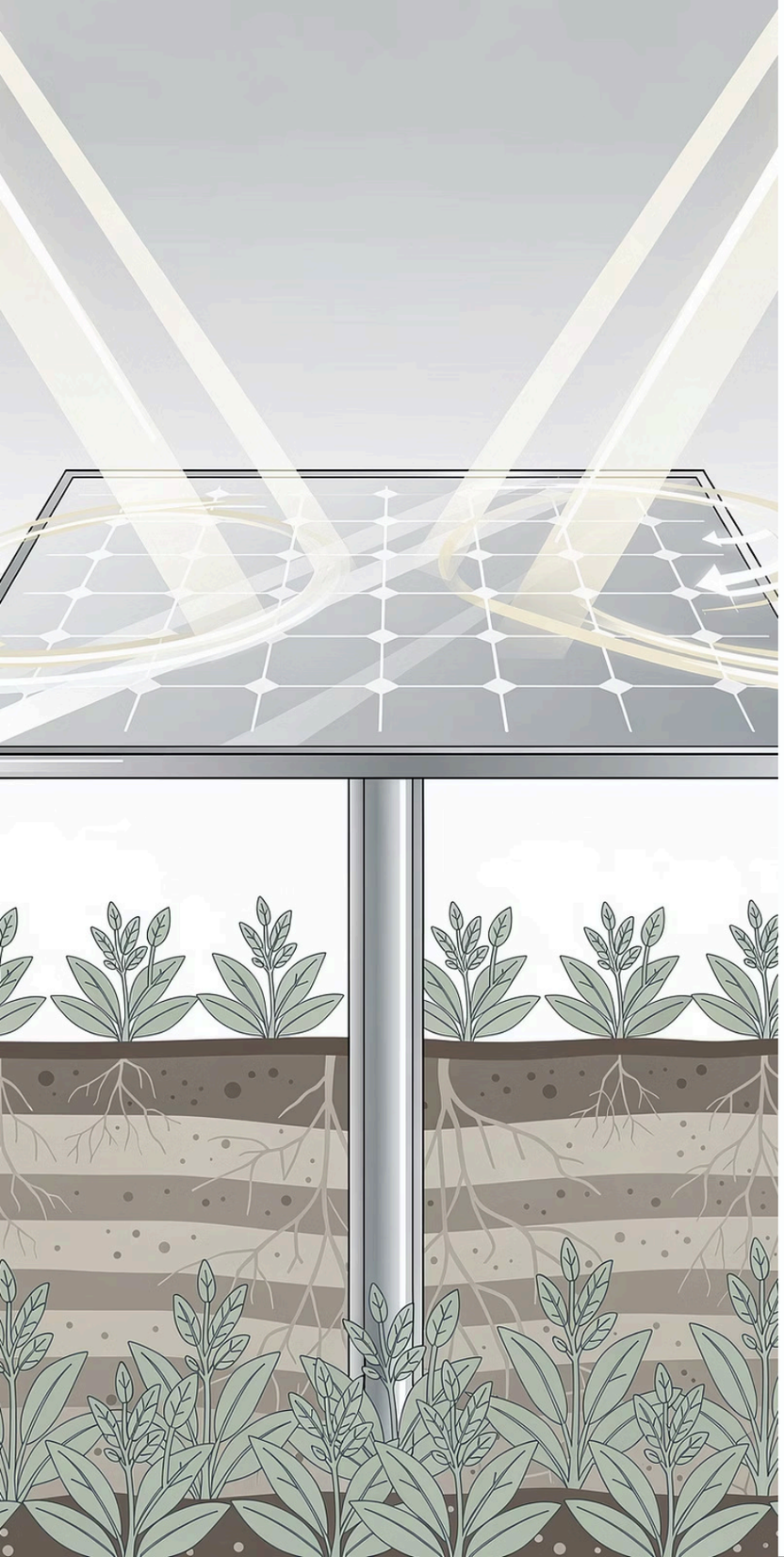
BIFACIALMAX AgriPV

Product Catalogue

Introducing single-row and specialized AgriPV systems designed for efficient energy production, robust crop protection, and optimized field microclimate management.

WE DON'T CAST SHADOWS; WE DESIGN FOR OPTIMAL LIGHT, WATER, AND ENERGY IN AGRICULTURE.



What is BifacialMAX AgriPV?

BifacialMAX AgriPV is an agrivoltaic system where energy generation and agriculture do not compete for land; instead, they complement each other. The design enables simultaneous electricity generation while maintaining active agricultural land use.

Energy

Frontal production plus true rear gain from the bifacial module's rear side.

Agriculture

Active cultivation under and between rows, ensuring no loss of productive area.

Microclimate

A controlled gradient of light, temperature, and soil moisture for optimal plant growth.

Safety

Features closed profiles, adheres to Eurocode standards, and boasts a design service life of 50 years.

Design Philosophy

Beginning with Light and Plant Biology. Then Geometry. Finally Steel.

Plant-First PV Design

The design process starts by considering the plant: its light requirements, and how it responds to shade, temperature, and water scarcity. Only after this assessment is the geometry of the PV system determined.

PV System's Influence on Plants

For existing PV systems, our calculator identifies suitable plant species, predicts the formation of distinct zones within the field, and analyzes how the microclimate will be altered. Each PV geometry creates a unique biological ecosystem.

The AgriPV project addresses five critical questions: the plant's light requirements, its shade tolerance, its reaction to overheating, the optimal PV geometry for an ideal compromise, and how to effectively zone the field for cultivation.

SECTION 1 — MAIN PRODUCT

BIFACIALMAX East–West 25°

A core AgriPV system for optimal crop yield, energy production, and structural integrity

The BifacialMAX East–West 25° is a foundational system within our AgriPV portfolio. It features a single-row, stationary bifacial design utilizing **closed profiles**, engineered to concurrently generate energy, provide crop protection, enhance the field's microclimate, and ensure superior mechanical safety for the entire installation. With appropriate field geometry and ground albedo, this system can deliver an additional energy contribution, or **rear gain**, from the **module rear side** of approximately 15–20%.

Why is the East–West 25° Configuration Our Flagship Product?

Optimized Energy Yield

An even daily production profile, efficient utilization of the bifacial module’s rear side, and an additional energy contribution from the module’s rear side of approximately 15–20% with the recommended arrangement and appropriate albedo.

Optimized for Diverse Crops

Supports the widest spectrum of agricultural applications, including vegetables, herbs, strawberries, berries, and various mixed crops.

Minimal Land Footprint

Features significantly more compact field geometry compared to Vertical or Tracker systems, ensuring the highest plot utilization efficiency.

Simplicity and Ease of Service

A stationary system without moving parts, leading to reduced mechanical complexity, fewer dependencies on automation, and lower operating costs.

Enhanced Module Safety

Closed profiles mitigate lateral overloads and the trapezoiding phenomenon, which can lead to cracking of the rear glass of bifacial modules.

Seasonal Crop Protection

Offers the possibility of deploying a protective film between rows, providing effective protection against spring and autumn frosts.

Rear Gain Physics: Why Narrow Tables Excel

Narrow Bifacial Table Design

In narrow tables with a single row of panels, reflected and diffused light gains significantly easier access to the module's rear side. This design minimizes excessive shading at the system's center.

Increased Mounting Height

Higher mounting improves the illumination of the module's rear side, consequently increasing rear gain and overall yield. This effect is dependent on the specific geometry and albedo.

Albedo as a Critical Design Parameter

Therefore, achieving high rear gain and a significant yield increase, while dependent on geometry and albedo, is not accidental. It is the direct result of consciously designed geometry and optimized optical conditions.

Rear gain and yield increases, contingent on geometry and albedo, require deliberate engineering.

It does not occur spontaneously. It is the result of the correct combination of a narrow table, appropriate mounting height, favorable albedo, and single-row optical transparency.

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approx. 15–20%

Additional Energy Contribution

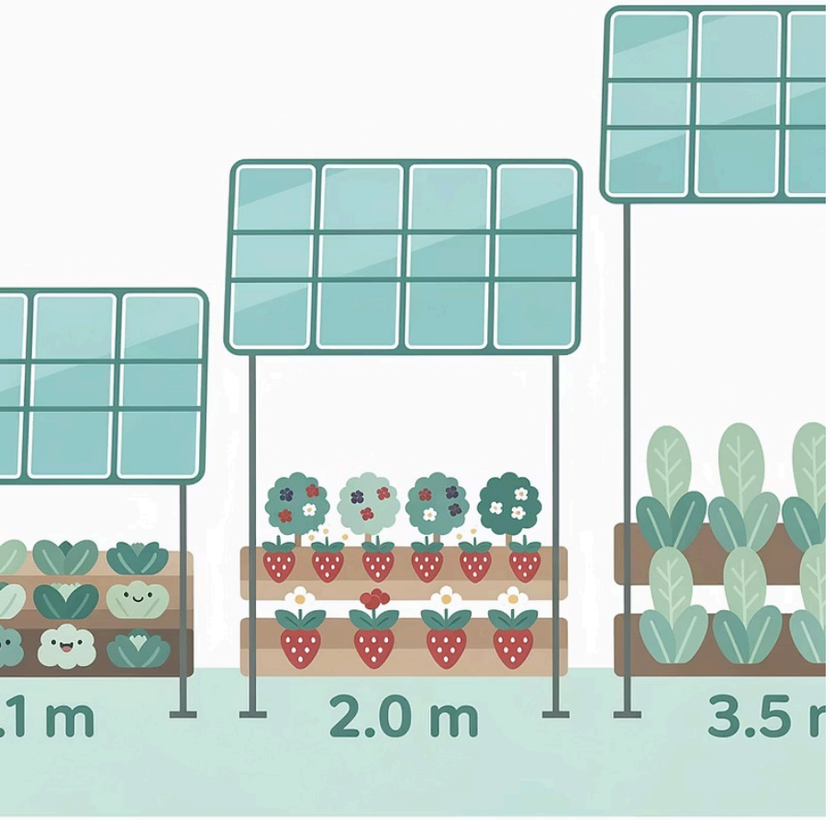
Additional energy contribution from the rear side of the module.

0.25–0.30

Reference Albedo

Design albedo value for optimal rear gain.

Indicative values. Actual yield depends on location, system geometry, mounting height, row spacing, albedo, and module type.



Height Range — One System, Diverse Crop Applications

1

1.10–1.20 m

Ideal for leafy vegetables, herbs, and low-growing crops, providing a strong thermal shield and reduced evaporation.

2

1.30–1.80 m

Suitable for strawberries, mixed crops, and berry plantations, ensuring optimal light and humidity balance.

3

1.80–2.10 m

Accommodates taller shrubs and blueberry plantations, enabling improved mechanization, more operational space, and enhanced rear gain.

4

2.10–3.00 m

Designed for orchards, specialist crops, and tall machinery, offering maximum clearance, streamlined logistics, and full agricultural flexibility.

The optimal system height is determined by the specific crop and farm organization, rather than purely aesthetic considerations. This family of systems can be scaled to suit various agricultural requirements.

Plant Classification — Groups A, B, C

Group A — Shade-loving and Partial Shade-loving

These plants thrive in the area near the panels, benefiting from reduced overheating and less water stress.

- Lettuce, rocket, spinach
- Basil, mint, leafy herbs
- Plants sensitive to heat

Group B — Moderate Shading

Located in the transitional zone, these plants benefit from microclimatic protection and an optimal light balance.

- Blueberry, raspberry, currant, blackberry
- Strawberry, various fruit bushes
- Berry and mixed crops

Group C — Light-demanding

These plants are best positioned in the center of the inter-row or technological strip, where they receive fuller access to solar radiation.

- Grapevine, cereals, maize
- Sunflower, certain field vegetables
- Strongly light-demanding plants

Design Table: Plant → Height → Spacing → System

Crop Type	System	Height	Row Spacing	Dominant Effect
Leafy vegetables and herbs	EW 25°	1.10–1.20 m	3.0–4.5 m	Thermal shielding, reduced evaporation, and lower water stress
Strawberry and mixed crops	EW 25°	1.30–1.50 m	4.0–6.0 m	Balanced light and humidity, light mechanization capability
Berry plantations	EW 25°	1.50–2.10 m	5.0–8.0 m	Microclimatic regulation, cultivation convenience, rear gain, and thermal protection of fruits
Grapevine and specialist crops	EW 25° higher or Vertical	2.10–3.00 m	7.0–10.0 m	Increased clearance, optimal light exposure, and enhanced mechanization
Cereals and wide fields	Vertical or Tracker 2P	Tall specialist variants	9–12 m	Wide working aisles, high mechanization potential, and dual land use
Hot and dry climates	EW 25° in raised variant	Higher construction variants	Wider row spacing	Priority: Reduced overheating and water loss

Safety and Durability — EW 25°

Closed Profiles

Enhanced stiffness resists bending and torsion. This design eliminates lateral overloads, which in conventional multi-row installations can cause trapezoidal deformation and cracking of the rear glass of bifacial modules.

European Standards

Adherence to PN-EN 1991 (Eurocode 1), PN-EN 1993 (Eurocode 3), and the relevant parts of the EN 1090 series. Design compliant with wind zones 1–4 and snow zones as per European standards.

Why This Matters for a Bifacial Module

In bifacial systems, the module's rear glass is particularly susceptible to uneven stresses resulting from structural deformations. The single-row BifacialMAX arrangement on rigid, closed profiles radically reduces this risk — directly impacting the long-term lifespan of the modules and the actual operating costs of the installation.

50+

50+ Years of Durability

design life of coating and structure

1–4

Wind Zones

design compliant with relevant European standards

Summary: East–West 25° System – Key Features

Minimal Spatial Requirements

Compact geometry requires significantly less land area compared to Vertical systems (9 m) and Tracker systems (6–12 m).

Optimized for Vegetable and Berry Cultivation

Provides the most favorable microclimatic conditions for agricultural groups A and B, including vegetables, herbs, blueberries, raspberries, currants, and strawberries.

High Rear Gain and Yield Increase

Additional energy contribution from the module's rear side, up to approximately 20%, achievable with the recommended arrangement and appropriate albedo.

Seasonal Protective Film Integration

Potential for transformation into a large greenhouse module, offering protection against ground frost.

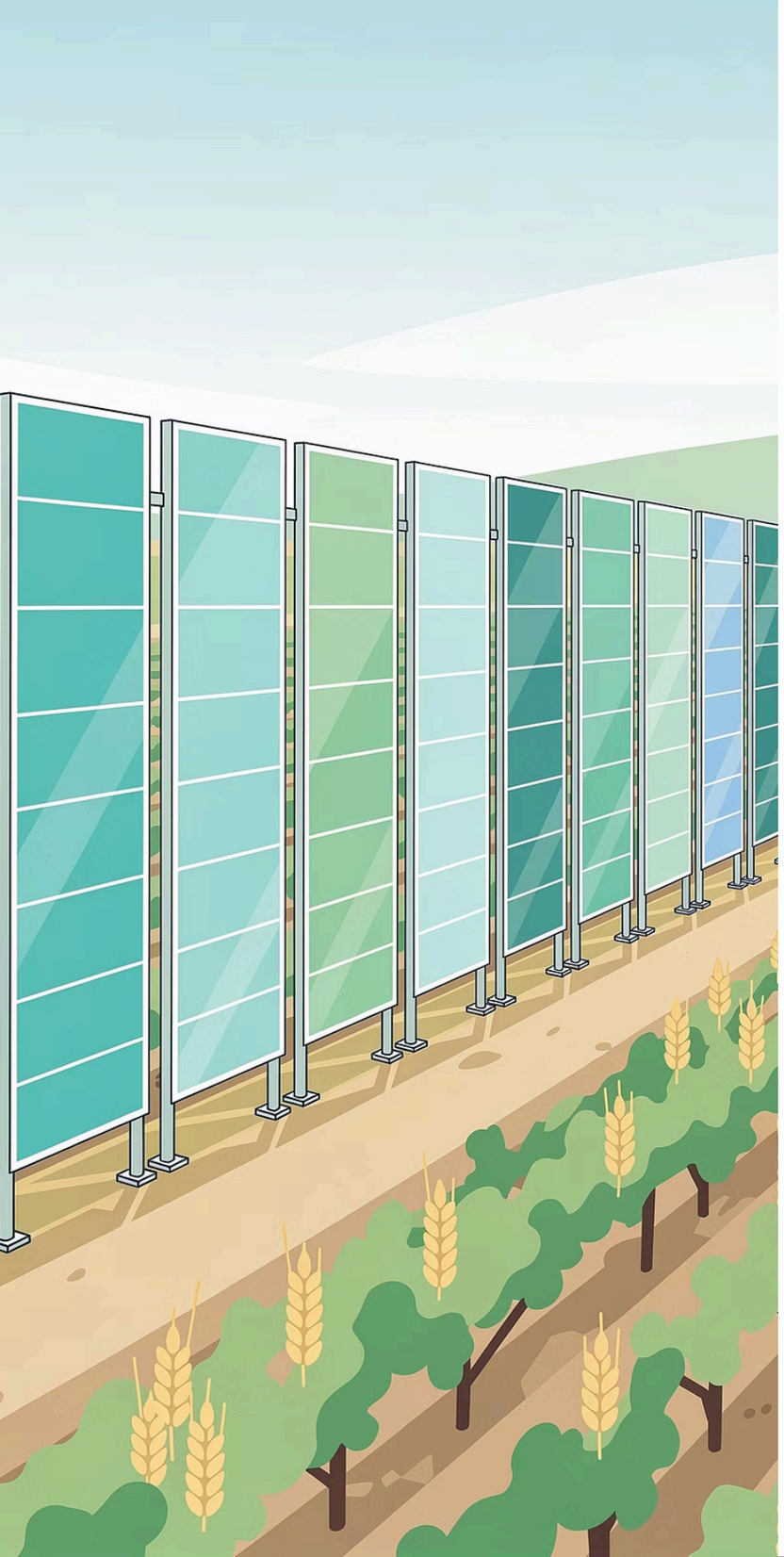
Simplified Servicing

Absence of moving parts, no reliance on complex automation, resulting in minimal operating costs.

Enhanced Module Safety

Closed profiles eliminate trapezoidal deformation, thereby reducing the risk of cracking the rear glass of bifacial modules.

The East–West 25° system represents the main BIFACIALMAX AgriPV offering—the most versatile solution, characterized by minimal spatial requirements and optimal suitability for intensive agriculture.



SECTION 2 — PRODUCT TWO

BIFACIALMAX Vertical

Vertical AgriPV Systems: Optimized for Wide-Row Cropping, Cereals, and Specialized Applications

BIFACIALMAX Vertical represents the second core system family within our AgriPV catalog. While not our most versatile offering—a distinction held by the East–West 25° system—the vertical configuration is crucial for applications requiring **significant open ground**, fencing functionality, wide passages, or strip cropping.

When is Vertical the Best Choice?

Optimal Applications for the Vertical System

Wide Technological Passes

Facilitates large machinery, wide cultivation strips, and clear field layouts. Requires a minimum cultivation strip of approximately 9m for agricultural machinery.

Cereals and Strip Crops

Ideal for vines, cereals, and maize — C4 plants requiring a high proportion of direct light.

Energy Fences

Enables perimeter integration with field boundaries, zone division functions, and landscape projects.

Demonstration Projects

Suitable for showcase, reference, and specialist installations that require a slender, visible geometry.

Vertical vs. EW 25° — Key Differences

The Vertical system and the East–West 25° system do not directly compete. Each performs optimally in different field geometries:

- **EW 25°** — compact geometry, vegetables, berries, microclimate
- **Vertical** — wide cultivation strips, accessibility, fencing, cereals

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The Vertical system does not replace the East–West 25° system; it complements the offering where the field geometry demands a different approach.

Structural Advantages of the Vertical System

Closed Profiles

Consistent material philosophy with the EW 25° system, offering high stiffness, corrosion resistance, and compliance with Eurocode 1, 3, and EN 1090.

Slender Support Geometry

Narrower profiles minimize structural self-shading and optimize the optical performance of the modules, in contrast to bulkier market solutions.

Durability in Agricultural Environments

Features a protective coating with high resistance to abrasion, corrosion, dust, fertilizers, and temperature cycles. Designed for multi-year operation under demanding conditions.

Wind Zones 1–4

Design compliant with relevant European standards for wind and snow loads. The system is engineered for real-world field conditions across various wind zones.

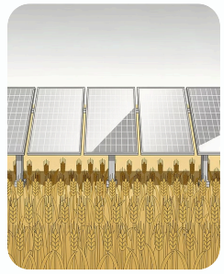
> In BifacialMAX vertical systems, the structural steel and geometry must be as refined as the energy function itself.

Vertical BifacialMAX Variants

1×1 Vertical 90°

Featuring a 90° angle, module height of approximately 250 cm, and a weight of approximately 30 kg, this is a light, modular, and flexible variant. It is designed for:

- Energy field fences
- Perimeter security systems
- Pilot and demonstration projects
- Crop boundary lines



1×5 Vertical AgriPV

With a module start height of approximately 210 cm and a weight of approximately 139 kg for 5 modules, this system is optimized for wide cultivation terraces. It is designed for:

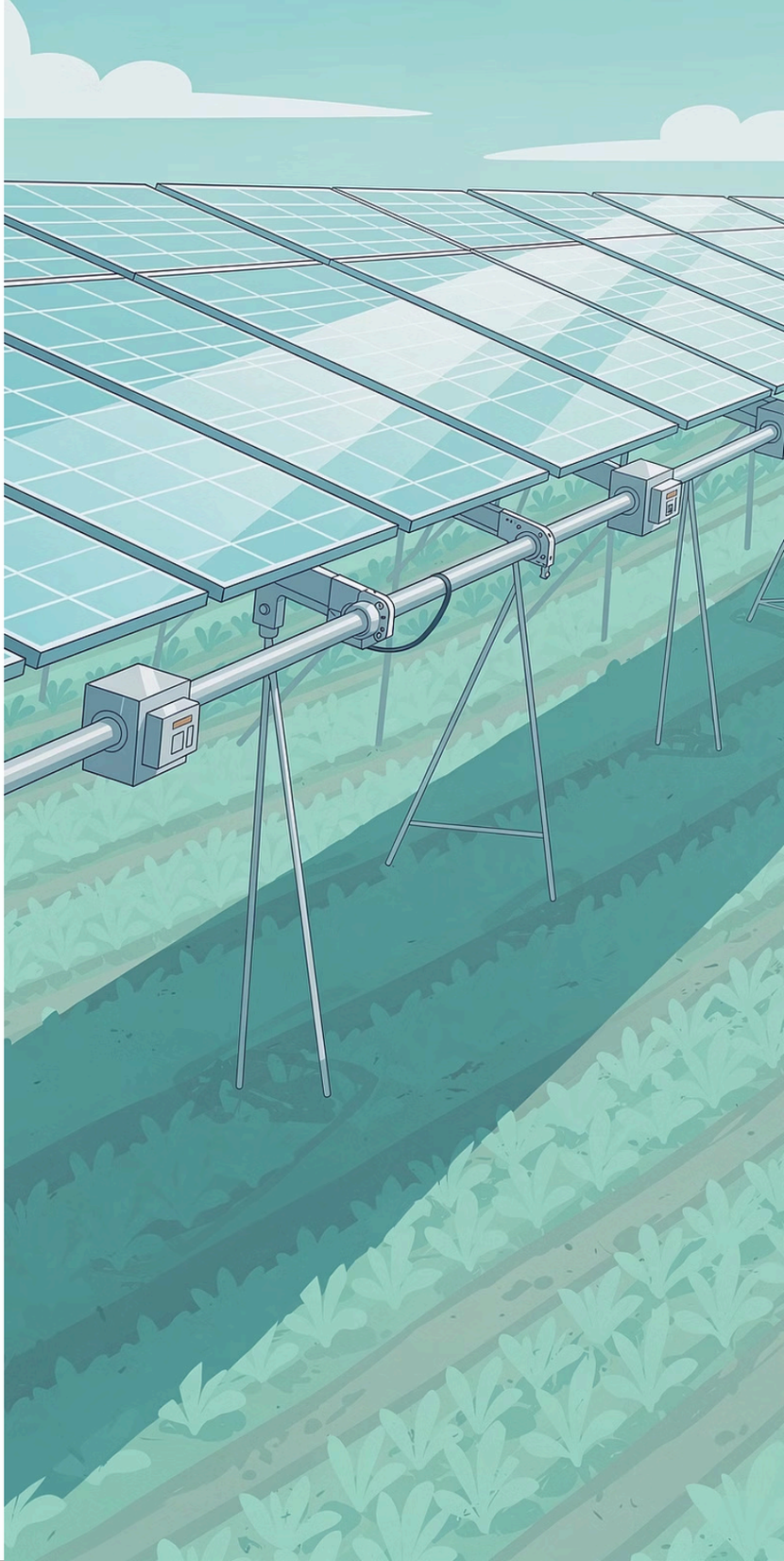
- Cereals and strip crops
- Applications requiring wide passages and high mechanization
- Vineyards and specialist crops
- Projects with a minimum 9 m cultivation terrace

CHAPTER 3 — SPECIALIST SYSTEMS

BIFACIALMAX Trackers 1P and 2P

Specialist Systems for Demanding AgriPV Projects

BifacialMAX trackers are engineered for projects demanding higher energy production and more advanced module operating geometry. While not a primary catalog system—a role fulfilled by East–West 25°—they represent a crucial category of solutions for **specialist investments**, particularly where combining an active agricultural function with enhanced energy productivity is paramount.



BifacialMAX Trackers: Design Philosophy

Safety and Responsible Engineering

BifacialMAX designs its trackers with a **high mechanical safety reserve**, ensuring that the system's overall safety is not solely reliant on the flawless operation of automation.

This embodies a conservative engineering approach: the structure retains substantial mechanical stability **even during emergency scenarios** and challenging weather conditions, specifically when electronic controls are unable to orient the system into a safe position.

Practical Implications

- Large mechanical safety reserve, exceeding normative requirements
- Module protection under extreme wind loads
- Operational safety does not assume flawless electronic functionality.
- Compliance with Eurocode 1, Eurocode 3, and EN 1090

This distinction precisely sets BifacialMAX trackers apart from lower-cost market solutions, which often base system safety solely on the speed of automation response.

Tracker 1P — The Compact System for Agrivoltaic and Mixed-Use Projects

The Tracker 1P is a more compact variant within our tracking system portfolio. In the BifacialMAX reference catalog, it is presented as a system featuring an operating angle of approximately **60°**, a module height of approximately **230 cm**, and a recommended **cultivation strip of approximately 6 m** to accommodate agricultural machinery.

Standard and Elevated Variants

The standard Tracker 1P operates with moderate working clearance. However, it can also be engineered in elevated variants, providing working clearance up to approximately 200 cm, when necessitated by specific cultivation requirements, logistical considerations, or mechanization needs.

Optimal Applications for Tracker 1P

- Projects primarily focused on energy generation rather than intensive agriculture.
- Cultivation types with moderate clearance requirements.
- Mixed projects that seek to optimize both energy production and active agricultural function.
- Scenarios where a tracker system is required, but without the need for very high structural clearance.

approx. 20–30%

Increased Energy Yield

compared to static systems

6 m

Cultivation Strip Width

reference for machinery

Tracker 2P — System for Wide Dual Land Use

The Tracker 2P is a more expansive tracker variant, designed for large farms and wide cultivation strips. The module starting height is approximately **210 cm**, with an operating angle of approximately **60°**, and a weight of approximately **1200 kg for 24 modules**. A recommended cultivation strip of approximately **12 m** is provided for agricultural machinery.

Where the 2P Offers Strong Rationale

The Tracker 2P is engineered for projects where active agricultural function beneath the construction is intended to be practical, extensive, and mechanized:

- Cereals and wide field crops
- Reference AgriPV implementations — large dual land use projects
- Large technological strips requiring significant mechanization
- Selected orchards and specialized crops requiring high clearance

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The 2P represents a natural entry point into markets requiring genuine dual land use — where mere proximity of agriculture with PV is not sufficient.

1P or 2P — Choosing the Right Tracker

Criterion	Tracker 1P	Tracker 2P
System characteristic	More compact	More spacious
Operating angle	Approx. 60°	Approx. 60°
Module height	Approx. 230 cm (standard version)	Approx. 210 cm (starting height)
Structure weight	Approx. 600 kg / 12 modules	Approx. 1200 kg / 24 modules
Recommended cultivation strip	**Approx. 6 m**	**Approx. 12 m**
Best applications	Mixed projects, moderate clearance, selected row crops	Cereals, wide fields, high mechanization, reference AgriPV implementations
Agricultural function	Good	Very good with wide cultivation strips
Role in the catalog	Specialized system	Specialized system for wide dual land use projects

Neither 1P nor 2P is inherently superior; they are distinct design tools. The choice between 1P and 2P should first consider the **field geometry** and the desired **agricultural function**.

SECTION 4 — SAFETY AND DURABILITY

Safety and Reliability — The BifacialMAX Philosophy

BifacialMAX designs all AgriPV systems—East–West 25°, Vertical, and Tracker solutions—adhering to a core philosophy of responsible engineering: safety is not merely a marketing add-on, but a fundamental prerequisite for a robust system economy.

1

Closed Profiles

Enhanced rigidity against bending and torsion, leading to a reduced risk of trapezoidal deformation and lateral overloads.

2

Protective Coating

Ensures long-lasting resistance to corrosion, abrasion, dust, fertilizers, and varying climatic conditions.

3

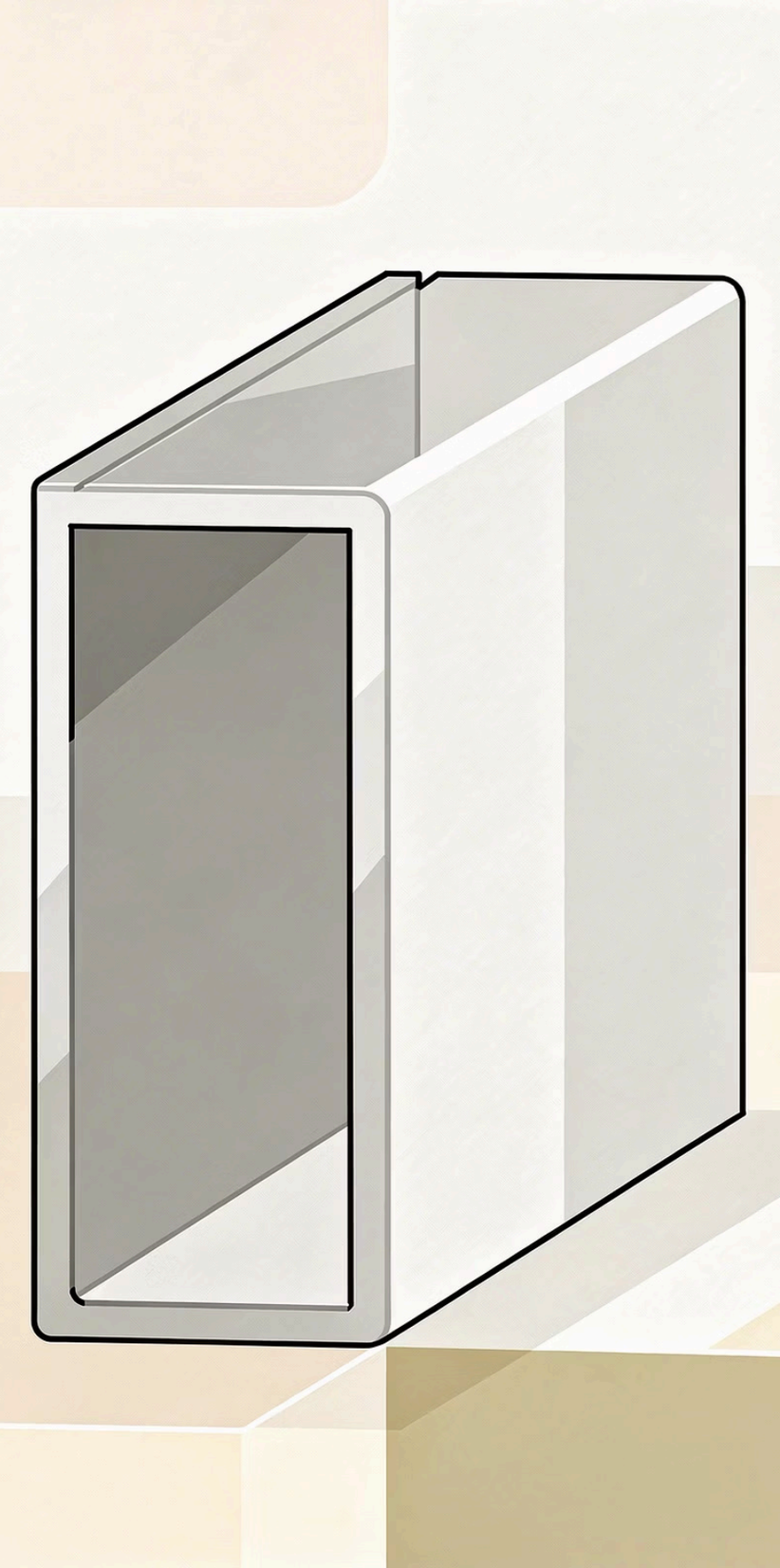
Eurocode 1, 3

Design for wind, snow, and self-weight loads in accordance with PN-EN 1991 and PN-EN 1993 standards.

4

EN 1090

Manufacture of structural components in accordance with relevant parts of the EN 1090 series, depending on material and project scope.



Bifacial Module Protection — A Critical Project Component

Challenges in Conventional Multi-Row Systems

In multi-row systems with wide module arrays, lateral structural overloads and trapezoidal deformation result in **uneven stress on the rear glass** of bifacial modules. This often leads to glass breakage, which frequently goes unnoticed for prolonged periods, thereby continuously reducing module yield and durability.

BifacialMAX Solution

The single-row East–West 25° arrangement, utilizing rigid closed profiles, **radically mitigates this risk** by ensuring:

- Greater rigidity of load-bearing elements
- Reduced lateral forces within the system
- Absence of trapezoidal deformation, a characteristic issue of wide multi-row arrays
- Permanent module mounting in a stable, single-row geometry

BifacialMAX Trackers employ robust omega-type clamps with a thickness of 2.5 mm, guaranteeing even support along the panel's edge and protecting the glass from point stresses.

Four BIFACIALMAX Systems: Tailored for Diverse Applications

Each BIFACIALMAX system features distinct operational logic and serves a specific role within the portfolio. System selection is primarily guided by crop requirements and field geometry.

East–West 25°

MAIN SYSTEM

Optimized for vegetables, herbs, berries, and strawberries. This system offers an optimal compromise: energy production, agricultural yield, operational simplicity, and microclimate control. It requires the smallest cultivation strip.

Vertical

SECOND PILLAR

Ideal for cereals, grapevines, and strip crops. Features wide access routes, strip layouts, and effectively functions as an energy fence.

Tracker 1P

SPECIALISED SYSTEM

Designed for mixed projects and specific field crops. This compact tracker is suitable for projects requiring active solar tracking.

Tracker 2P

SPECIALISED SYSTEM

Suitable for cereals, extensive field crops, and applications requiring substantial mechanization. This tracker supports broad dual land use and enhanced agricultural mechanization.

> First, consider crop biology and field geometry. Then, select the appropriate system.

Land Footprint per System

MAIN SYSTEM

East–West 25°

Cultivation Strip (Terrace): crop-dependent
typically 3.0–4.5 m
approx. 0.61–0.91 MWp/ha

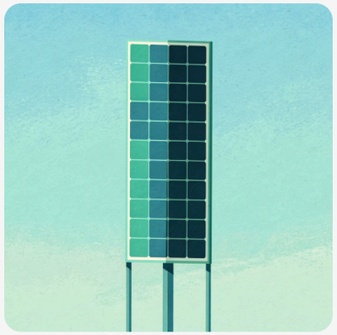
Very compact variant:
approx. 2.52 m
up to approx. 1.08 MWp/ha

Suitable for: Vegetables · Berries · Strawberries

Optimal Land Utilization

VERTICAL SYSTEM

Vertical



Cultivation Strip (Terrace): approx. 9 m
approx. 0.30 MWp/ha

Wide access routes for machinery

Suitable for: Cereals · Vineyards

SPECIALISED SYSTEM

Tracker 1P

Cultivation Strip (Terrace): approx. 6 m
approx. 0.45 MWp/ha

Compact tracker design

Suitable for: Cereals

SPECIALISED SYSTEM

Tracker 2P

Cultivation Strip (Terrace): approx. 12 m
approx. 0.45 MWp/ha

Facilitates extensive mechanization

Suitable for: Cereals · Maize

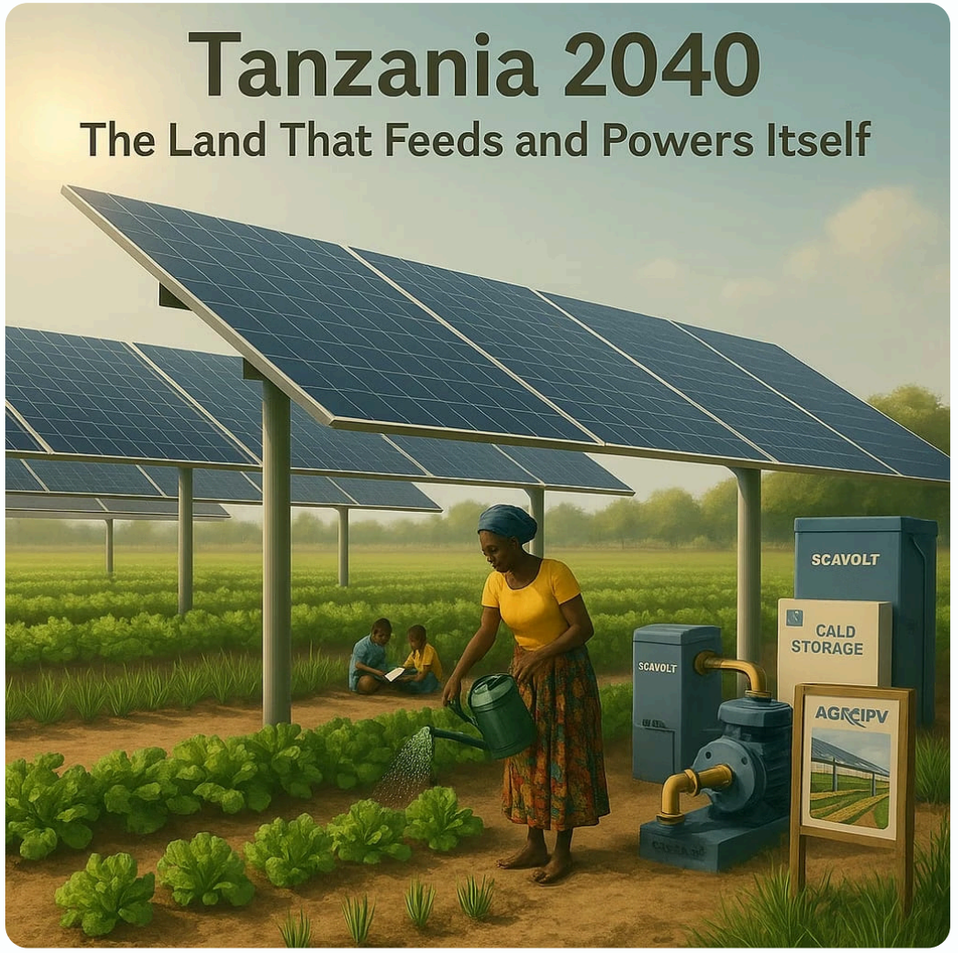
The primary advantage of the East–West 25° system is its capability to implement AgriPV with a **significantly more compact field geometry**. This makes it ideally suited for vegetables, herbs, strawberries, berries, and various mixed crops, where both microclimate management and intensive land utilization are crucial.

- East–West 25° — typically 3.0–4.5 m — approx. 0.61–0.91 MWp/ha
- East–West 25° — very compact variant 2.52 m — up to approx. 1.08 MWp/ha
- Tracker 1P — approx. 6 m — approx. 0.45 MWp/ha
- Vertical — approx. 9 m — approx. 0.30 MWp/ha
- Tracker 2P — approx. 12 m — approx. 0.45 MWp/ha

Indicative values for 600 W modules with dimensions 2.20 × 1.13 m, mounted vertically, calculated as a reference DC power density per hectare.

> The smaller the required cultivation strip, the more land remains actively agricultural.

AgriPV in Hot and Dry Climates



AgriPV as a Biological Protection Tool

In hot and dry climates, AgriPV transcends its role as a mere energy supplement. It transforms into a **system for protecting agricultural fields against overheating and water loss**.

Preferred Project Parameters

- Increased panel height — for enhanced protective shade
- Wider row spacing — to improve air circulation
- Prioritization of shade, not solely energy generation
- High albedo — resulting in cooler substrate and higher rear gain
- East–West 25° configuration as a foundational approach

Drought-Resistant Plants

Olives, dates, figs, alfalfa, and selected fodder crops — these are plants native to Mediterranean and desert climates, which particularly benefit from PV protection.

Who Can Benefit from BifacialMAX AgriPV?

Vegetable Farms

Lettuce, arugula, spinach, and herbs benefit from the EW 25° 1.10–1.50 m configuration, which offers an optimized microclimatic protection geometry.

Berry Plantations

For blueberries, raspberries, currants, blackberries, and strawberries, the EW 25° configuration provides the most significant commercial benefit.

Orchards and Specialist Crops

Higher variants of 2.10–3.00 m are ideal for orchards, vineyards, and other crops requiring substantial clearance under the panels.

Energy Investors

Projects integrating genuine agricultural production with guaranteed electricity generation, embodying effective dual land use.

Pilot and R&D Projects

Suitable for demonstration, reference, and research installations, including 1x1 systems or small EW 25° arrangements.

Municipalities and Energy Clusters

Local AgriPV models serve as a key element of the energy transition and provide crucial support for local agriculture.

Why BifacialMAX AgriPV?

Active Agricultural Function

The land beneath the structure and between rows maintains full agricultural productivity throughout the year.

Enhanced Bifacial Performance

An optimized narrow table design, appropriate height, and favorable optical conditions contribute to an additional yield of approximately 15–20% from the module rear side.

Microclimatic Benefits

Benefits include reduced overheating, improved water management, and protection from extreme insolation and hail.

High Durability

Utilizes closed profiles, a protective coating, and is designed in accordance with relevant European standards, ensuring 50-year design durability.

Design Flexibility

Offers heights ranging from 1.10 to 3.00 m, accommodating various row spacings, diverse crop types, and differing levels of mechanisation.

> BifacialMAX AgriPV is a system where agriculture and energy mutually reinforce each other.

FIELD ZONES IN THE BIFACIALMAX EAST–WEST 25° SYSTEM

The AgriPV system establishes distinct biological zones within the field. Each zone is characterized by a unique light intensity, soil temperature, and moisture management profile. This facilitates the targeted selection of plants suitable for specific sections of the inter-row space.

Zone	Location	Light	Soil Temperature	Moisture / Evaporation	Additional Phenomenon	Optimal Function
A	adjacent to panel	deep shade / semi-shade	lowest	maximal moisture stability, minimal evaporation	increased water runoff from modules	shade-loving and semi-shade-loving plants
B	transition zone	moderate light	moderate	balanced moisture and light access	optimal microclimatic protection	berry plants and mixed crops
C	center of inter-row	highest insolation	highest	lower humidity, higher evaporation	technological pathway or light-demanding plant zone	more light-demanding plants and field logistics

A — Shade · Moisture · Coolness

B — Balance · Microclimate

C — Sun · Warmth · Evaporation

> BIFACIALMAX AgriPV designs not only for energy but also for water, shade, and field biology.

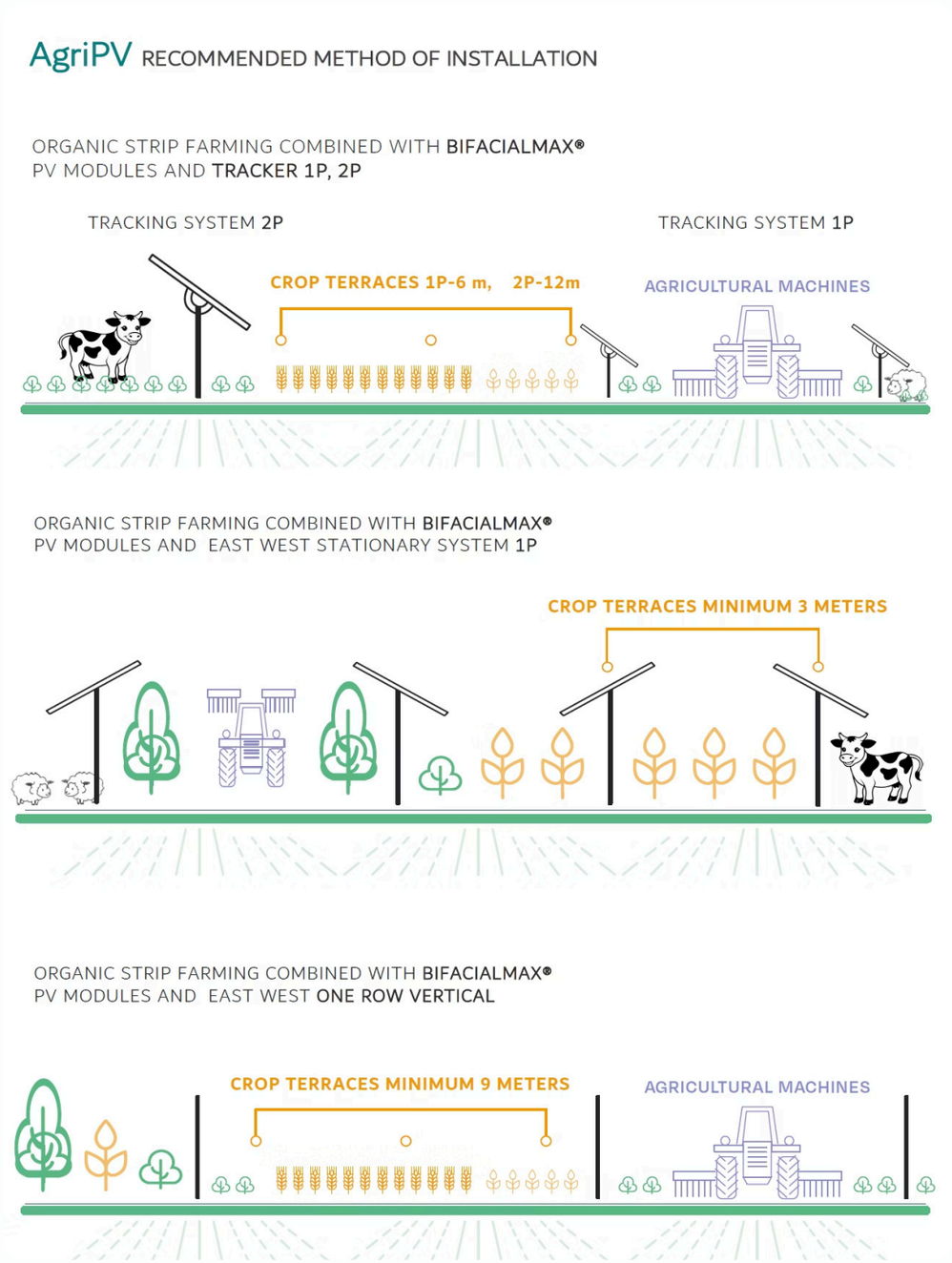
VEGETABLES AND HERBS – OPTIMAL APPLICATIONS FOR THE EAST–WEST 25° SYSTEM

The BIFACIALMAX East–West 25° system is ideally suited for environments requiring precise microclimate control, mitigation of overheating, and more efficient land utilization. Consequently, it presents a particularly logical solution for vegetables, herbs, and other low-growing crops.

Plant	Preferred Zone	Recommended Structure Height	Typical Row Spacing	Primary Agronomic Benefit
Lettuce	A	1.10–1.20 m	3.0–4.5 m	Reduction of overheating, enhanced humidity stability
Rocket	A	1.10–1.20 m	3.0–4.5 m	Reduced thermal stress, more consistent microclimate
Spinach	A	1.10–1.20 m	3.0–4.5 m	Reduction of evaporation and soil overheating
Basil	A / B	1.10–1.30 m	3.0–4.5 m	Protection against excessive radiation and drought
Mint	A / B	1.10–1.30 m	3.0–4.5 m	Improved humidity and reduced overheating
Leafy herbs	A / B	1.10–1.30 m	3.0–4.5 m	More stable growth conditions
Strawberry	B	1.30–1.50 m	4.0–6.0 m	Balanced light, humidity, and microclimatic protection

Zones A and A/B represent the primary application areas of the BIFACIALMAX East–West 25° system for vegetables and herbs.

> The East–West 25° system is the primary BIFACIALMAX solution for vegetables, herbs, and low-growing crops, optimizing both energy generation and agricultural yield.



RECOMMENDED AGRIVOLTAIC SYSTEM GEOMETRY

Different BIFACIALMAX configurations enable various crop row widths, mechanization levels, and field biological conditions. The specific system geometry significantly influences the field's operational effectiveness.

Tracker 1P and 2P

— Tracker 1P: crop row approximately 6 m

— Tracker 2P: crop row approximately 12 m

— Application: Suited for greater mechanization, wide working rows, large fields, and more energy-intensive systems.

East–West 25°

— Typical crop row: 3.0–4.5 m

— Compact variant: From 2.52 m

— Application: Ideal for berries, vegetables, mixed crops, offering the best compromise between field biology and power density.

Vertical

— Typical crop row: approximately 9 m

— Application: Suitable for grapevines, cereals, strip cropping, and wide passages.

Effective agrophotovoltaics prioritizes field geometry, plant biology, and farm logistics—not solely the module itself.

Berries and Soft Fruits — Optimal Applications for the BIFACIALMAX System

Berry plantations are exceptionally well-suited for the BIFACIALMAX East–West 25° system, as they benefit significantly from moderate shading, enhanced water management, and microclimatic protection. This makes them one of the strongest application areas for this system.

Crop	Zone	Recommended System Height	Typical Row Spacing	Main Benefit	Level of Mechanization
Blueberry	B	1.50–2.10 m	5.0–8.0 m	Protection from heat stress, more stable humidity	Medium
Raspberry	B	1.50–2.10 m	5.0–8.0 m	Improved microclimate and reduced overheating	Medium
Currant	B	1.50–2.10 m	5.0–8.0 m	Favorable compromise of light and protection	Medium
Blackberry	B	1.50–2.10 m	5.0–8.0 m	Improved water management and microclimatic cover	Medium
Strawberry	B	1.30–1.50 m	4.0–6.0 m	Optimal conditions for fruit and soil	Low / Medium
Specialized Fruit Bushes	B / C	1.80–2.50 m	6.0–9.0 m	Greater field and passage flexibility	Medium / High

Zone B is the most valuable zone for berry plantations, offering an optimal balance of light, humidity, and microclimatic protection.

For berries, the BIFACIALMAX East–West 25° system presents an exceptionally logical biological and economic solution.

Optimizing for Sun-Loving Plants and Wide Fields: Vertical and Tracker Systems

Not every crop requires the same field layout. For applications involving wide access ways, cereals, grapevines, and certain sun-loving plants, Vertical or Tracker systems may be more appropriate.

Zone C — for plants requiring full sun and wide access ways

The East-West 25° system is best suited for Zones A and B, while Vertical and Tracker systems are more suitable for applications typical of Zone C.

Plant	Preferred Zone	Best Suited System	Required Ground / Terrace	Main Reason for Choice
Grapevine	C	Vertical or high EW 25°	7.0–10.0 m	Greater clearance and fuller light exposure
Cereals	C	Vertical or Tracker 2P	9–12 m	Wide field access and optimal mechanization
Maize	C	Tracker 2P or high specialist systems	9–12 m	Large working aisle and abundant light
Sunflower	C	Vertical or Tracker 2P	9–12 m	Sun-loving plant, suitable for wide fields
Sun-loving field vegetables	C / B+C	high EW 25° or 1P	6–8 m	Requires a greater share of direct light
Wide-field specialist crops	C	Tracker 2P	12 m	Accommodates wide mechanization and active field usage

> While East-West 25° systems dominate for vegetables, herbs, and soft fruits, Vertical and Tracker systems are employed when the specific field geometry necessitates a different approach.

BIFACIALMAX System Selection by Crop Type

Optimal AgriPV system design begins with understanding the specific crop requirements. Only then are the system geometry, height, and row spacing determined.

Crop Type	Field Zone	System	Height	Row Spacing	Main Effect
Leafy Vegetables and Herbs	A / A+B	BIFACIALMAX East–West 25°	1.10–1.20 m	3.0–4.5 m	Thermal shield, reduced evaporation
Strawberry and Mixed Crops	B	BIFACIALMAX East–West 25°	1.30–1.50 m	4.0–6.0 m	Light and humidity balance
Berry Plantations	B	BIFACIALMAX East–West 25°	1.50–2.10 m	5.0–8.0 m	Microclimate, ease of cultivation, rear gain
Grapevines	C / higher zones	Vertical or high EW 25°	2.10–3.00 m	7.0–10.0 m	Greater clearance, fuller light
Cereals and Wide Fields	C	Vertical or Tracker 2P	High / specialist variants	9–12 m	Wide working area, extensive mechanisation
Hot and Dry Climate	Zones A and B; priority: protection against overheating	BIFACIALMAX East–West 25°	Higher variants	Wider spacing	Thermal protection, reduced water loss

> First the plant and field biology. Then the system selection.

SEASONAL PROTECTIVE COVERING

A protective film or netting can be seasonally stretched between adjacent rows of panels.

Seasonal protective film or netting, when stretched between adjacent rows of panels, creates a covering over the cultivation area, eliminating the need for separate greenhouse tunnels. This covering does not obstruct the modules and is not mounted beneath the primary structure.

Protective Film — Cold and Ground Frost

Seasonal film stretched between adjacent rows of panels. Provides protection against ground frost in spring and autumn, extending the production season.

Protective Netting — Hail and Mechanical Screening

Netting stretched between adjacent rows of panels. Offers protection against hail and provides light mechanical screening. Allows both light and air to pass through.

More Stable Thermal Buffer

Features a greater air volume than classic tunnels, leading to slower temperature changes beneath the covering.

Integrated Infrastructure

PV rows provide a ready-made support structure, eliminating costs for separate covering infrastructure.

One system — three functions: year-round energy production, seasonal protection against ground frost (film), and protection against hail (netting).

> The BIFACIALMAX East–West 25° system not only protects against heat but can also shield against cold.

FINAL TABLE

COMPARISON OF BIFACIALMAX AGRIVOLTAIC SYSTEMS

Each BIFACIALMAX system features distinct field operational logic, agricultural functionality, and spatial requirements. The table below illustrates which system offers the greatest versatility and which provides a specialized solution.

Criterion	BIFACIALMAX East–West 25°	BIFACIALMAX Vertical	BIFACIALMAX Tracker 1P	BIFACIALMAX Tracker 2P
Role in Portfolio	Primary catalog system	Second key offering	Specialized system	Specialized system for large-scale dual land use projects
Main Function	Optimal balance: energy, agriculture, safety, and operational simplicity	Facilitates wide passages, strip cropping systems, and energy fences	Compact tracking system for mixed-use projects	Tracking system for dual land use and enhanced mechanization
Required Land Footprint / Cultivation Strip Width	Smallest footprint, adaptable to specific crops	Approximately 9 m	Approximately 6 m	Approximately 12 m
Best Suited Crops	Vegetables, herbs, strawberries, blueberries, raspberries, currants, blackberries, mixed crops	Cereals, grapevines, strip and specialized crops	Mixed-use projects, some field crops	Cereals, wide field crops, high mechanization
System Height	Approximately 1.10–3.00 m	Specialized vertical variants	Compact and medium variants	Wide variant with increased clearance
Energy Performance	High rear gain and high plot energy productivity	Good for specific applications	High tracking yield	High tracking yield and broad field coverage
Field Microclimate	Strongest advantage	Moderate impact	Moderate impact	Moderate to high impact
Maintenance Demands	Simplest	Simple	More demanding	Most demanding
Safety	Very high	High	High	High
Protective Film Compatibility	Yes — a significant advantage	Not integral to the system's core design	Not integral to the system's core design	Not integral to the system's core design
Most Important Commercial Advantage	Primary offering: smallest spatial requirements, optimal for vegetables and berries, microclimate benefits, and simplicity	Wide passages and energy fences	Compact tracking system	Tracking system for wide fields

> BIFACIALMAX East–West 25° remains the most versatile and prominent system within the product portfolio.

TECHNICAL MECHANISM

WHY BIFACIALMAX SYSTEMS EXCEL

Geometry, structural bifaciality, and module safety

The superior performance of BifacialMAX systems is not solely attributable to the term "bifacial." It stems from optimized field geometry, enhanced light access to the module's rear side, effective limitation of structural self-shading, and stable, safe long-term module operation.

OPTIMIZING REAR-SIDE MODULE PERFORMANCE

Single-Row Geometry

The narrow, single-row East–West 25° configuration significantly improves access for reflected and diffused light to the module's rear side.

Increased Height and Field Geometry

Appropriate mounting height and optimized field geometry enhance the optical conditions crucial for effective rear-side module operation.

Structural Bifaciality

Slender, narrower support profiles are engineered to minimize structural self-shading, thereby not impeding the performance of the module's rear side.

Albedo as a Design Parameter

Effective rear gain is not incidental; it is a direct result of meticulously designed field geometry and optimized optical conditions.

It is not sufficient to merely use a bifacial module. The supporting structure must also be designed to ensure it does not compromise the performance of the module's rear side.

MODULE AND STRUCTURE SAFETY

Closed Profiles

Closed profiles provide higher stiffness and torsion resistance, and effectively limit lateral overloads.

Limitation of Trapezoidal Deformation

The stable, single-row geometry inherently reduces the risk of deformations commonly associated with wider multi-row tables.

Protection of the Module's Rear Glass

This design minimizes the risk of uneven stresses, glass cracking, and potential long-term yield losses.

Standards and Durability

Our design adheres to Eurocode 1, Eurocode 3, and EN 1090 standards, integrating a durability logic specifically tailored for agricultural environments.

In BifacialMAX systems, safety is not merely a marketing add-on. It is a fundamental prerequisite for stable module operation and ensures long-term system durability.

ECONOMIC ANALYSIS

ECONOMICS OF BIFACIALMAX AGRIPV SYSTEMS

Geometric, Energy, and Operational System Differences

Not every system offers the same field logic. Project value is simultaneously determined by the cultivation terrace, productivity per hectare, energy output, service level, and system adaptation to agriculture.

System	Typical Cultivation Strip / Terrace	Indicative Power Density	Energy Output	OPEX / Service Needs	Rationale for Application
BifacialMAX East–West 25°	typically 3.0–4.5 m	approx. 0.61–0.91 MWp/ha	rear gain approx. 15–20%	low — static system without moving parts	main system in offer, best compromise: energy, agriculture, microclimate, and hectare utilization
BifacialMAX East–West 25° — compact variant	approx. 2.52 m	up to approx. 1.08 MWp/ha	rear gain approx. 15–20%	low	maximizes plot utilization and provides very high productivity per hectare
BifacialMAX Tracker 1P	approx. 6 m	approx. 0.45 MWp/ha	approx. 20–30% more energy vs. static systems	higher than static systems	specialized solution for projects requiring tracking
BifacialMAX Vertical	approx. 9 m	approx. 0.30 MWp/ha	effective for special applications	low or moderate	wide passages, strip arrangements, energy fences, lower power density per hectare
BifacialMAX Tracker 2P	approx. 12 m	approx. 0.45 MWp/ha	high yield from tracking	highest service requirements in the offer	wide mechanization and large fields, least compact field geometry

15–20%

Rear Gain (E-W 25°)

Additional energy contribution from the rear side of the modules.

2.52 m

Very Compact Variant

Enables a very compact field geometry.

0.61–0.91 MWp/ha

Typical E-W 25° Range

Achieves high productivity per hectare.

FACTORS CREATING PROJECT VALUE

- → Greater productivity per hectare
- → Rear gain and a more useful energy profile
- → Low OPEX and reduced mechanical risk
- → Active agricultural function

> The advantage of BifacialMAX East–West 25° results from the combination of compact field geometry, rear gain, low OPEX, and active AgriPV function.

AGRIPV PROJECT VALUE

AGRIPV PROJECT VALUE

Energy, Production Profile, Storage, OPEX, and Active Agricultural Function

In AgriPV, comparing only the construction cost is insufficient. The true project value is determined by the entire value chain, encompassing investment cost, energy yield, energy value over time, storage needs, operating expenditures (OPEX), productivity per hectare, and the agricultural value of the field.

Parameter	Reference System	BifacialMAX East–West 25°	Impact on Project Value
Investment Cost	100	103	Example: CAPEX increases by only 3%
Energy / Revenue Effect	100	115–120	Effect increases by approximately 15–20% due to bifacial geometry and rear gain
Daily Production Profile	More concentrated in a single peak	More even spread across morning, noon, and afternoon	Greater local and market energy utility
Energy Value over Time	Reference	Potentially higher	Greater share of energy produced in the morning and afternoon
Need for Energy Storage / Shifting	Higher	Potentially lower	Possible reduction of storage CAPEX and OPEX
Operating Costs (OPEX)	Standard	Lower due to static system without moving parts	Reduced servicing and lower reliance on automation
Risk of Mechanical Losses	Standard	Lower due to closed profiles and stable geometry	Fewer indirect and emergency costs
Productivity per Hectare	Reference	Higher due to compact field geometry	Greater project value from the same ground area
Agricultural Function of the Field	Limited or secondary	Active AgriPV function	Project provides energy and agronomic value simultaneously

PROJECT VALUE CHAIN

Similar CAPEX
→ Real rear gain
→ More even energy profile
→ Higher energy value in the morning and afternoon
→ Lower storage needs
→ Lower OPEX
→ Active agricultural function
→ Potentially faster return

AGRIPV: BEYOND ENERGY PRODUCTION

- Land remains agriculturally productive throughout the year
- Microclimate can reduce water loss and plant thermal stress
- System integrates energy and agriculture on the same hectare, enabling dual land use
- Project creates two value streams: energy and agricultural production

In AgriPV, project value stems not only from kWh produced, but from the combined energy, agricultural, and utility effect of dual land use on the same hectare.

> With BifacialMAX AgriPV, investors acquire not only installed power, but also optimized field geometry, true rear gain, active agricultural function, a more beneficial energy profile, and potentially superior overall project economics.

Geometric values, power density, and rear gain ranges are reference values consistent with the systems presented in the catalogue. The example (100 / 103 / 115–120) is comparative in nature and does not replace an individual project's financial model.

BIFACIALMAX AgriPV

Designing Light, Water, and Energy Solutions for Agriculture

Should you require a system specifically adapted for a particular crop, machine height, working width, and desired energy yield, we will prepare a tailored variant for your farm or investment project.

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> We do not merely create shade over the field. We meticulously design light, water, and energy for optimized agricultural production.