Jolywood Solar Company Presentation

Content

About Jolywood Group

Established in 2008

2500+ Employees

Vertical Integration of Supply Chain

170 Patents Authorized

Qualified China Green Factory

Global Top 500 Energy Enterprise

- Listed 2014, Shenzhen stock exchange (300393)
- **Vertical Integration of Supply Chain:** new material, solar-grade polysilicon, solar cell, solar module and PV+ creative deployment
- Accumulated **160 GW** solar backsheet shipped; **One of the largest solar backsheet suppliers**, 25% market share taken globally
- Accumulated **5.8 GW + n-type** bifacial cell & module shipped
- Provided **150,000 + householders** with the green energy service
- Developed **2000 MW + power stations**

About Jolywood Solar

Founded in 2016，Jolywood Group subsidiary
Registered capital $355M, Total asset $839M, Net asset $304M
The leader of N-type bifacial industrialization technology

Enterprise Strength

- National high-tech enterprise
- National Green Factory
- Bloomberg Tier1 financing brand
- MunichRe reinsurance brand

R&D Strength

- 300+ R&D team member
- 188 applied patents
- 86 authorized patent
- Large size cell achieve 25.4% efficiency in the lab

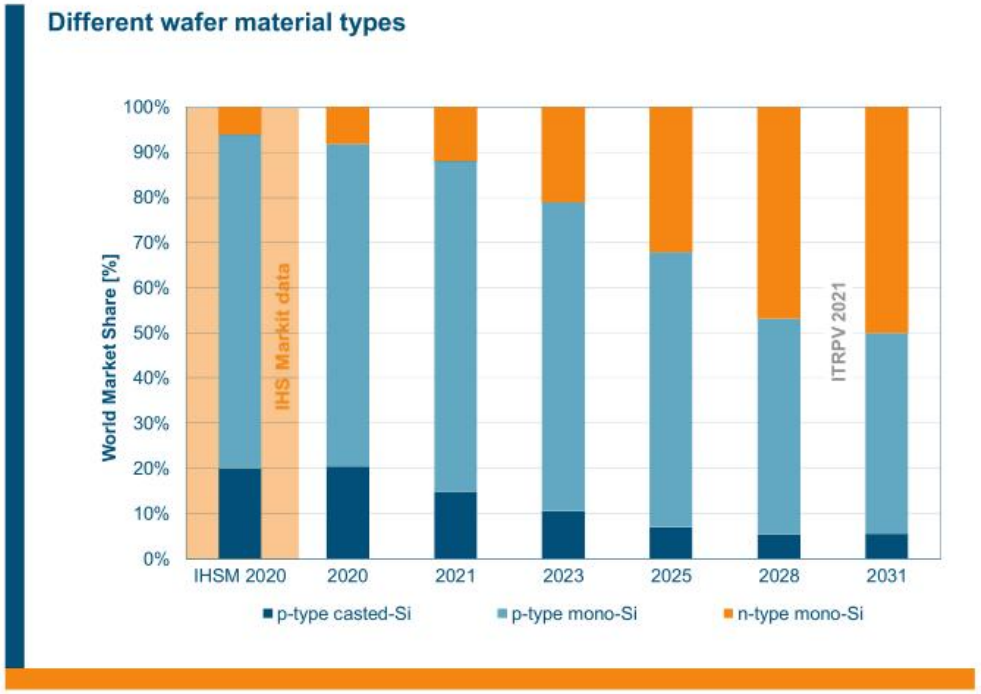
Strong Production Capacity

- Cell efficiency achieved 24.5% in mass production
- 16 GW cell factory under construction in Shanxi

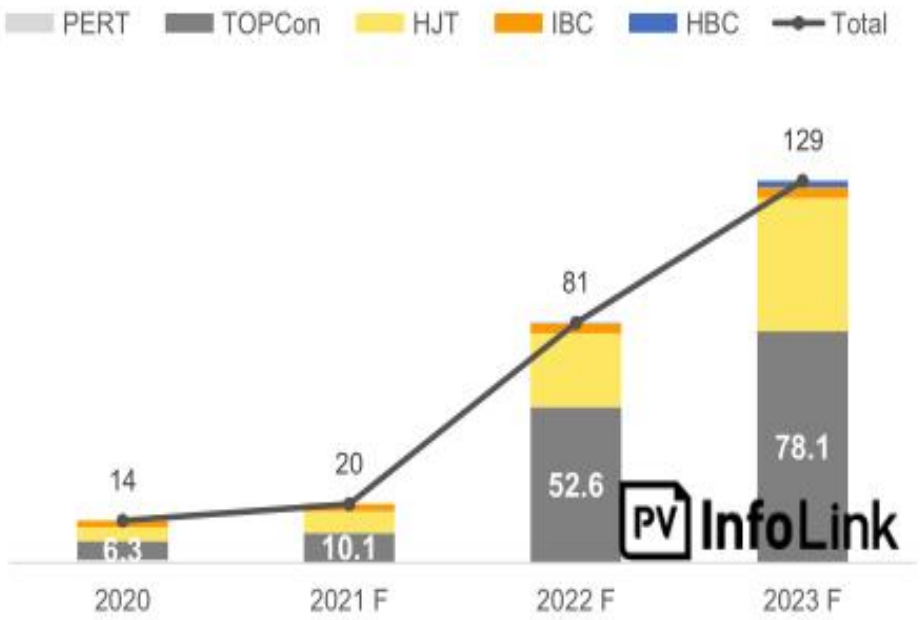
Global Recognition

- The only N-type module supplier for UNDP "Panda Power Station“
- N-type module supplier for National “Top Runner” project
- Shipped 5 GW + product to over 60 countries
- Over 10% market share in the Middle East

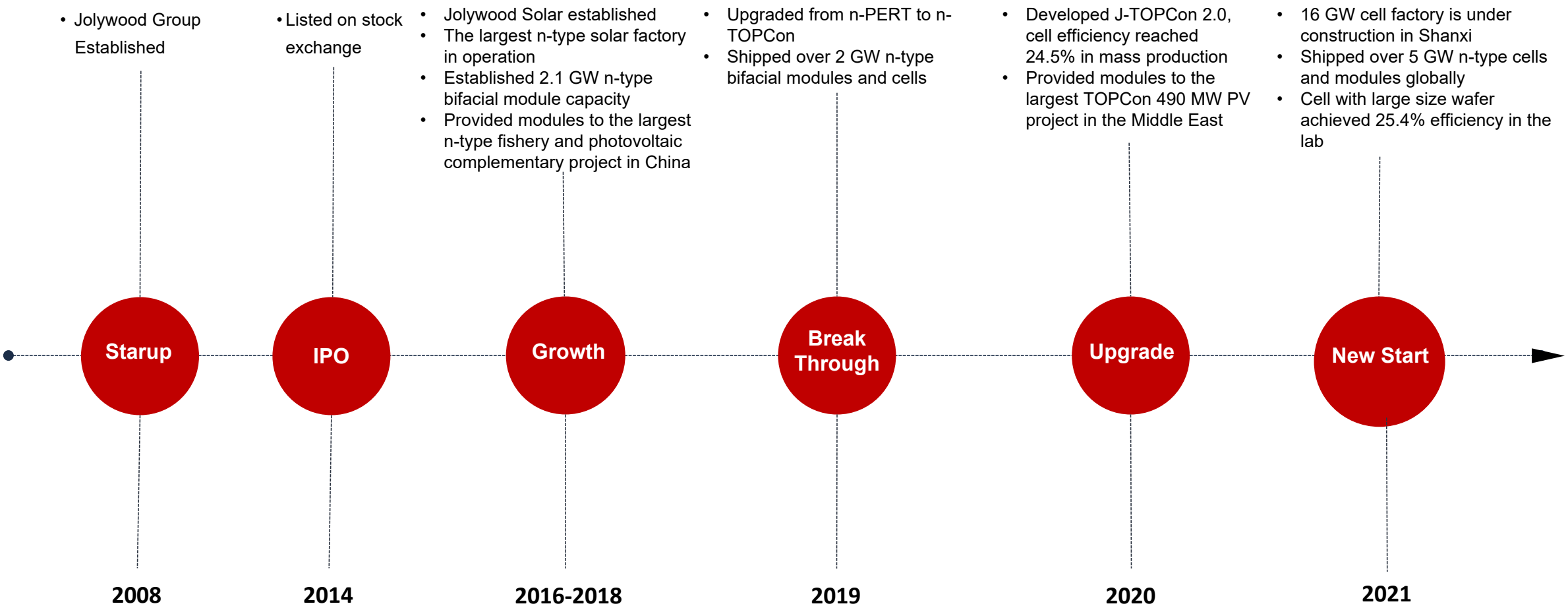
Market Trend N-Type Technology



N type product capacity forecast, Unit: GW



Key Milestones



More Efficiency, Higher Capacity

Jolywood Solar N-type Production

Innovative Product for Diversified Needs

7.6 GW Cell

3 GW Module

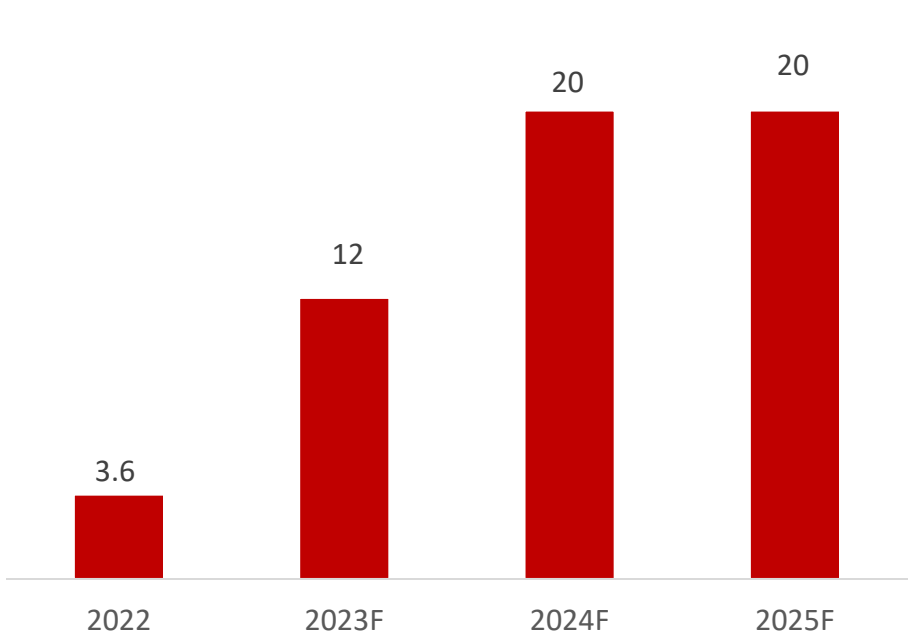
Jolywood Solar Shanxi

16 GW N-type Cell Production Line

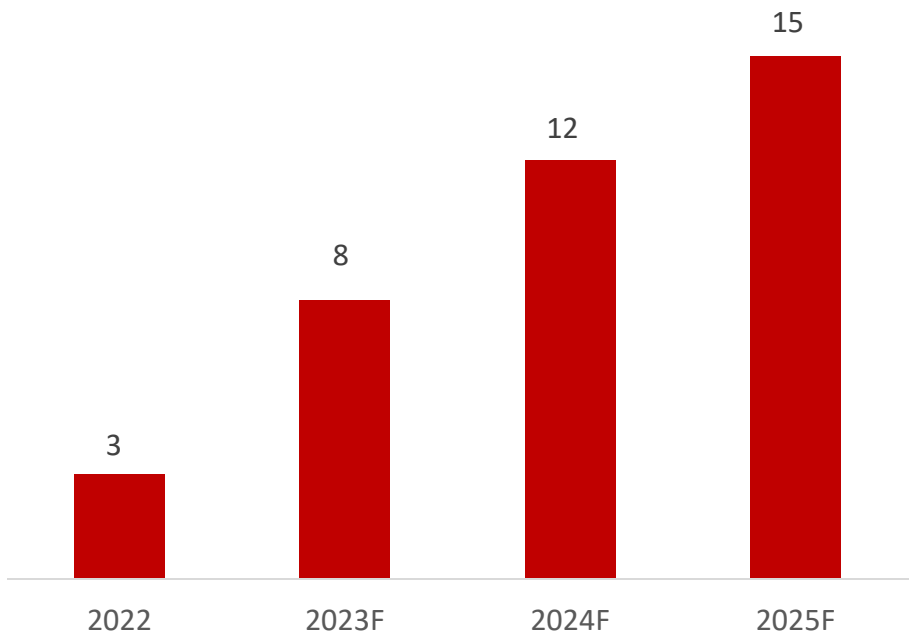
- The world's largest single production workshop for n-type solar cells
- The world's largest single AI intelligent unmanned cell factory
- Adopt n-type TOPCON 2.0 technology developed by Jolywood Solar
- 12 billion kWh of green power output per year
- Reduce carbon dioxide emissions by 11.96 million tons per year

Leading TOPCon Market Position with Stable Supply Capability

Jolywood Solar Year-end Expected TOPCon Production Capacity



Cell Capacity (GW)



Module Capacity (GW)

Comprehensive Product Portfolio

More Efficiency, High Value Return

Jolywood Solar Innovative Product 2022

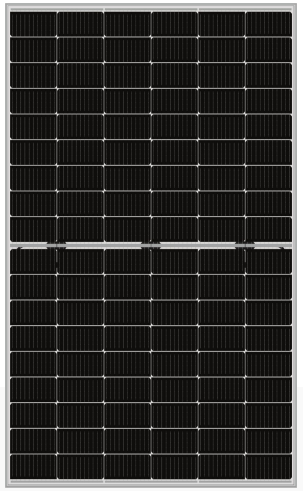
Niwa Series for Residential market

Niwa Black

HD108N M10 / HD120N M6
1722*1134*30mm/ 1756*1039*30mm
Full Black Design
Double Glass Design
Max Power: 425 W

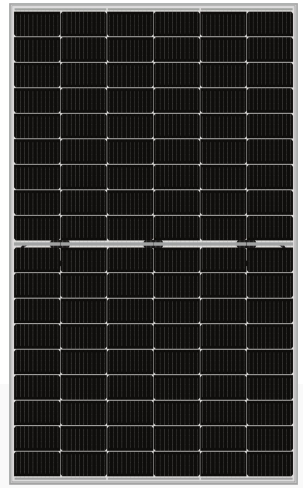
Niwa Black

HT108N M10 / HT120N M6
1722*1134*30mm/ 1756*1039*30mm
Full Black design
Weight: ≤ 21.5kg
Max Power: 425 W



Niwa Max

HD108N M10 / HD120N M6
1722*1134*30mm/ 1756*1039*30mm
Efficiency: 21.27% +
Double Glass Design
Max Power: 435 W

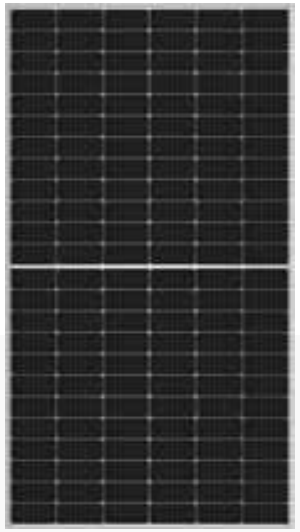


Niwa Light

HT108N M10 / HT120N M6
1722*1134*30mm/ 1756*1039*30mm
Efficiency: 21.27% +
Weight: ≤ 21.5kg
Max Power: 435 W

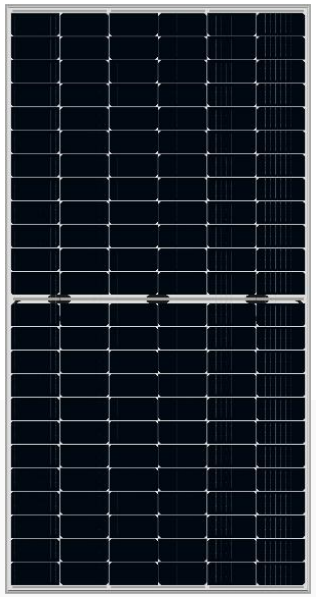
Jolywood Solar Innovative Product 2022

JW Family for Commercial & Industrial market



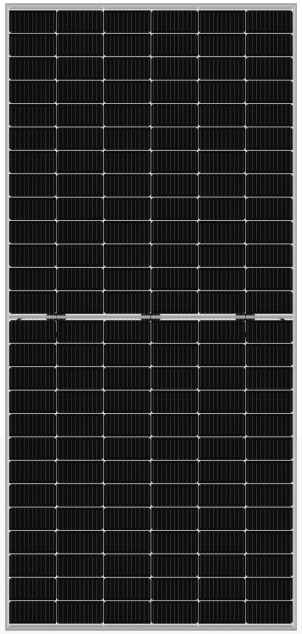
HD144N M6

Size: 2095*1039*30 mm
Max Power: 475 W



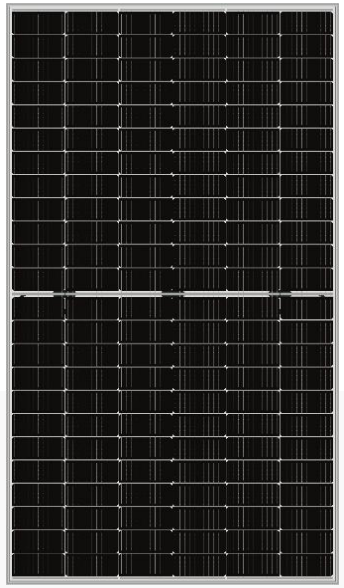
HD144N M10

Size: 2278*1134*30 mm
Max Power: 575 W



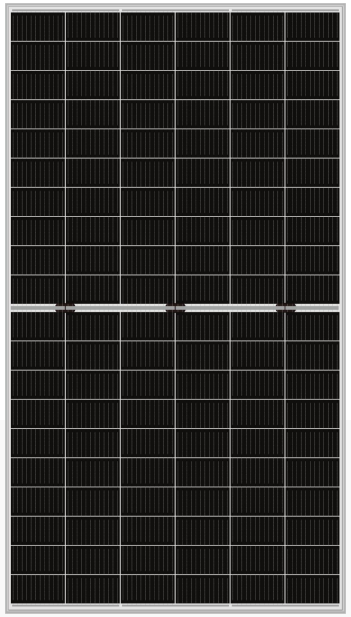
HD156N M10

Size: 2456*1134*35 mm
Max Power: 625 W



HD120N G12

Size: 2172*1303*35 mm
Max Power: 635 W



HD132N G12

Size: 2384*1303*35 mm
Max Power: 700 W

Advantages of Jolywood Solar Module

1

Higher Bifaciality

80%-85% Bifaciality;
At least 30 years product lifetime and bifacial design, more than 10-30% additional power gain comparing with the regular modules

2

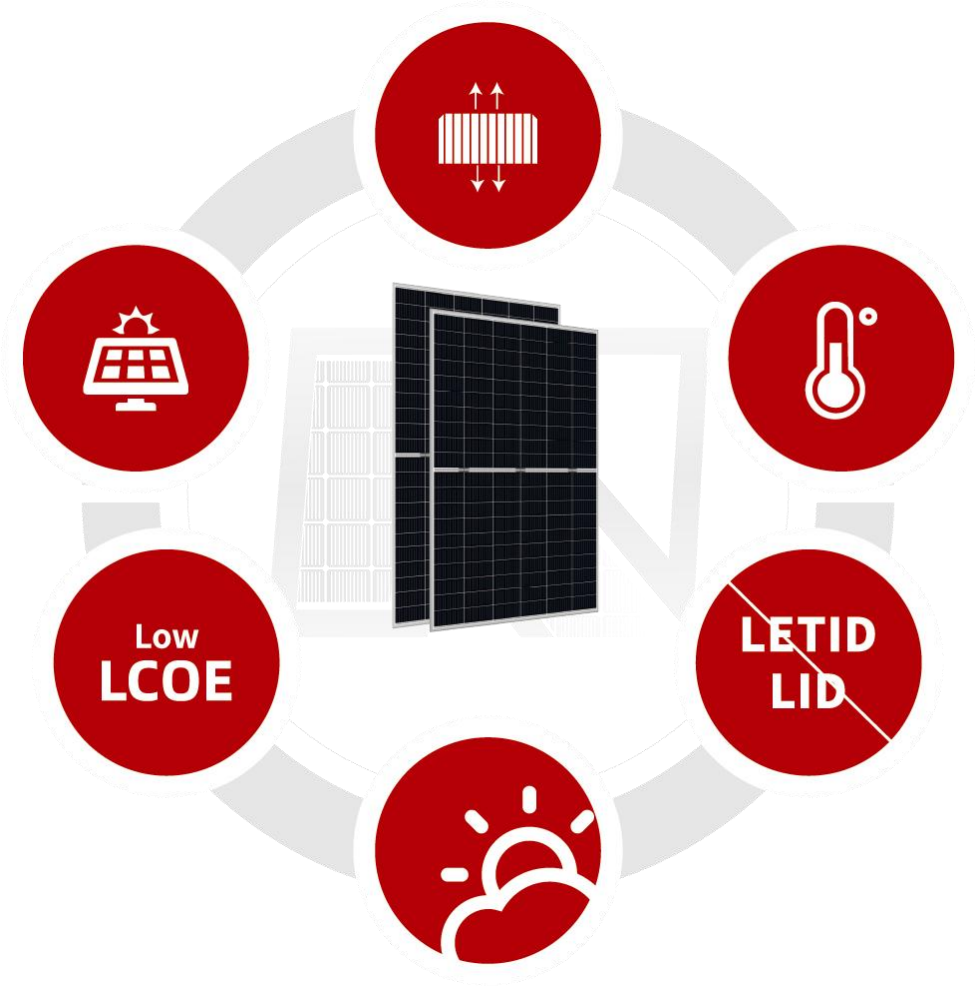
Better Temperature Coefficient

≤ -0.30%/℃, higher power generation under working conditions adopting Passivating Contact Cell technology

3

ZERO LETID and LID

N-type TOPCon solar cell technology has no LID and LETID naturally, can increase power generation



4

Better Weak Illumination Response

Wide spectral response, higher power output even under low light settings like smog or cloudy days.

5

Low Degradation

1st year ≤ 1%; annually ≤ 0.4%
30th year ≤ 12.6%

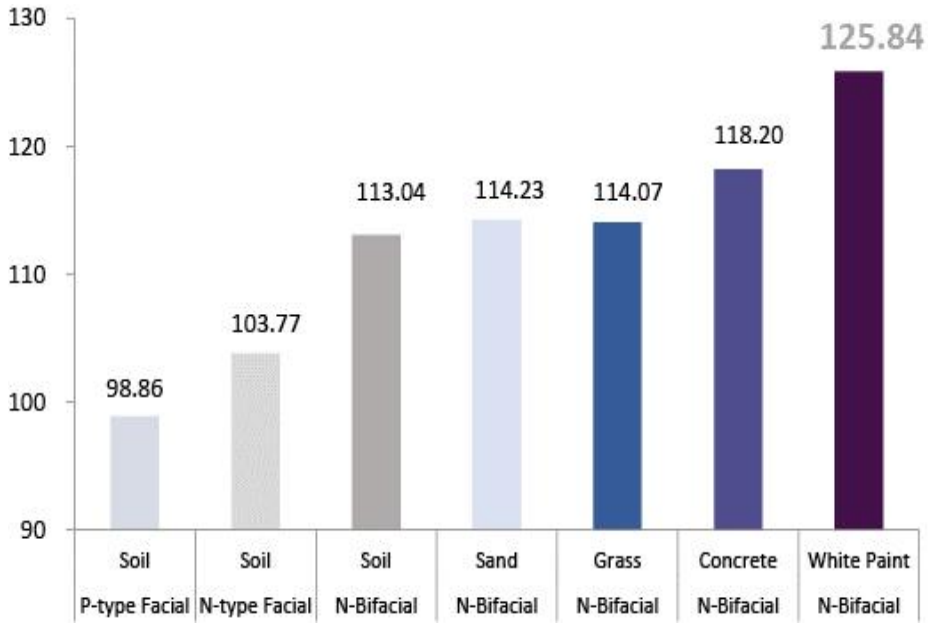
6

Wider Applicability

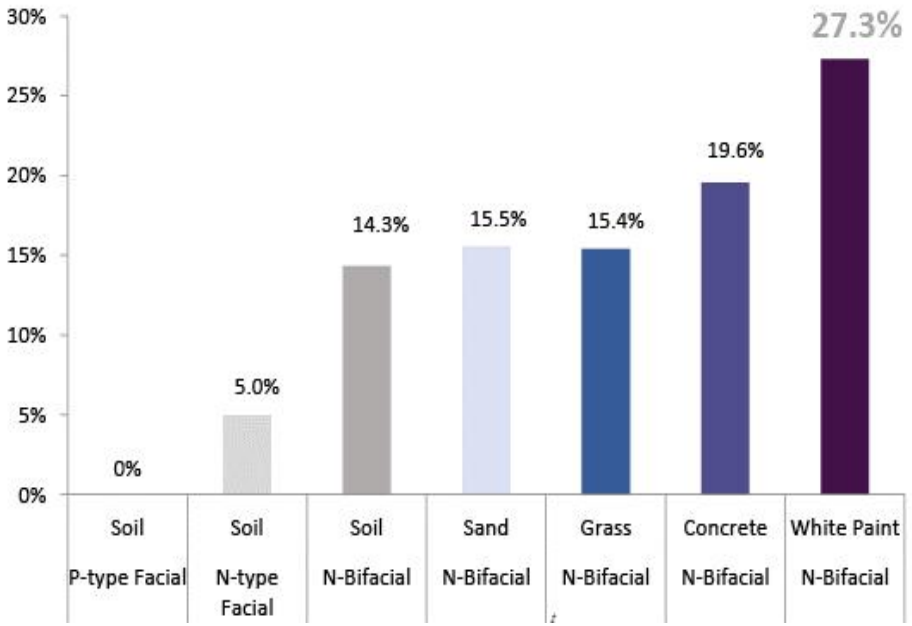
Wider application with bifacial design, like BIPV, vertical installation, snowfield, high humid area, windy and dusty area

TOPCon Module- High Value Return

Generating Capacity under Different Albedos



Generating Capacity under Different Albedos



Resources TUV NORDOutdoor Tests Field in NingXia

Case: TUV NORD Lab Project

- TUV NORD Outdoor Tests Field in NingXia, Northeast
- To monitor and evaluate actual generation by bifacial modules under different albedos.

TOPCon Module- High Value Return

Item	Unit	PERC bifacial	TOPCon bifacial	TOPCon bifacial
Annual effective irradiation hours	h/year	1200	1200	1200
Module power	Wp	450	460	465
Module price	$/Wp	0.279	0.304	0.306
Effective power	Wp	411	429	434
Total cost per watt in life (discounted)	$/Wp	0.782	0.802	0.801
Initial investment per watt	$/Wp	0.729	0.749	0.749
BoS	$/Wp	0.45	0.446	0.444
LCOE	$/kWh	0.0369	0.0369	0.0369

For the same module power, NTOPCon module has an extra value of 2.5 ~ 2.65 USC/Wp Vs. P-PERC module.

- 1MW project, Germany
- TOPCon module: bifaciality 75%, temperature coefficient -0.32%/℃, 1st year degradation 1%, annual degradation 0.4%
- PERC module: bifaciality 65%， temperature coefficient -0.34%/℃， 1st year degradation 2%， annual degradation 0.45%

TOPCon Module- High Value Return

Item	Unit	PERC bifacial	TOPCon bifacial	TOPCon bifacial	TOPCon bifacial
Annual effective irradiation hours	h/year	1650	1650	1650	1650
Module power	Wp	545	545	545	575
Module price	$/Wp	0.272	0.291	0.272	0.308
Effective power	Wp	502	514	502	542
Total cost per watt in life (discounted)	$/Wp	0.837	0.859	0.837	0.857
Initial investment per watt	$/Wp	0.663	0.682	0.663	0.69
BoS	$/Wp	0.391	0.391	0.391	0.382
LCOE	$/kWh	0.0275	0.0275	0.0275	0.0275

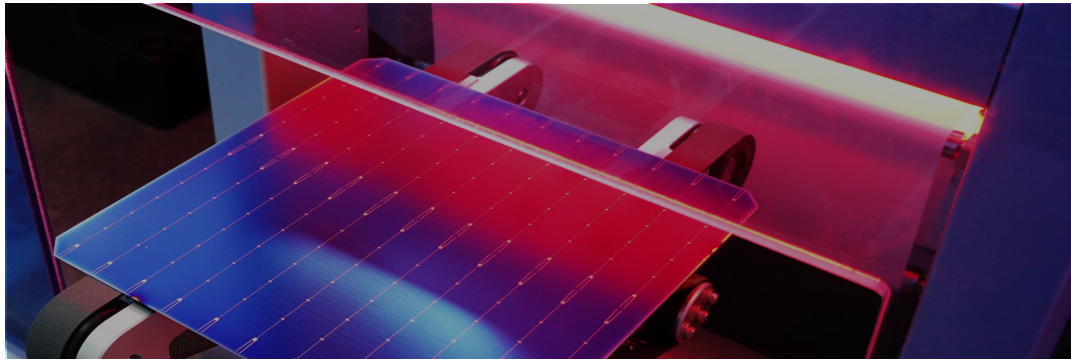
Suppose the LCOE is the same, TOPCon module has a extra value of 1.9 USC/Wp Vs. P-PERC module.

TOPCon module has a higher power of 30W, which brings a premium of 3.5 USC/W.

50MW project, Spain
TOPCon module: bifaciality 80%, temperature coefficient -0.32%/℃, 1st year degradation 1%, annual degradation 0.4%
PERC module: bifaciality 70%， temperature coefficient -0.34%/℃， 1st year degradation 2%， annual degradation 0.45%

Jolywood’s POPAID TOPCon Technology

Cutting-edge R&D Constant Innovation



Jolywood Solar Core technical advantages

Core Technical Advantages

Perfect Patent Protection

Completely independent intellectual property rights;
180+ applied patents, and 80+ authorized patents, covering N-type cell and module technology.

R&D Core Equipment

Independent cooperative R&D in core equipment;
The localization rate of equipment can be 100%;
The equipment investment in TOPCon production line is greatly reduced cell cost.

Core Materials

Co-development in core materials, including silver paste, non-silverized metal paste, and etching additives.

Technical Experience

More than 6 years expedience in n-type technology;
Have sophisticated technology accumulation and technology precipitation.

Talent Reserve

High-level international R&D team with 300+ people, including 6 doctors and 31 masters

R&D Investment

National, provincial and municipal science and technology projects support;
Annual new R&D investment exceeds 100 million yuan.

Cutting-edge R&D Constant Innovation

R&D investment

$18 M

(in 2021)

R&D Employees

300+

Patents Applied

180+

(80+ issued)

R&D Investment

Average 3-4% of Jolywood Solar total revenue is invested in R&D

Technical Team

The international R&D team
More than 300 technical staff working on cell, and module development

Patents

Has developed 180+ patents on cell and module technology

Pioneering Solar Cell Technology

POPAID TOPCon 2.0

01.

Fewer Process

02.

Higher Efficiency

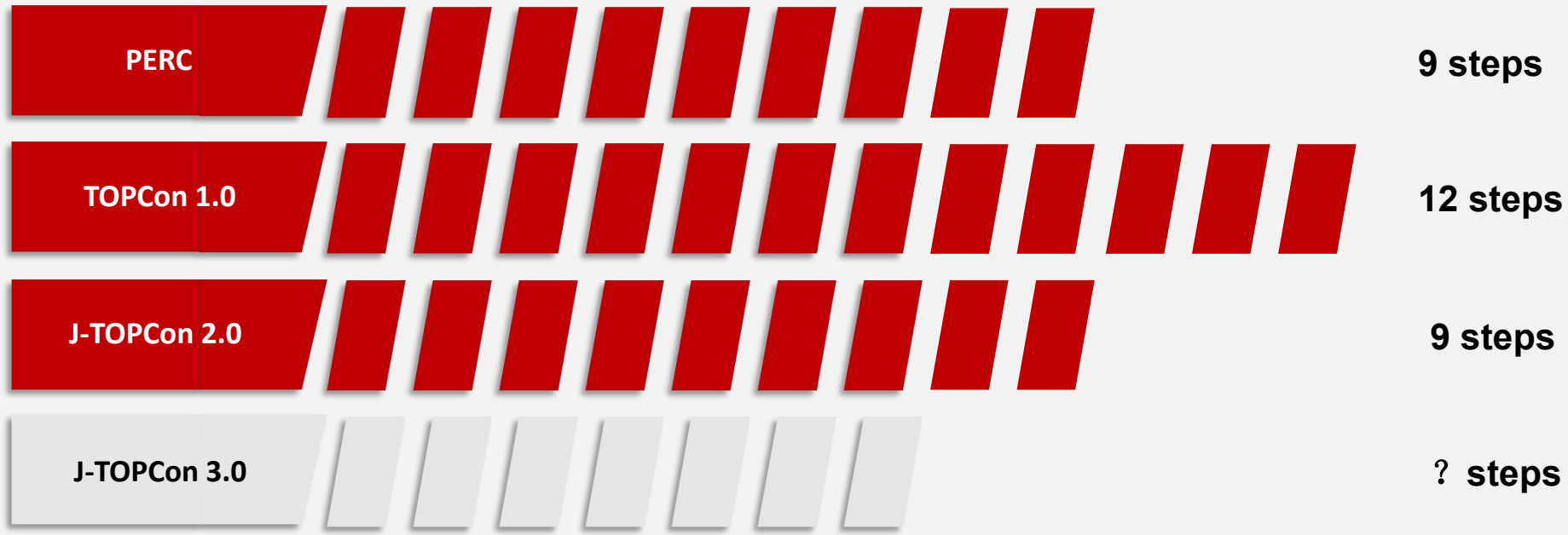
03.

Higher Yield

04.

New TOPCon Production Line

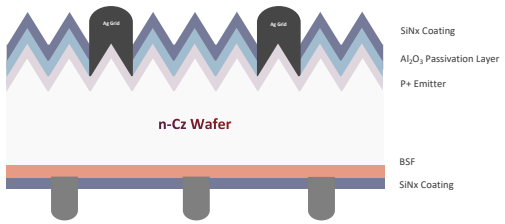
J-TOPCon 3.0： POPAID technology + less silver consumption + fewer process



Jolywood Solar
N-type Cell Technology

Cell efficiency achieved 24.5% in mass production ,
Cell efficiency with large size wafer achieved 25.4%
in the lab, broke the industrial record in Sep. 2021

21.5%-22%
N-PERT cell

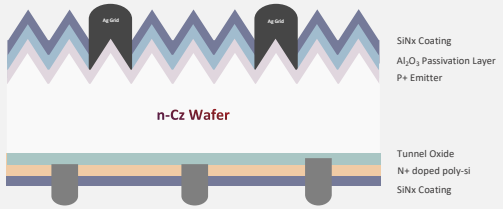


2016 — 22% — 2018

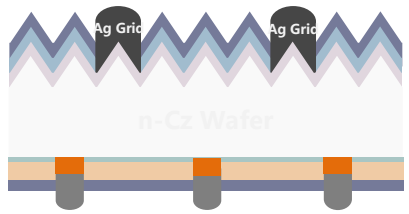
Average production line efficiency 22%

2019 — 25.4% — 2022

23.5%-25.4%
J-TOPCon 2.0



>26%
J-TOPCon 3.0



26% — 2025

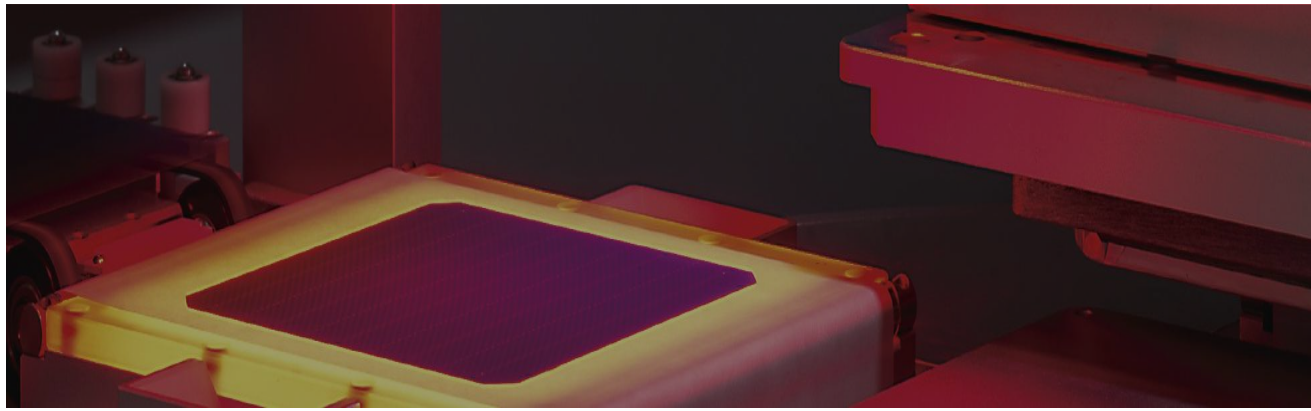
Less seilver consumption
Shorter process

Jolywood Solar N-type Module Power Improvement Roadmap

N-182 & 210 module

High Management Standards and Assurance

Trusted by Industrial Strong PV Players



Global Supply Chain System

Centralized procurement, unified management

- strict supplier management system
- complete qualified supplier base

Comprehensive assessment of qualified supplier quarterly

- to make sure good quality assurance and reliable after-sales services

Long-term strategic partnerships with domestic first-tier suppliers

- such as Huawei, ZHONGHUAN, TONGWEI, Far East Etc.
- forming a healthy cooperation with the supplier and win together while reducing costs and increasing efficiency

Constantly introducing new materials

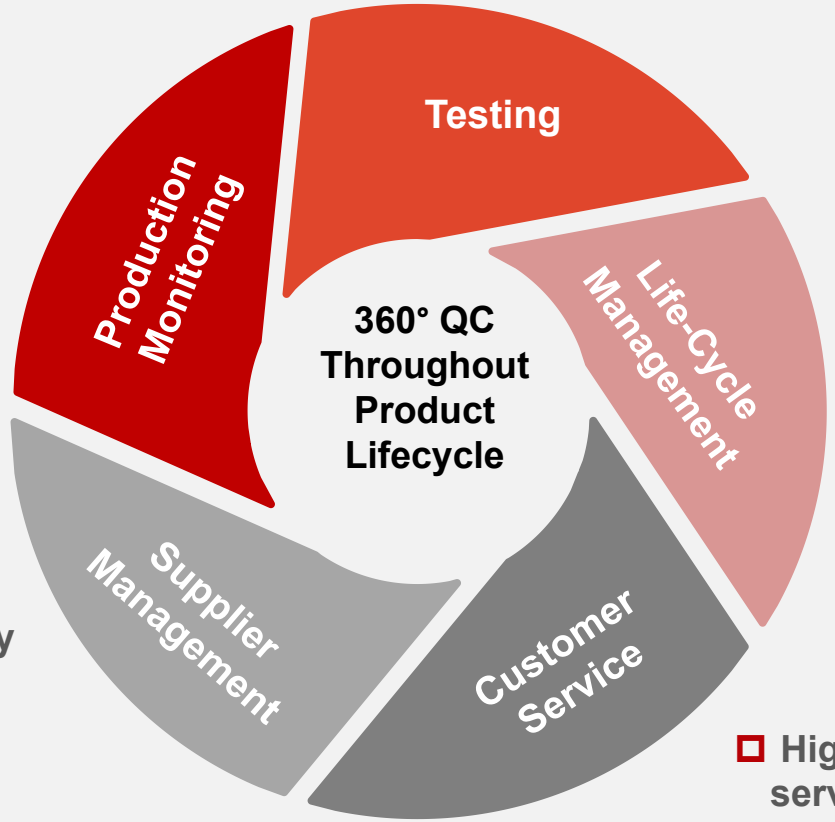
- to help company win opportunities in fierce market competition
- works with key suppliers to jointly develop innovative products and solutions

Manufacturing Management

Jolywood Solar vertically integrated production process is proven to systematically optimize costs and provide maximized value for customers.

Quality Assurance

- Leading PV product test center
- 36 QC check points throughout whole production process



- Product lifecycle management: new product launch –product quality – maintenance – phase-out
- Intensified supplier quality management to ensure quality and consistency
- Highly efficient customer service and quality support mechanism

Long Endurance & Safer Insurance Services

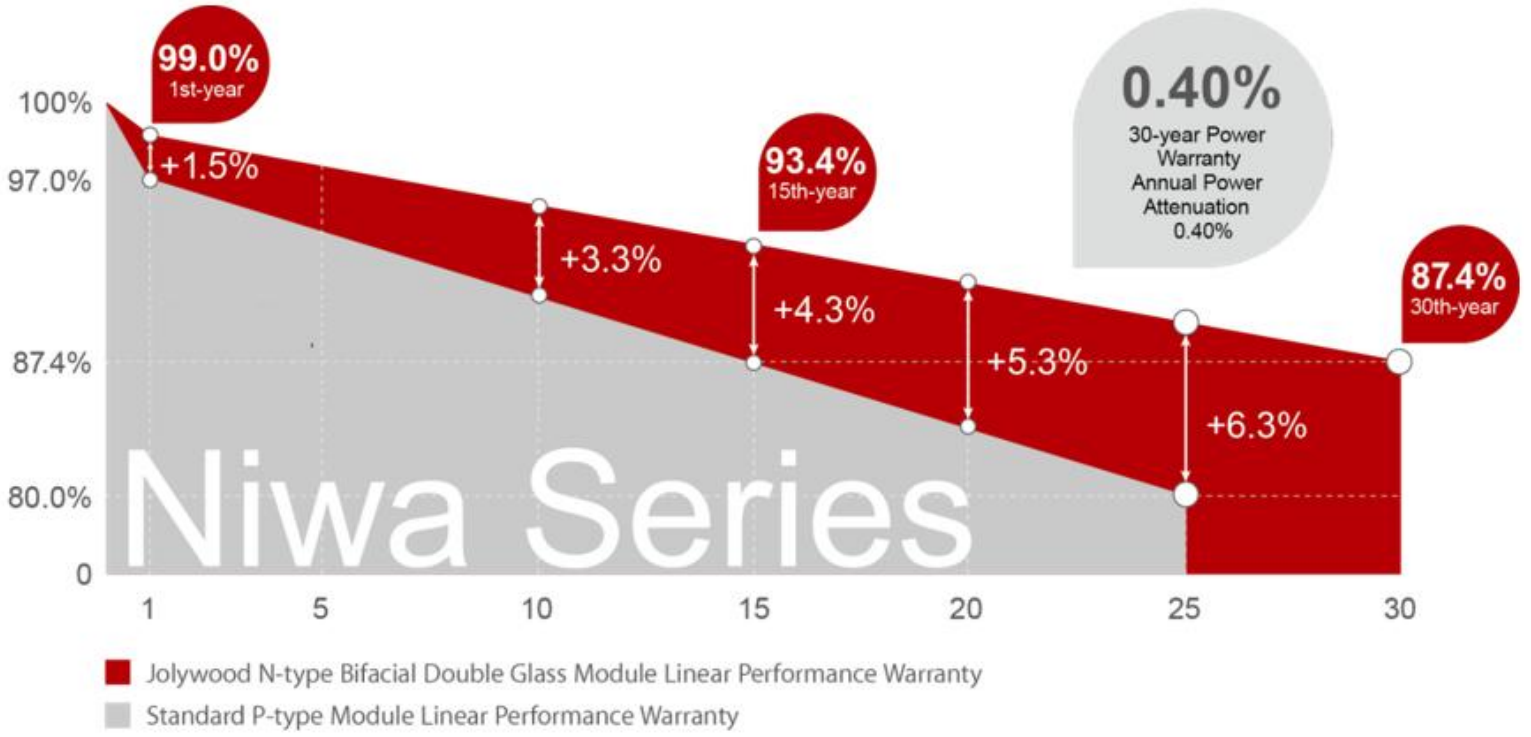
Munich RE

12 Years

WORKMANSHIP WARRANTY

30 Years

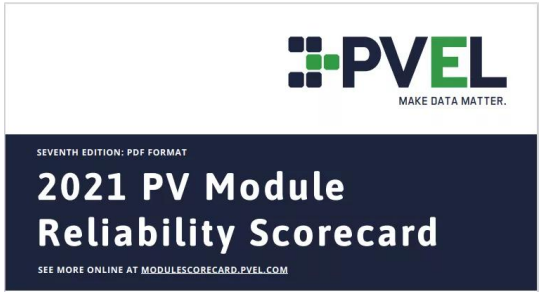
LINEAR PERFORMANCE WARRANTY



Industrial Standard Certification and authorities recognized

- Work closely with industrial test center and authoritative third party to make sure our products to meet industrial standards, or even exceed the standards
- The products of Jolywood Solar gained certifications from global institutions of TUV Rheinland, TUV NORD, CQC, JET, SCA, etc.
- has long term research cooperation with Belgium IMEC, Nanjing University, SunYat-sen University, Shanghai Jiao Tong University, and East China University of Science and Technology

International Certificates and Award



Bankability PV supplier list by BNEF

Tier 1 Module Manufacturer

Largest N-type module capacity in Tier 1 supplier list

Bloomberg
NEW ENERGY FINANCE

2019 Q 1 ~ Q 4

2020 Q 1 ~ Q 4

2021 Q 1 ~ Q 4

2022 Q 1 ~ Q 2

Table 1: Photovoltaic module manufacturers meeting BloombergNEF's Tier 1 criteria as of 2Q 2022

Firm/ brand	Annual module capacity, MW/year	Firm/ brand	Annual module capacity, MW/year
Jolywood	3,000		

Jolywood Solar Bankability

Recognized by Most of Banks Globally

Global Partners

Trusted by Industrial Strong PV Players

中来股份
JOLYWOOD

Global Leading N-Type PV Cell and Module Manufacturer

N Type, Same Sunshine More Value

Overseas Residential Projects


Poland 6 kW


Germany 7 kW


Poland 10 kW


Poland 50 kW

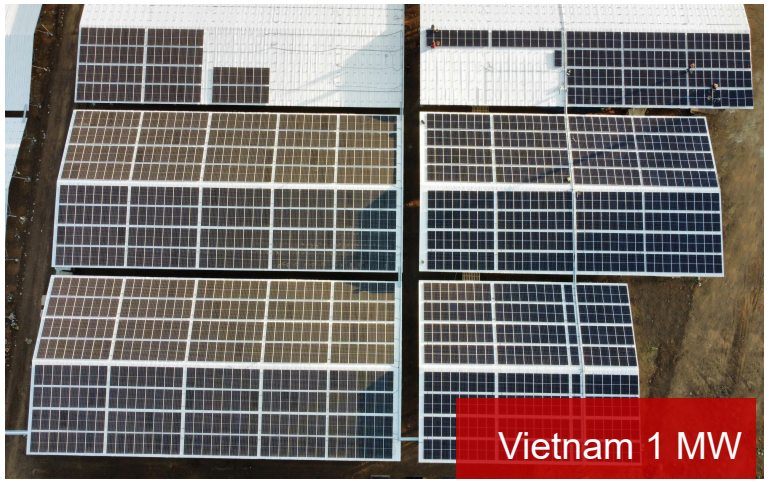

Poland 120 kW

Overseas Commercial Projects


French 240.7 kW


French 258.6 kW


French 258.61 kW


Vietnam 1 MW


Poland 120 kW


French 227.3 kW

Overseas Utility Projects


Amin, Oman 125 MW


Ibri II, Oman 458 MW


Khmelnitskiy, Ukraine 1.8 MW


Baden-Württemberg, Germany 1 MW


Rilland, Netherland 11.75 MW

Domestic Utility Projects


Datong, Shanxi 29.2 MW


Sihong, Jiangsu 110 MW


Qinghai 153 MW


Yangquan, Shanxi 100 MW


Sihong, Jiangsu 104 MW

Jolywood Solar N-type products have been installed more than

5.8 GW globally

中来股份
JOLYWOOD

Thanks !