

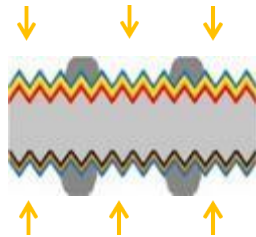
# How to build a bifacial technology solar plant

September, 2019

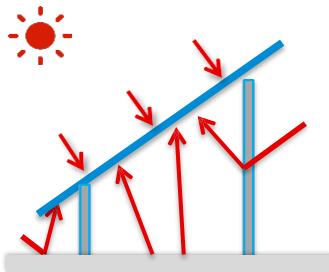
# Basics of bifacial

## Bifacial technology

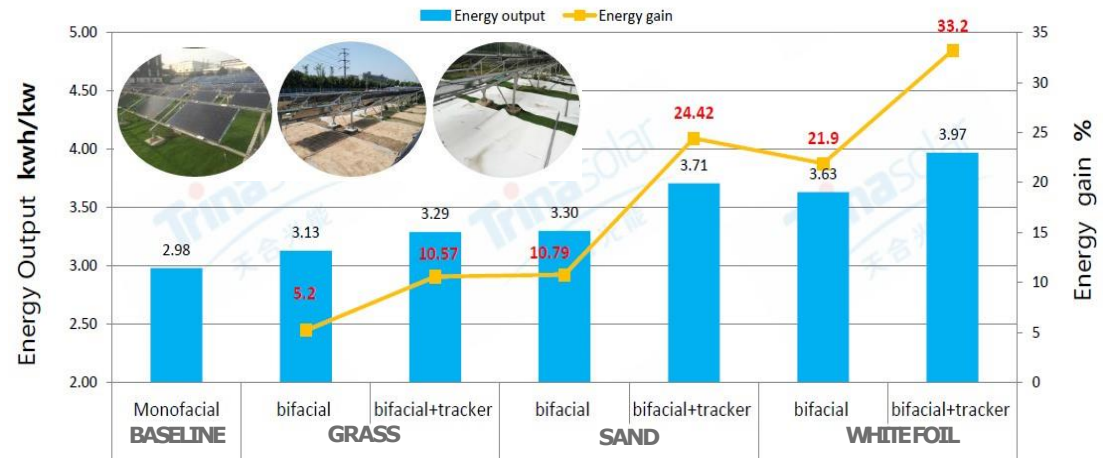
### Double Sided Cell



Generating energy when light reaches **FRONT** and/or **REAR** sides



## Results: Up to 30% of additional energy production from the rear side of solar modules

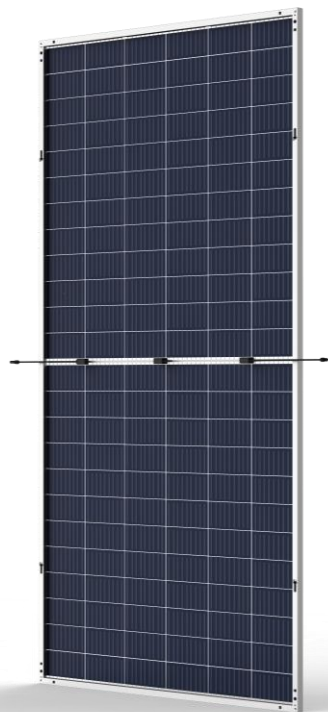


- **Location:** Changzhou, China (E119° 58' N31° 48')
- **Ground:** grass, sand, white foil

- **Installation Angle:** 27° for fixed structure; single axis tracker
- **Test period:** February 2017 - April 2017
- **Height:** 0.4m for fixed tilt system

# Bifacial Modules

## Main characteristics



DuoMax Twin

	Usual options	Comments
Cell type	Usually p-type or n-type PERC.	Several possibilities within these families (eg. iTOPCON)
Module size	60-cell type: 1.5m (120 cells) 72-cell type: 2.0m (144 cells) Extended : 2.2m (156 cells / larger cells)	To be selected according project conditions and tracker configuration.
Nominal power	120-cell type: 320-335W 144-cell type: 370-415W 156-cell type: 420-450W	Defined as only the front power at STC. Back power should not be considered.
Bifaciality	Usually in the range 70% for p-type and 90% for n-type	As a % of front side. (ie. 70% of 400W = 280W)
Degradation	p-type : <2.5% year 1 and <0.5% y2-30 n-type : <2.0% year 1 and <0.4% y2-30	n-PERC has better degradation values. However, sudden power drops happen.
Enclosure & frame	Double glass 2.0/2.0mm Glass 3.2mm / transparent backsheets	Currently similar weight Double glass provides better mechanical protection and thermal evacuation
Frame	Framed or frameless	Most of the market is framed

# Trackers for bifacial modules

## Tracker structure

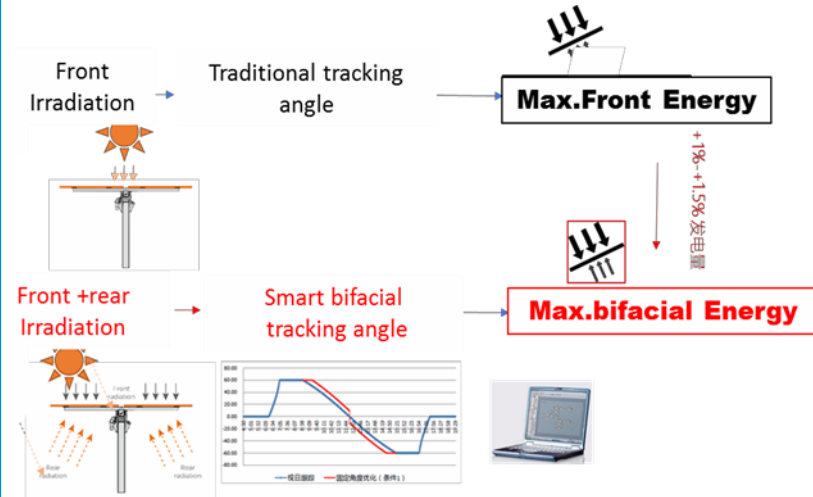


NClave SP160

### Key Factors

- Avoid shadowing on the backside (central beam and beam strouts)
- Allow cleaning of backside

## Optimum tracking for bifacial



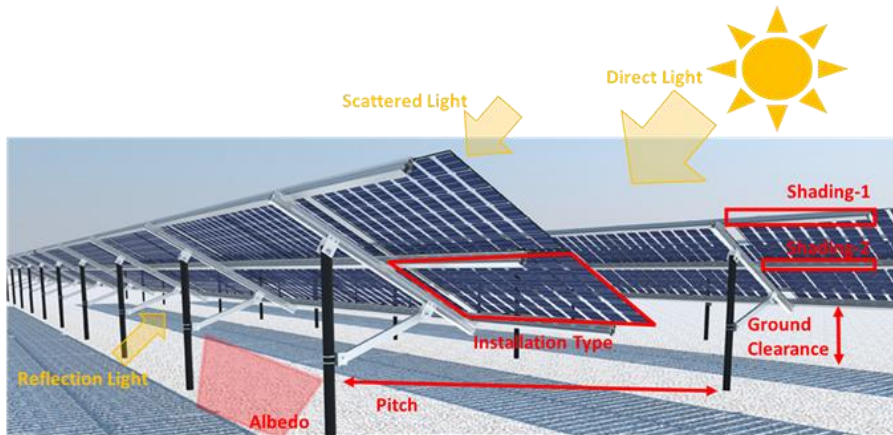
### Key Factors

- Optimize power on both sides through close loop.
- Backtracking



# Power plant optimization

## Plant layout



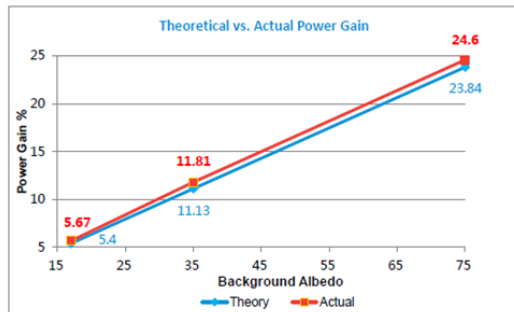
Currently, software to design power plants allow the manual entry of factors, such as albedo or

### Key Factors

- Pitch: Distances between arrays
- Size of Array
- Ground Clearance.
- Height differences of arrays

## Albedo

Albedo (amount of light reflected on a surface) is the key of the energy gain of bifacial modules. There is a linear correlation between both.



Albedo can be measured on site (resource assessment) and can be metered during operation.

Improving albedo: No solution yet to increase the natural reflection of the ground. Issues with the cost of implementation, the degradation of dusting and the environmental costs.

# Operation of bifacial power plants

## Cleaning

The backside of a bifacial module is usually heading down, which significantly reduces the amount of soiling on the module. However, for an optimal performance of the plant it is necessary to clean the backside.

Currently there is no automatic solution for cleaning the backside of modules and manual cleaning is considered.

The cleaning method of the backside has to be approved by the manufacturer. This is especially important for backsheet modules because the least pressure on the cell would cause microcracks.



**TrinaPro plant with bifacial modules in Qinghai Province, China**

# TrinaPro Complete solution for bifacial plants

Customized Smart PV Solution for Utility Scale Ground Mount Applications  
Adapted to different Landscape and Climate Conditions

## Quality Hardware

### Optimized & Fully Compatible

TrinaSolar

NCLAVE

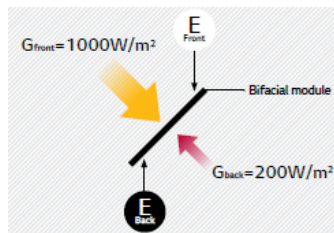


### Inverters



## Intelligent Software

### Optimum Tracking Algorithm



### TrinaPro Monitoring Platform



## Value Added Service

System Design Consulting

Pull Out Test

Geotechnical Investigation

Full Mechanical Assembly

On-site Supervision

Commissioning

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# THANK YOU

[www.trinasolar.com](http://www.trinasolar.com)

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