



# Products Brochure

A leading global provider of smart PV energy solutions



Yingli Solar Official WeChat



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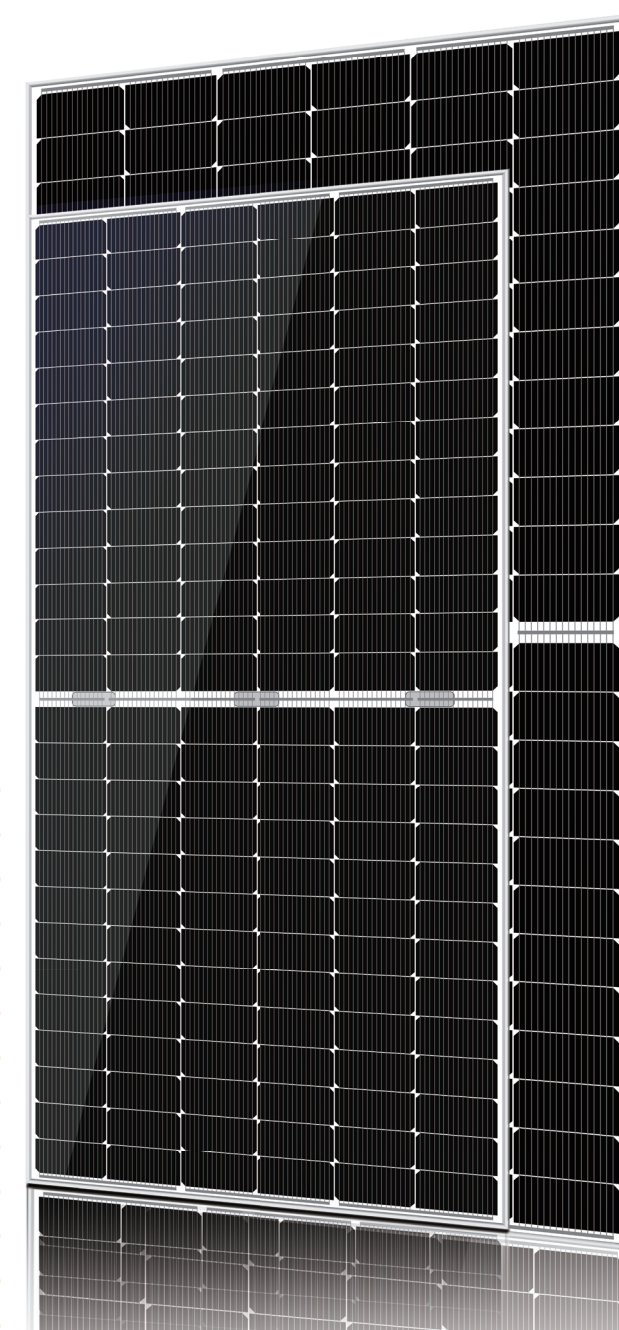
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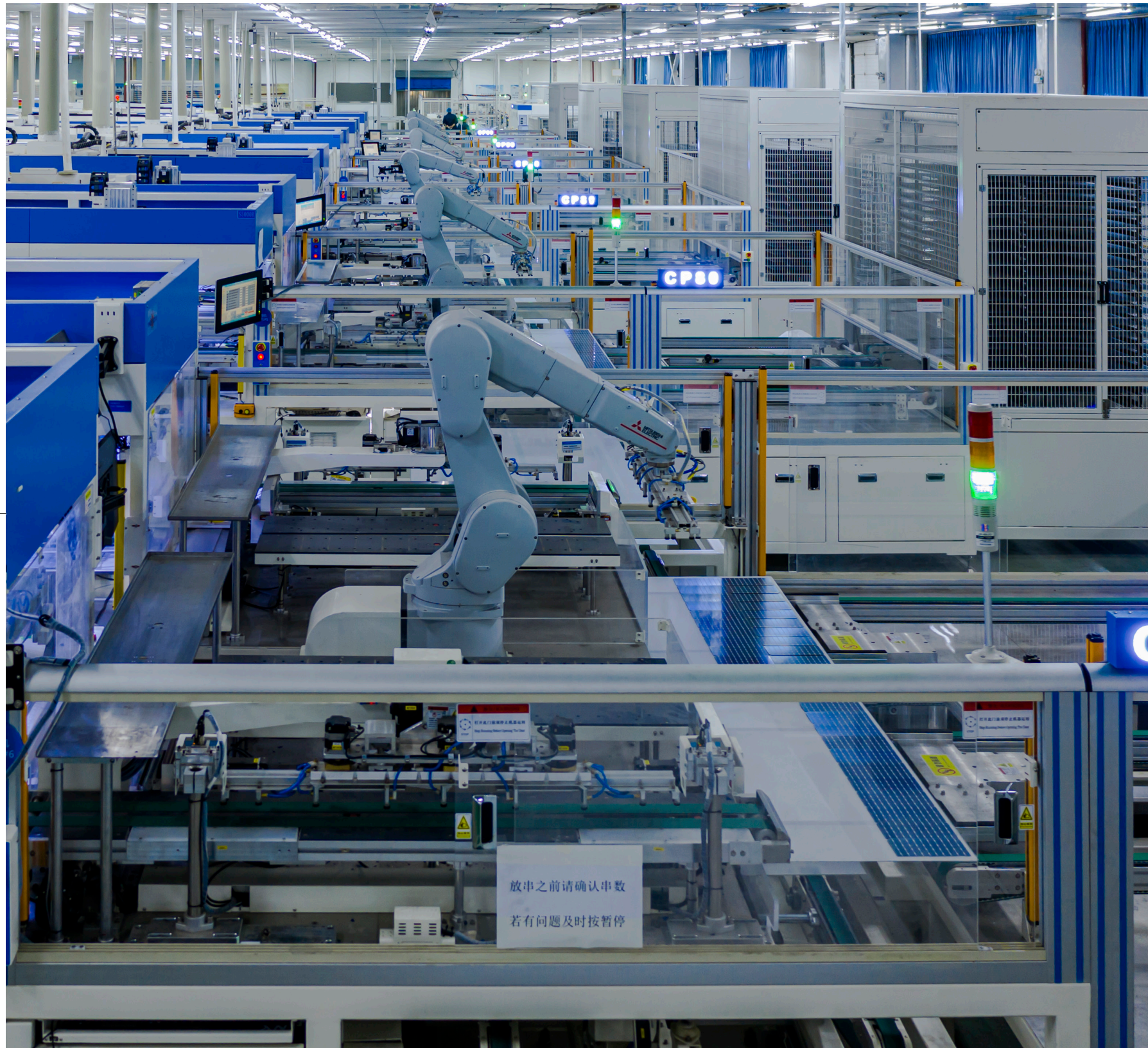
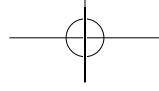
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Yingli Energy Development Co., Ltd.







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# Company Profile

## The world's leading provider of smart energy solutions for photovoltaics

Yingli Energy Development Co., Ltd., known as “Yingli Solar”, which is one of the earliest Chinese companies that involved in the photovoltaic industry, has now developed into a provider of smart photovoltaic energy solutions which focuses on R&D, smart manufacturing, and development and operations of power plants. Yingli Solar has always focused on high-efficiency photovoltaic modules and power plants business. Since entering the photovoltaic industry in 1998, Yingli Solar’s photovoltaic products have been sold to more than 100 countries and regions worldwide.

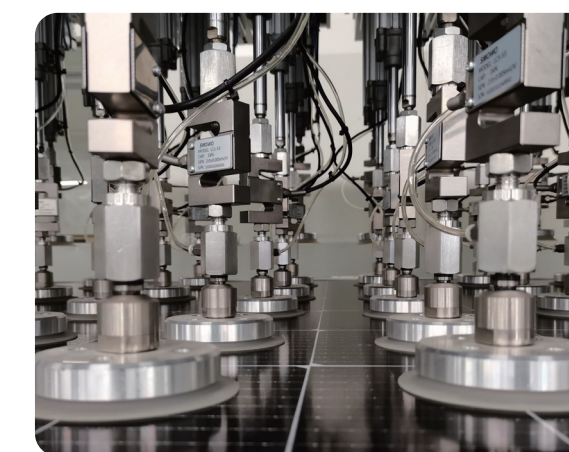


# Quality Strength

## High-Level Technology Innovation Platform

Relying on five Chinese national innovation platforms, academician workstation and post-doctoral workstation, Yingli Solar has made continuous efforts in independent innovation to improve its core competitiveness.

Yingli Solar’s PV Technology Laboratory is qualified by the China National Accreditation Service for Conformity Assessment (CNAS). It can tests more than 200 items related to the entire industry chain, including silicon wafers, cells, modules and power plants. while, it can meets the requirements of many international standards such as IEC61215 and IEC61730.



## Authoritative Quality Certification



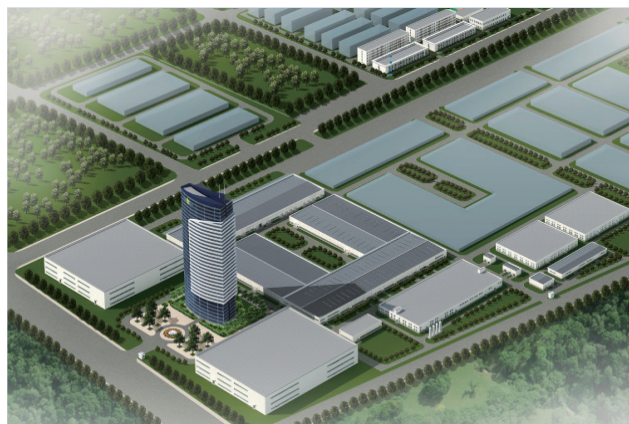
# Smart Manufacturing

## Focus on High-Efficiency Modules

Yingli Solar is headquartered in Baoding City, Hebei Province, China, with four smart manufacturing bases in Tianjin City, Hengshui City, Li County and Mancheng District in Baoding City. Yingli Solar adopts advanced process equipment and technology to achieve a high level automation of manufacturing, quality control and energy management in order to create a "smart factory". All these are for delivering higher quality products to customers with shorter delivery time and lower price.

### Four smart manufacturing bases

Tianjin



Li county



Hengshui



Mancheng



Big Data



Smart Analysis



Digital Connections



Cloud



Zero Carbon

## Products Introduction







# Products overview


## Product Details





	PANDA 3.0 series	YLM 3.0 series	
Glass Backsheet	182 TOPCon module 108 cells: $P_{max} = 420\text{--}430\text{ W}$ 144 cells: $P_{max} = 560\text{--}575\text{ W}$ 156 cells: $P_{max} = 610\text{--}625\text{ W}$	182 PERC module 108 cells: $P_{max} = 405\text{--}415\text{ W}$ 144 cells: $P_{max} = 545\text{--}555\text{ W}$	210 PERC module 120 cells: $P_{max} = 590\text{--}605\text{ W}$ 132 cells: $P_{max} = 655\text{--}670\text{ W}$
Glass Glass	182 TOPCon module 108 cells: $P_{max} = 420\text{--}430\text{ W}$ 144 cells: $P_{max} = 560\text{--}575\text{ W}$ 156 cells: $P_{max} = 610\text{--}625\text{ W}$	182 PERC module 108 cells: $P_{max} = 405\text{--}415\text{ W}$ 144 cells: $P_{max} = 545\text{--}555\text{ W}$	210 PERC module 120 cells: $P_{max} = 590\text{--}605\text{ W}$ 132 cells: $P_{max} = 655\text{--}670\text{ W}$

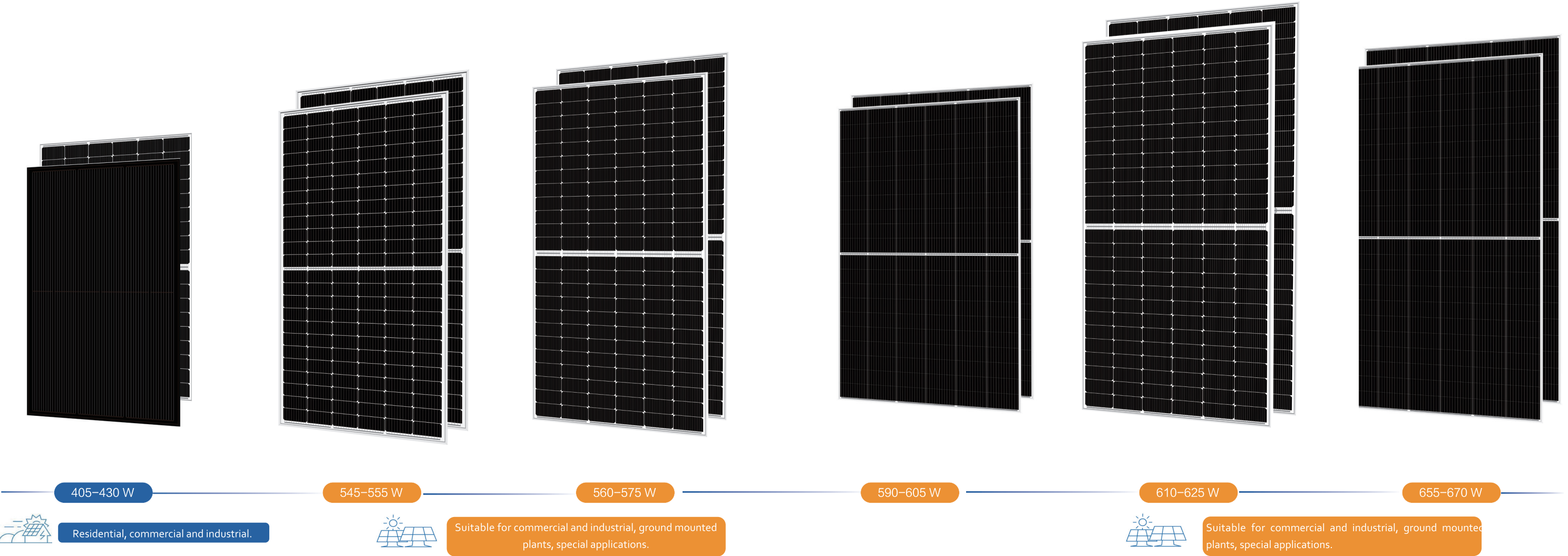
## Our Products

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Wide power range from 400 to 670 W.
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Suitable for residential, commercial and industrial, ground mounted plants, special applications.
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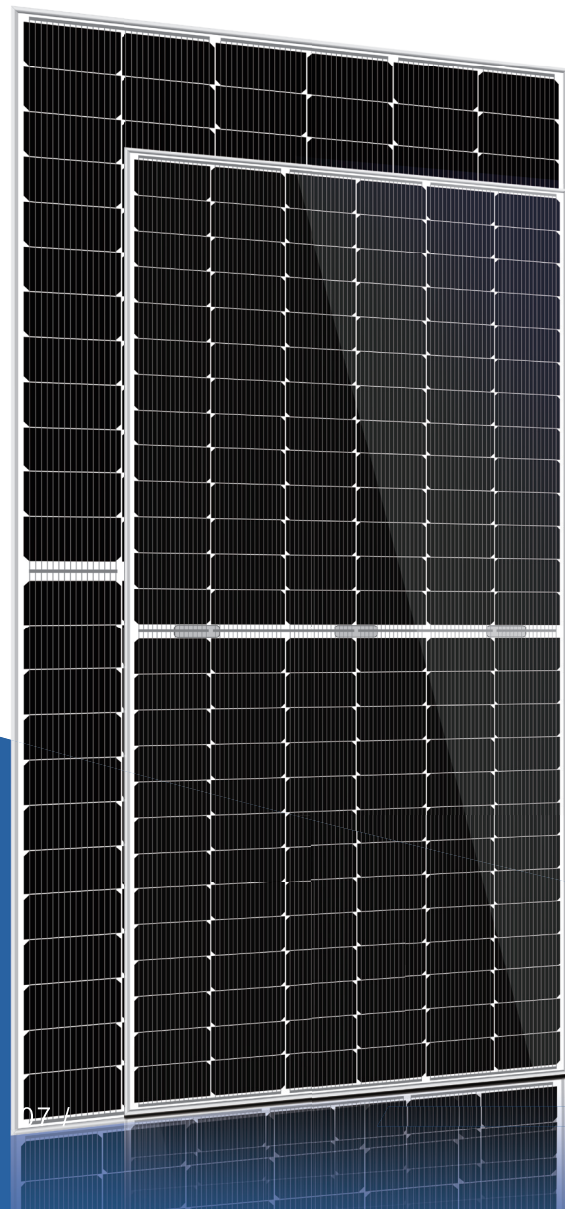
Authoritative third-party reliability certification for applications such as salt mist, ammonia, dust and sand.
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# pan<sup>da</sup> 3.0 Series

The leader of N-type monocrystalline products



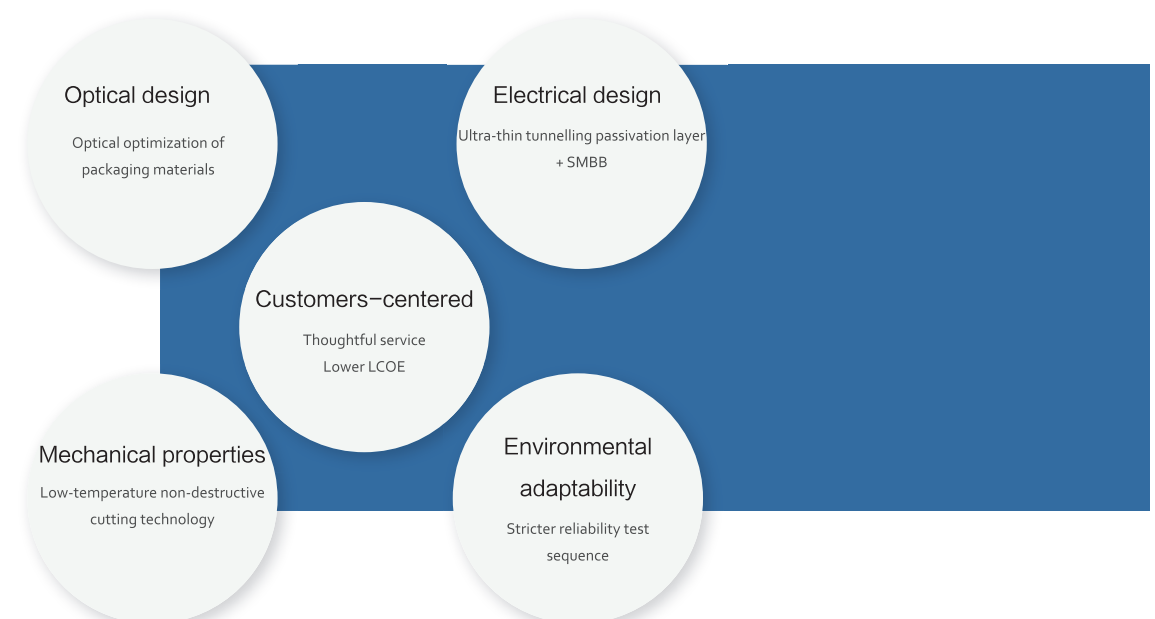
## Series overview

### The Leader of N-type Monocrystalline Products

PANDA 3.0 has been upgraded based on technological innovation.

	PANDA 1.0 N-type PERT	PANDA 2.0 N-type IIF	PANDA 3.0 N-type TOPCon
Cell efficiency	20.5%	21.0%	25.0%
Module efficiency	17.3%	18.2%	22.2%
Bifaciality coefficients	78.0%	80.0%	85.0%
1st-year degradation	2.0%	2.0%	1.0%
Annual degradation	0.6%	0.5%	0.4%
Module power	285 W	300 W	600 W+

### Multi-dimensional innovative design of PANDA 3.0 series





# panda 3.0 Series

## The Pioneer of N-type Monocrystal Technology

Yingli Solar has been researching and industrialising N-type monocrystalline silicon bifacial cells and modules since 2009, and is a pioneer in the development and mass production of N-type technology. Yingli Energy was awarded the right to develop the 50 MW ground-mounted power plant project in Datong, Shanxi, the first national advanced technology PV demonstration base under the National "Leader" Program. Yingli Energy's self-developed Panda bifacial modules, which have the advantages of high power generation capacity, good weather resistance and wide range of applications, are the first bifacial power generation products in the world to be certified by CGC, UL and TÜV Rheinland.

## The Pioneer of N-type Monocrystal Technology

Yingli Solar took the lead in publishing the "Test Methods for Electrical Parameters of Bifacial Power Generation PV Modules" standard, filling the gap of domestic bifacial power generation PV standards. Also Yingli Solar took the lead in completing the "Key Technology Research and Production Line Demonstration for the Industrialization of High Efficiency Homogeneous Junction N-type Monocrystalline Silicon Bifacial Power Generation Solar Cells (TOPCon Cells)" project during the chinese National 13th Five-Year Plan period, which improve technological progress of the PV industry and provided important guarantee and support for the industrialization of N-type TOPCon cells in the PV industry. The project has provided important support for the industrialization of N-type TOPCon cells in the photovoltaic industry.

Cooperated with ECN, Tempres and others to research and develop N-type high-efficiency cell technology, and established PANDA project team.

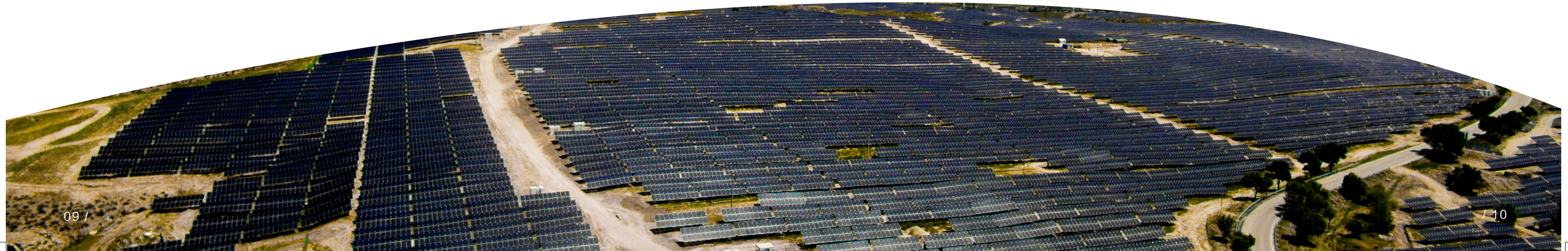
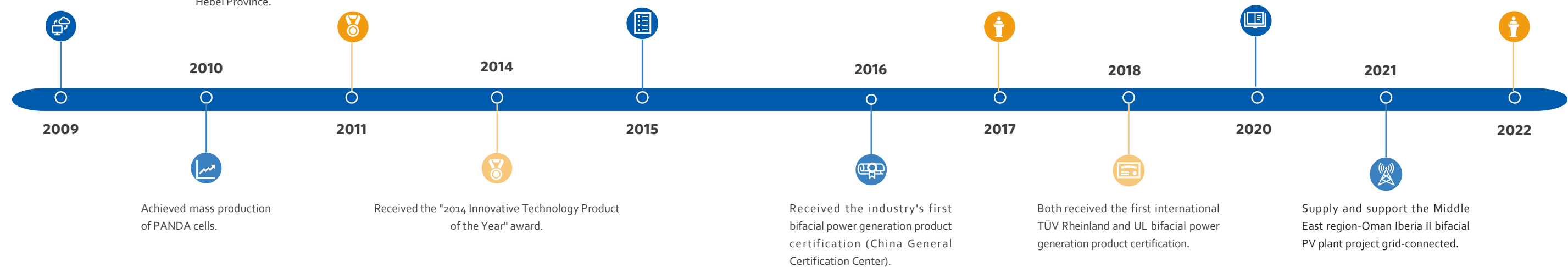
Received the First-class Award of Science & Technology Progress Prize of China Renewable Energy Society  
the Second-class Award of Science & Technology Progress Prize of National Energy Administration  
The Third-class Award of Science & Technology Progress Prize of Hebei Province.

Acquired the right to develop bifacial PV plant projects in the first batch of national "Top Runner" advanced technology demonstration base.

Received the "Dual Glass+" Bifacial Power Generation Technology Innovation Contribution Award at the 3rd "TOP Runner" Innovation Forum.

Released two group standards for bifacial photovoltaic power generation to fill the gap in China's bifacial power generation product testing standards.

Launched PANDA 3.0 series

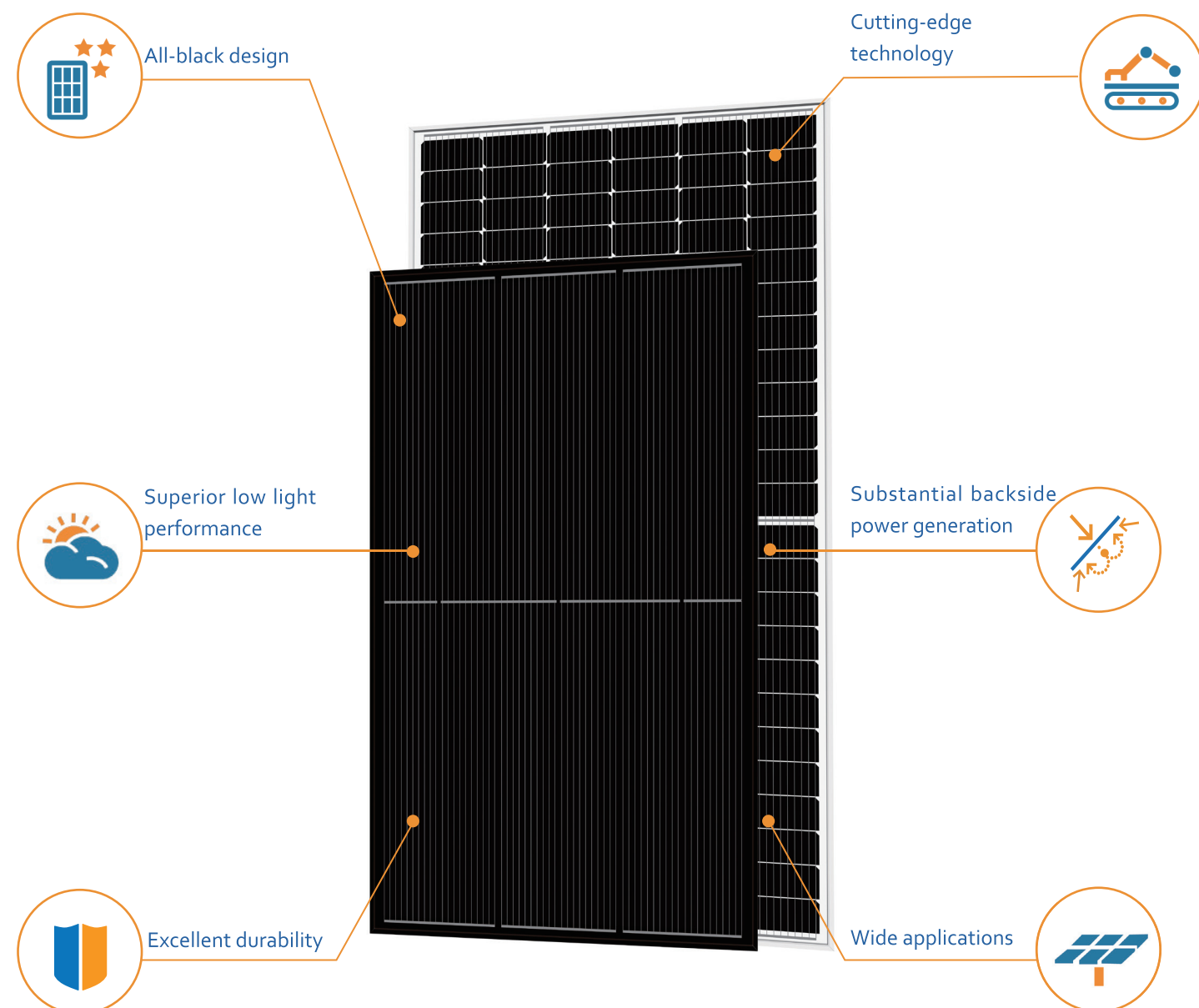




# Product Strength

182 TOPCon Module

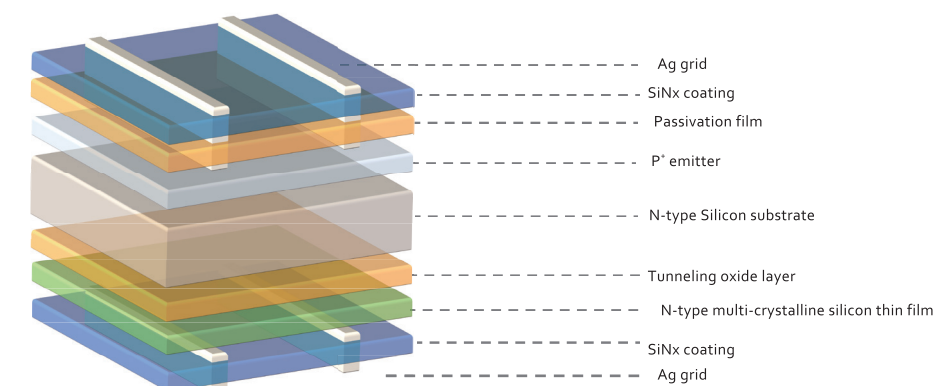
*pan*da 3.0 PRO



# Product Advantages

## Better Cell Performance

Multi composite films passivation technology on the front side and tunnel oxide passivation contacts technology on the rear side to enhance the Voc of the cell with bifaciality coefficient up to 90%.



## Lower Temperature Coefficient

Temperature coefficient reaching  $-0.30\%$ , more outstanding power generation in high temperature condition.

### TOPCon modules

$-0.30\%/^{\circ}\text{C}$

Power	Temperature
472 W	85°C
489 W	75°C
506 W	65°C
523 W	55°C
541 W	45°C
558 W	35°C
575 W	25°C

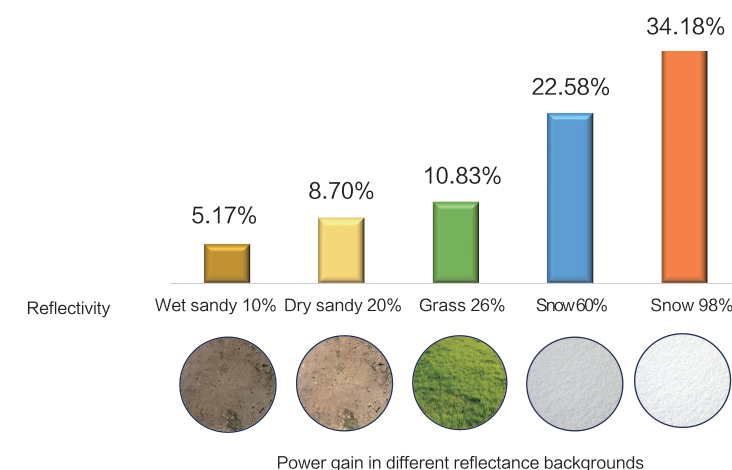
### PERC modules

$-0.35\%/^{\circ}\text{C}$

Power	Temperature
454 W	85°C
474 W	75°C
495 W	65°C
515 W	55°C
535 W	45°C
555 W	35°C
575 W	25°C



## Higher Backside Power Generation in Typical Environments



Case Information: Hebei Baoding, 100 MW, Fixed Tilt 2P  
Module Information: TOPCon Module

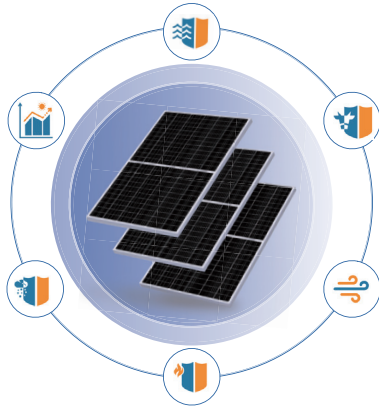


# Product Classification

Yingli Solar focus on customers interests and needs. We launched PANDA 3.0 series products, which includes glass/glass modules and glass/backsheet modules. The performances of PANDA 3.0 series beyond the IEC standard test requirements, with the ability to resist risks such as salt mist, ammonia, dust and sand, and PID. PANDA 3.0 series products are suitable for residential, commercial and industrial, ground mounted plants, special applications.

## Complete System and Product Certifications

- IEC 61215: 2016, IEC61730: 2016
- ISO 9001: 2015 (Quality management systems)
- ISO 14001: 2015 (Environmental management systems)
- BS OHSAS 18001: 2007 (Occupational health and safety management systems)
- IEC 62941: 2019 (Terrestrial photovoltaic (PV) modules- Quality system for PV module manufacturing)





Basic certificate



Certificate: anti-PID 192 hours



Certificate: Sand and Dust resistance



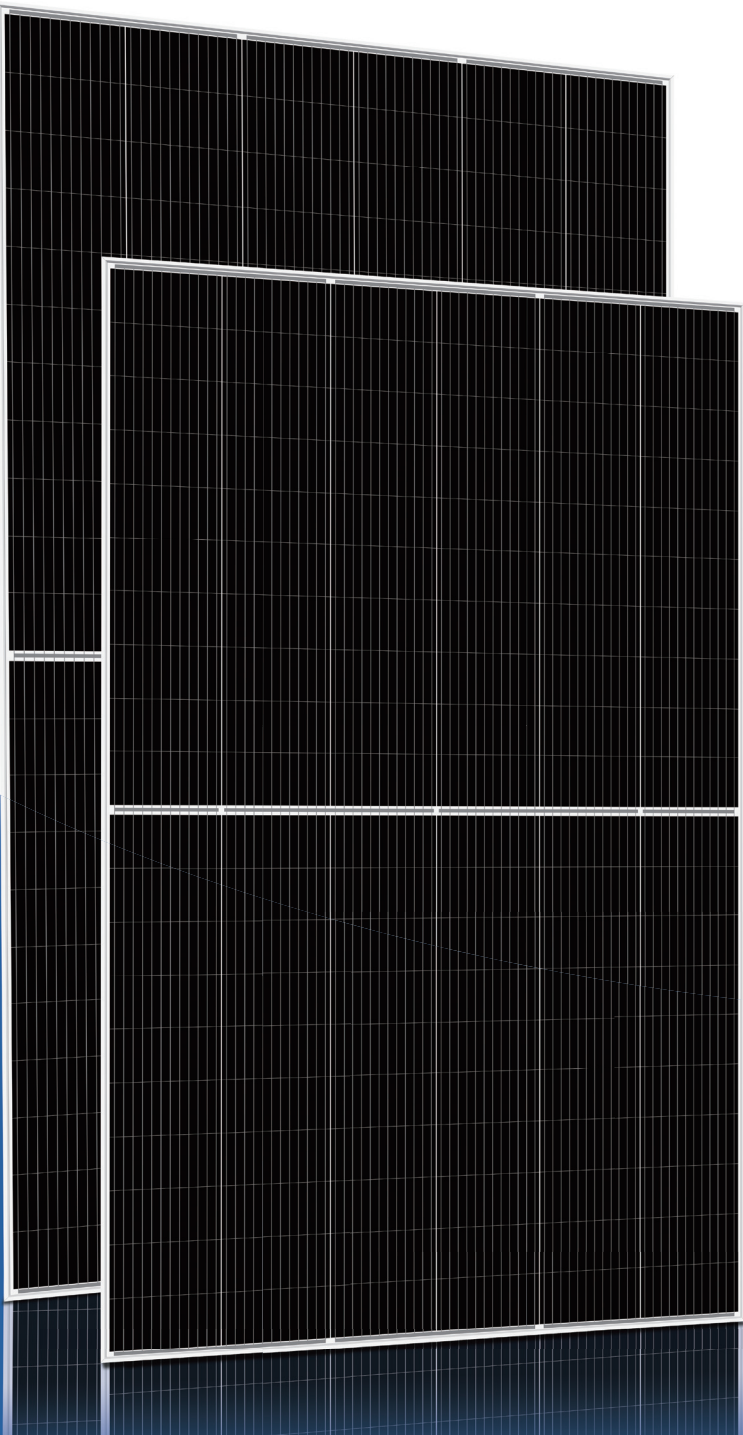
Certificate: Ammonia Corrosion resistance

## PANDA 3.0 PRO Series (182 mm TOPCon cell)

PANDA 3.0 PRO	Module Type	Power ( W )	Cell number ( pcs )	Module dimensions (mm)	Weight (kg)	Bifaciality Coefficients ( % )
Glass/Backsheet module	YLxxxC-38e 1500V 1/2	420-430	108	1722*1134*30	21.5	/
	YLxxxC-50e 1500V 1/2	560-575	144	2278*1134*35	28.0	/
	YLxxxC-55e 1500V 1/2	610-625	156	2465*1134*35	30.6	/
Glass/Glass module	YLxxxCF54 e/2	420-430	108	1722*1134*30	24.8	80 ± 5
	YLxxxCF72 e/2	560-575	144	2278*1134*30	32.0	80 ± 5
	YLxxxCF78 e/2	610-625	156	2465*1134*30	35.0	80 ± 5

Note: The datesheets of the above products may be updated irregularly, and you can consult or download them through the contact information provided on the back cover of the brochure. In addition, our company can provide customized products for customers.

# YLM 3.0 Series

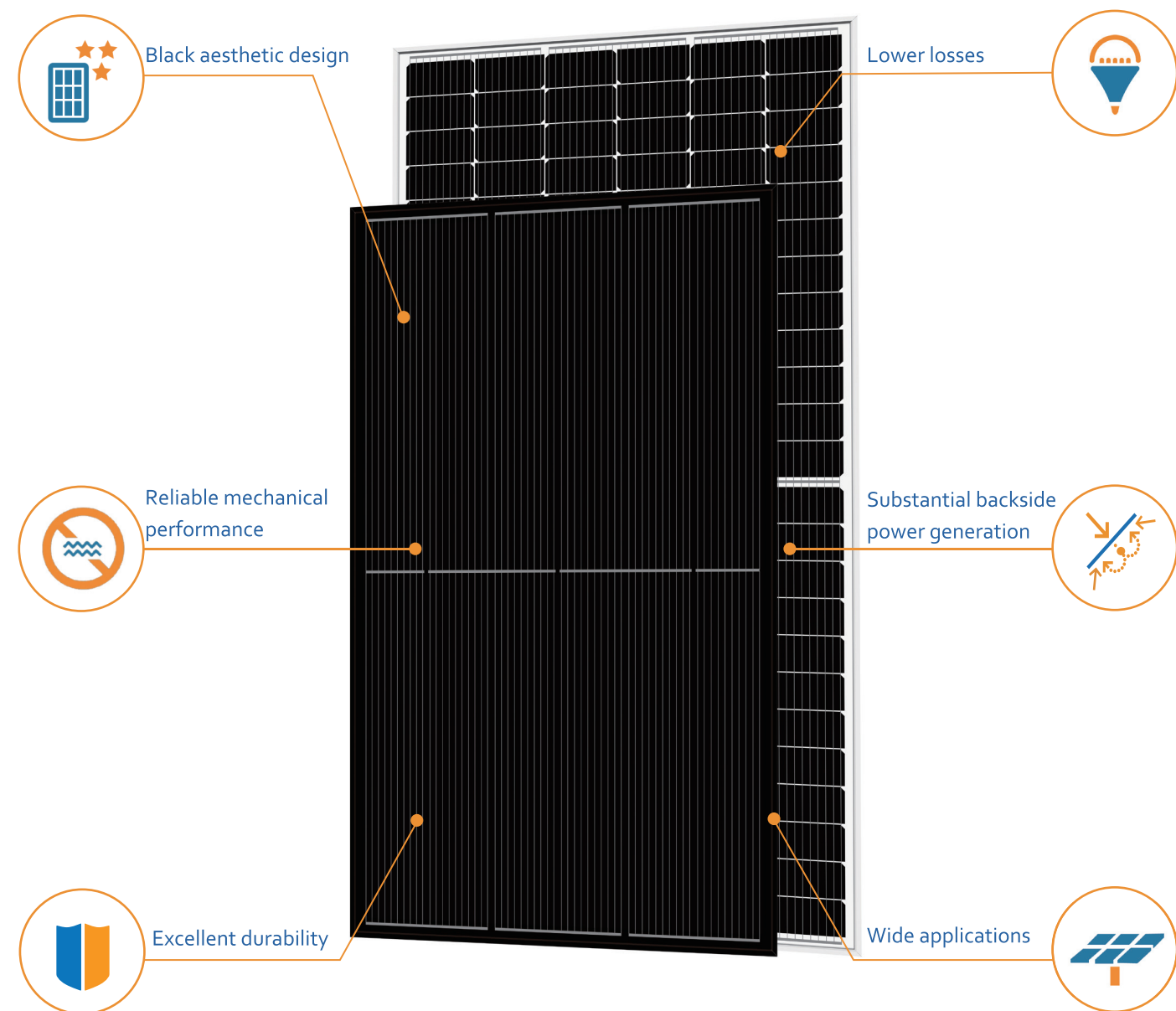




# Product Strength

182PERC Module

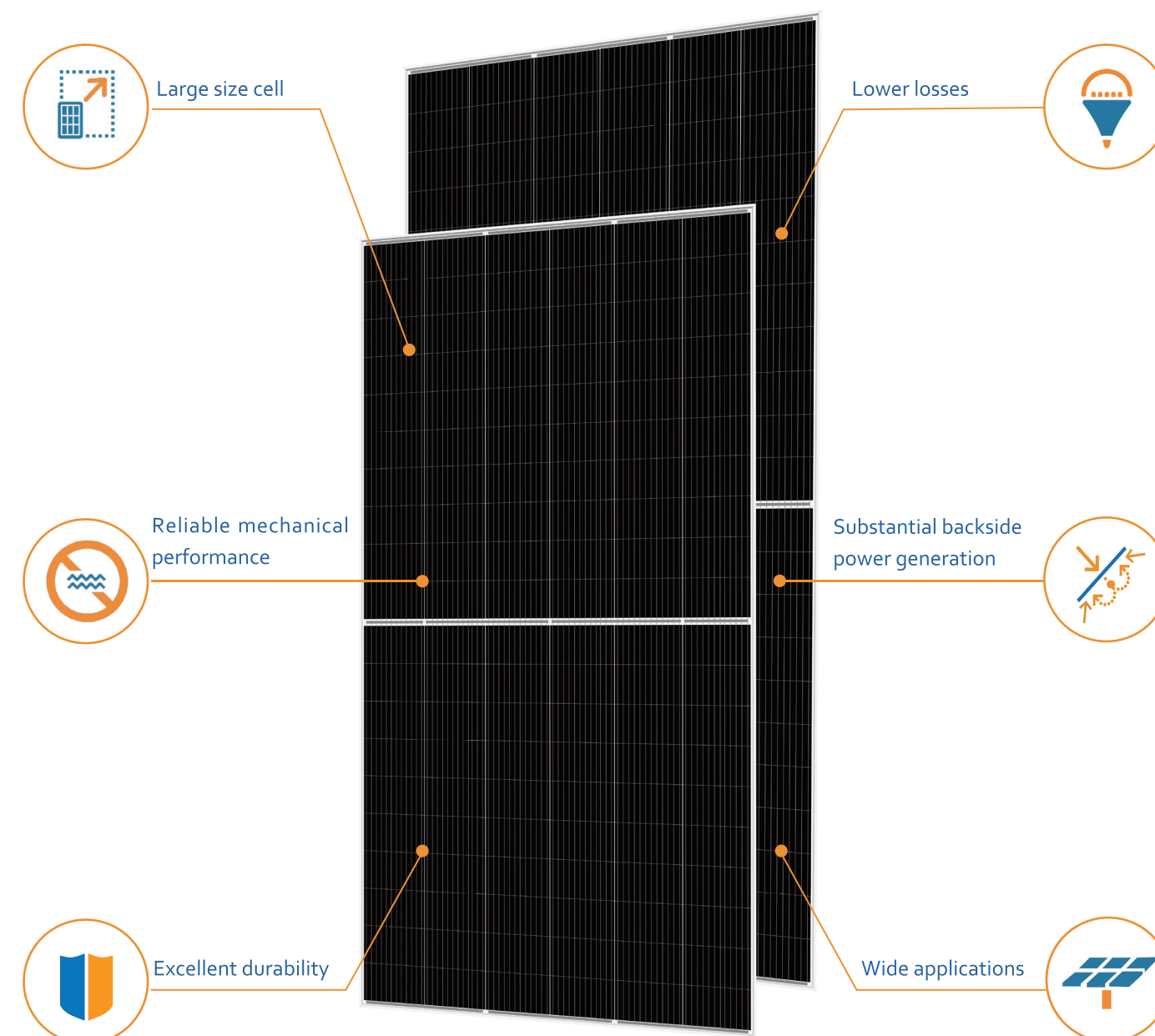
YLM 3.0 PRO



# Product Strength

210PERC Module

YLM 3.0 PLUS

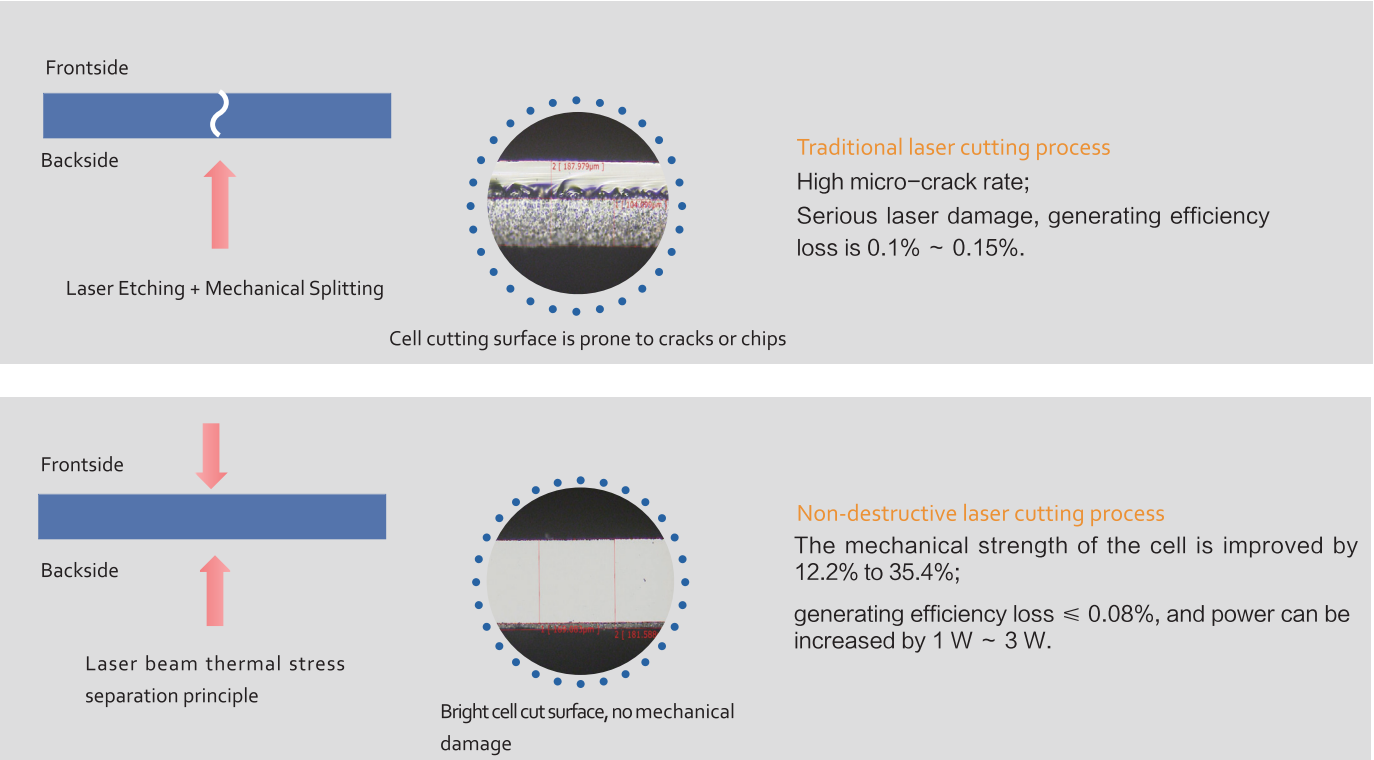




# Product Advantages

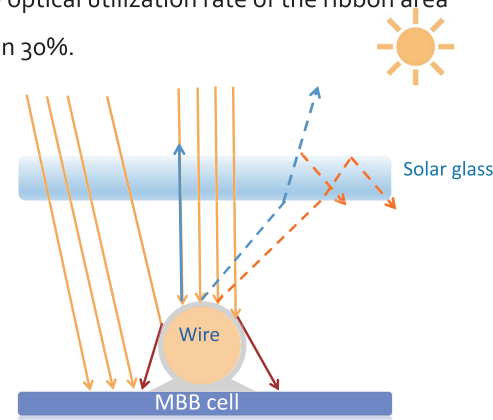
## Low Temperature Non-destructive Cutting Technology

Non-destructive cutting, smooth cut surface, no silicon body cutting damage, no micro-cracks.

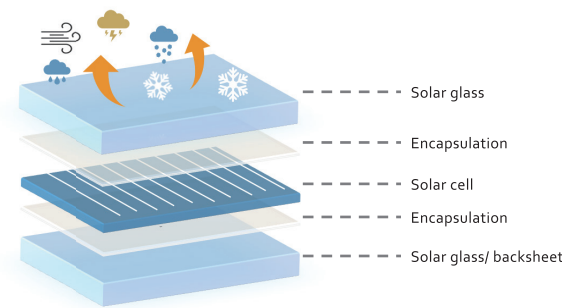


## High Power and High Reliability Encapsulation Technology

MBB cell technology reduces micro-crack and broken grids risks effectively. The use of circular ribbon instead of flat ribbon for metal interconnection can increase the optical utilization rate of the ribbon area by more than 30%.



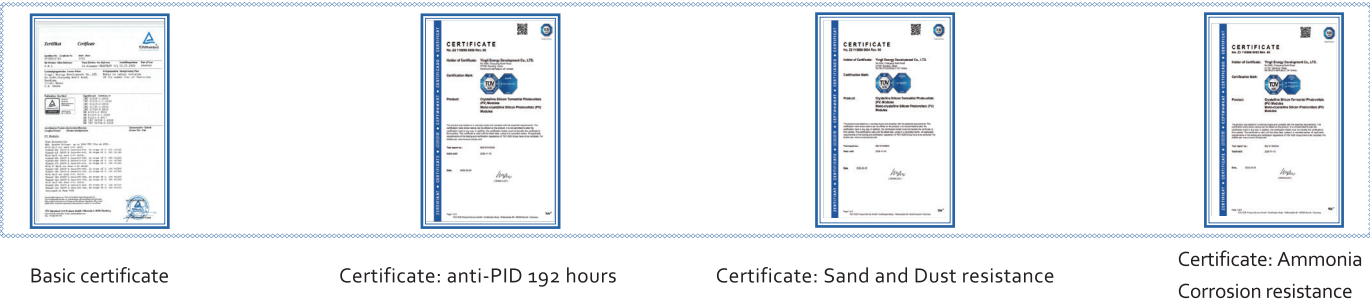
Special material compatibility, ultra-strong frames and high-reliability encapsulation technology enable module performances beyond the IEC standard test requirements, with the ability to resist risks such as salt mist, ammonia, dust and sand, and PID.



# Product Classification

## Complete Product Certification System

YLM 3.0 series includes glass/glass modules and glass/backsheet modules using high efficiency PERC cells. With high quality encapsulation materials, YLM 3.0 modules are perfectly suited to the harsh environment and provide you with high reliability and quality assurance.



Glass/Glass and Glass/Backsheet modules certificate

## YLM-J 3.0 PRO Series (182 mm PERC cell)

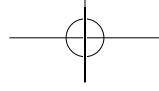
YLM-J 3.0 PRO	Module Type	Power ( W )	Cell Number ( pcs )	Module Dimensions (mm)	Weight (kg)	*Bifaciality Coefficients ( % )
Glass/Backsheet module	YLxxxD-37e 1500V 1/2	405-415	108	1722*1134*30	21.5	/
	YLxxxD-49e 1500V 1/2	545-555	144	2278*1134*30	28.0	/
Glass/Glass module	YLxxxDF54 e/2	405-415	108	1722*1134*30	24.8	70± 5
	YLxxxDF72 e/2	545-555	144	2278*1134*30	32.0	70± 5

## YLM 3.0 PLUS Series (210 mm PERC cell)

YLM 3.0 PLUS	Module Type	Power ( W )	Cell Number ( pcs )	Module Dimensions (mm)	Weight (kg)	*Bifaciality Coefficients ( % )
Glass/Backsheet module	YLxxxD-41f 1500V 1/2	590-605	120	2172*1303*35	31.0	/
	YLxxxD-45f 1500V 1/2	655-670	132	2384*1303*35	34.0	/
Glass/Glass module	YLxxxDF60 f/2	590-605	120	2172*1303*35	35.1	70± 5
	YLxxxDF66 f/2	655-670	132	2384*1303*35	38.4	70± 5

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117 MW N-Type bifacial PV plant in Iberia, Oman

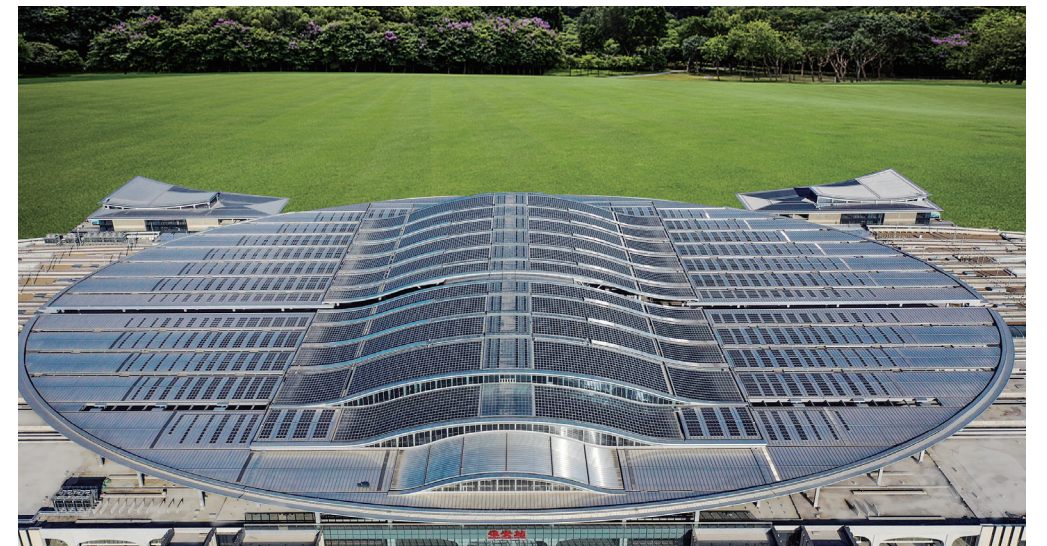


233 MW ground-mounted PV plant in Algeria - "Energy Oasis" in the Sahara Desert



240 MW PV plant of Internet plus smart energy in Zhangbei County, Hebei Province, China

Trust  
Delivery  
Growth  
Sharing



6 MW rooftop distributed plant at High-speed Railway Station in Xiongan, China



The integration of animal husbandry and Photovoltaics Project in Tiandeng county



50 MW N-Type bifacial PV plant of national "Top Runner" advanced technology demonstration base in Datong, Shanxi Province, China