HY SOLAR

GRAND ORIGIN
SYMBIOTIC FUTURE

HY SOLAR N-TYPE PV INDUSTRY INTEGRATION STRATEGY

module.hysolar.com

TO MAKE ENERGY CLEANER
TO BRING THE WORLD BETTER

HYSOLAR

Carry Forward the Grand Vision
Let the sun turn every corner of the planet green

As the new start begins
Return the energy to its natural green color

Contents

HYSOLAR

Company Profile

HY SOLAR

First Global N-type Full PV Industry Integrator

HYSOLAR

Market Share

NO.1

Leading manufacturer in crystalline silicon cutting equipment

Industry Chain

NO.1

Highest integration level in industry

N - type Coverage

NO.1

100% N-type coverage for all links with full capacity

ROE

NO.1

ROE32.61%

Financial Health

NO.1

Debt ratio 40.40%

Construction Speed

NO.1

Put into operation in the same year of construction

Strategic Path

We are an N-type PV industry integrator with 21 years of experience in the PV business, focused on innovation and application in the renewable energy industry.

HY 1.0
High-end PV Equipment Manufacturer

2002-2018

2002
Establishment of Wuxi Shangji Grinder Co., Ltd

2004
Entry into the solar industry, engaging in the manufacturing of equipment for crystalline silicon

2018
Wuxi Shangji Automation was listed on the SSE with stock code of 603185

HY 2.0
PV New Material Professional Provider

2019-2021

2019
Establishment of HOYUAN New Material (Baotou) Co.,Ltd. Entry into PV monocrystalline silicon industry

2020
Expansion of monocrystalline silicon production capacity to 8GW per year

2021
Expansion of monocrystalline silicon production capacity to 10GW per year

HY 3.0
Deeply Vertical-integrated PV Service Provider

2022-2025

2022-2025
- Metallurgical-grade silicon with 150 kilotonnes annual output
- High purity crystalline silicon with 100 kilotonnes annual output
- Monocrystalline silicon wafer with 75GW annual output
- N-TOPCon PV cell with 45GW annual output
- N-TOPCon PV module with 35GW annual output

HY 4.0
Global Green Energy Industry Eco-Integrator

2026-Future

2026-Future
- Power plant development and creating a green energy industry ecosystem
- Strategically provide diverse green energy industrial system solutions

HY SOLAR Carbon-Neutral Industry Chain

Industrial Chain	2023	2024
PV Equipment	Market share leading the industry. Silicon Carbide Market Share Ranked NO.1 in China	
Silicon Material 100 kilotonnes	Put on stream- 80 kilotonnes (Metallurgical-grade Silicon) Put on stream- 60 kilotonnes (Polycrystalline silicon)	Put on stream - 150 kilotonnes(Metallurgical-grade silicon) Put on stream - 100 kilotonnes(Polycrystalline silicon)
PV Wafer 75GW	Put on stream-35GW (Baotou Base) Under construction - 40GW (Baotou Base/ Xuzhou Base)	Put on stream - 75GW
PV Cell 45GW	Put on stream- 18GW (Xuzhou Base) Under construction - 27GW (Xuzhou Base/ Baotou Base)	Put on stream - 45GW
PV Module 35GW	Put on stream- 21GW (Jiangyin Base / Chuzhou Base) Under construction - 14GW (Jiangyin Base)	Put on stream - 35GW
Power Plant 11.5GW	Under construction – 2GW (Baotou base) Under planning - 9.5GW (Baotou Base/ Xuzhou base/ Wuxi base/ Chuzhou base)	Developed - 11.5GW

High-end Equipment

HYSOLAR

Advanced technological reserves
Reliable high-end intelligent equipment

2002
Design and manufacture of high-end intelligent equipment

Market share of high-end intelligent equipment has led the industry for many years

Designed for thinner wafer Customization
Promoting the increase in product yield rate

NO.1
Market share of Silicon CarbideSlicer Ranked NO.1 in China

- Outstanding Ability in CNC tech development
- Powerful Capability in complete machine
- Advanced Tech in precision components manufacturing
- Rich Experience in R&D of new products

1
Market share of Silicon Carbide Slices

4 Awards
1st & 2rd prizes of sci-Tech in Jiangsu Province

AUTO Grinding and chamfering integrated machine

Silicon carbide slicer

High Purity Material
Silicon Material

HYSOLAR

High-purity silicon material capacity guarantees excellent PV cell performance

Annual metallurgical-grade silicon output **150**kilotonnes

Adopting “Thermal Denitrification” technology, greatly reducing the emission of nitrogen oxides compound.

Annual crystalline silicon output **100**kilotonnes

Adopting "Modified Siemens me-thod".The output can be adapted for both P&N type PV cell.

Investment in Baotou Base **11.8**Billion(CNY)

Investment and construction in 2022

Continuously improve product quality

Use C-276 reduction furnace

Add cinnamon online filter

The distillation device incorporates a decarbonizing column, a boron, phosphorus, and metal removal adsorption column, and a high-low boiling tower.

Advanced water blasting and automatic crushing are used in the collating device

Continuously minimize production costs

Equipment selection

Rational reuse of energy

Introduction of new process

Pursuing the one-time success rate of device start-up

High Quality Manufacturing PV Wafer

HYSOLAR

The largest wafer slicing project globally
The first project with the capability of scale production in Inner Mongolia Autonomous Region

Mature production process & massive production capacity guarantee

Capacity of PV wafer	Product line for P+N type PV wafers	Shipment volume of PV wafers in 2023
35GW	Put on stream in July, 2019	**29**GW

Newly expanded PV wafer capacity	Product line for P+N type PV wafers	Investment	Annual output in Phase I
40GW	To be put on stream in 2024	**25.3** Billion (CNY)	**20**GW Put on stream in 2024

Realize large-scale application of CNC diamond wire slicer in PV wafer manufacturing

Slice Thickness
160um reduced to 130um (mass production)

Line Diameter
40um reduced to 34um (mass production)

PV Wafer Size
182、210

Process Time
Shortened to 90 min

Leading in Industry
Significant improvement in yield, output and decrease in cost

Industrial Union
To advance the "large size and thin thickness" process of PV wafer

High Energy Power PV Cell

HYSOLAR

Total Planning Capacity **45GW**

To take advantage of the light in a limited space

Technical Advantages

- TOPCon passivation contact technology
- The cell efficiency can reach 25.5% or higher
- Customized production with thickness of 110~150um
- Introduction of a full process quality control system
- Improve product quality greatly via "Wafer-by-wafer"tracking
- "Large size,flaking" cost reduction and effciency improvement

Cell Capacity

High-efficiency N-TOPCon Cell Capacity

2023 **18GW**	2024 **27GW**
Xuzhou Base	Xuzhou, Baotou Base

Product Advantages

- High Efficiency
- High Bifaciality
- High Reliability
- Low Degradation
- Low Temperature Coefficient
- Excellent Low Irradiance Performance

High-efficiency Module PV Module

Annual output
35GW
Ultra-efficient PV module

Phase I
21GW
Put on stream in 2023

Phase II
14GW
To be put on stream in 2024

Ultra-efficient PV module

- TOPCon technology
- Non-destructive cutting mode
- Half cut technology
- Milti-busbar (SMBB)
- High density cell encapsulating

High-yield Terminal Power Station

HYSOLAR

We're seeking an optimal solution for a zero-carbon world

With the group's vertical integrated layout deepening, HY SOLAR is aggressively setting out the development business of new energy power stations. with a flawless supply chain guarantee, intelligent design, efficient construction, and high-quality service. HY SOLAR has the potential to develop and execute new energy power plants. At the moment, signed orders include more than 11.5GW power stations, including Baotou Qingshan 3GW, Guyang 4.5GW, Xuzhou 2GW, and Wuxi and Chuzhou factory distributed projects 2GW, as well as 2GW power stations currently under construction.

11.5GW Signed

7.5GW Baotou Base

2GW Xuzhou Base

2GW Wuxi Base

Brand Reputation

95

2023 Ranked 95th of "Global New Energy Enterprises TOP 500"

229

2022 Ranked 229th of "Hurun China Top 500"

- Hurun China Top 500
- China Machinery Industry Sci-tech Award
- 2022forbes Innovation Top 50
- National Green Factory
- National SRDI Enterprise
- 2022 China Brands Top 500
- Jiangsu's Private Company Top 200
- Jiangsu'scompany In Manufacturing Industry Top 100
- China Federation Of Commerce Sci-tech Award
- Chinese Listed Company Valuation Top 500
- Major Sci-tech Undertaking Enterprise Of NDRC
- National High-tech Enterprise

Globalization

Headquarter

- Wuxi, Jiangsu, China

Global Marketing & Sales Center

- Wuxi, Jiangsu, China

Global Branches

- Singapore
- Germany
- Belgium
- United Arab Emirates
- Chile
- Brazil

Manufacturing Bases

- Equipment Wuxi, Jiangsu, China
- Silicon Baotou, Inner Mongolia, China
- Monocrystalline silicon rod Baotou, Inner Mongolia, China
- Wafer-cutting Baotou, Inner Mongolia, China
- Wafer-cutting Xuzhou, Jiangsu, China
- PV cell Xuzhou, Jiangsu, China
- PV cell Baotou, Inner Mongolia, China
- PV module Jiangyin, Jiangsu, China
- PV module Chuzhou, Anhui, China
- PV module Baotou, Inner Mongolia, China

HYSOLAR

Core Advantages

R&D Capability

1000+
Scientific Personnel

974 Milion (CNY)
R&D input in 2022

4.45%
R&D input portion in 2022

205
National patent authorizations

14
Software copyrights

1
National key high-tech product

13
Jiangsu Provincial high-tech products

5
Provincial and ministerial Sci-tech awards

16
International product certificates

Leading in R&D

- Construction & operation according with ISO17025 & CNAS certificate system
- 3000m² Laboratory with 58 devices of 28 models
- Being capable of testing with the standard of IEC61215 & IEC61730
- Applying LIMS management system

In order to operate the laboratory more intelligently while promoting high-efficiency testing and R&D concerns, all equipment, tasks, staff, and measured data must be integrated into the digital management system.

CNAS Accredited Laboratory

Honors

- National High and New tech Enterprise
- National innovation"Gazelle Enterprise" of south Jiangsu in demonstration zone
- China Federation of Commerce Sci-tech Award
- Major Sci-tech achievement transformation undertaking enterprise of Jiangsu province
- First set of Major Equipment Identification Enterprise in Jiangsu
- Jiangsu Province Two Integrations Demonstration Enterprise

Leading in N-Type Route

HYSOLAR

PECVD
Cutting-edge PECVD tech

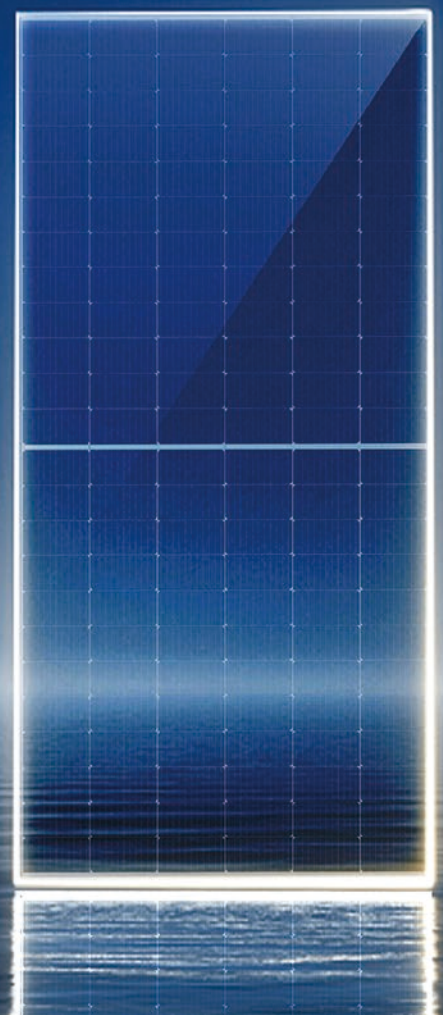
26.42%
PV cell mass production efficiency

LECO Tech, +0.25%
More than +0.25% increase in efficiency

High Yield, +0.3%
+0.3% increase in yield of pv cells

+40W
40W higher in efficiency compared with PERC modules

45GW
TOPCON cell capacity
18GW put on stream
27GW under construction



Manufacturing Excellence

The key to our manufacturing excellence is our 100% automatic, intelligent factory, which can satisfy different demands in the market. The advanced ERP system ensures effective coordination between the R&D center and the five bases with the commerce, planning, and quality Depts. Cutting-edge MES can ensure 100% traceability of cells and modules.

Modularized AUTO production line

To guarantee the product quality and consistence to a great extent

Advanced MES

MES enables the realization of the information interconnection of the whole factory, being the key in intelligent manufacturing

Real-time Quality-monitoring platform

Throughout manufacturing management helps achieve a full-cycle monitoring from raw material, production, testing to delivery

Quality Assurance

Full-cycle Traceability

Strict Full-cycle Quality Monitoring System

All-around control of quality, environmental and hse

- ISO9001
- ISO14001
- ISO45001

Control of Raw Material

Incoming material inspection
Evaluation of suppliers
Raw material testing center

Process Monitoring

Automatic intelligent workshop
>90% automation rate
Workshop 6S management

Guaranteed Reliability

Monitoring of mass production consistency
100% coverage BOM

After-sale Service

Outstanding warranty performance
Comprehensive certificates
Survey on customer-satisfaction

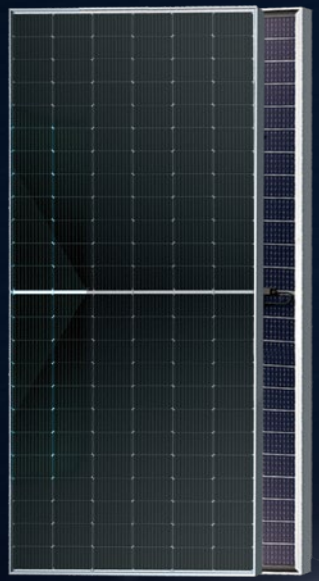
HYSOLAR

Module Products

HY SOLAR Module - TOPCon Module

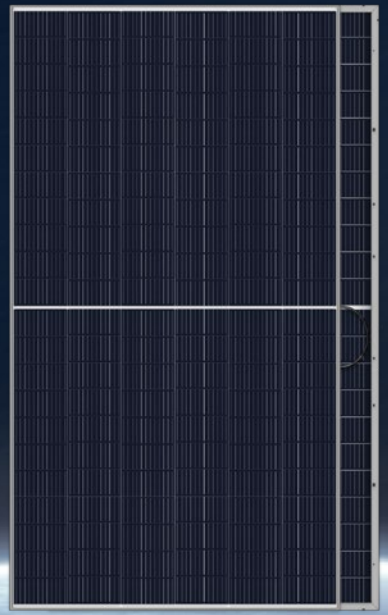
HY SOLAR

HT Bifacial series



HY-NT10/72GDF

HY-NT11/66GDF



HY-NT12/66GDF

445W
HY-NT10/54BGDF

645W
HY-NT10/78GDF

450W
HY-NT11/48BGDF

630W
HY-NT11/66GDF

595W
HY-NT10/72GDF

710W
HY-NT12/66GDF

Developed Product - Rectangular Cell Module

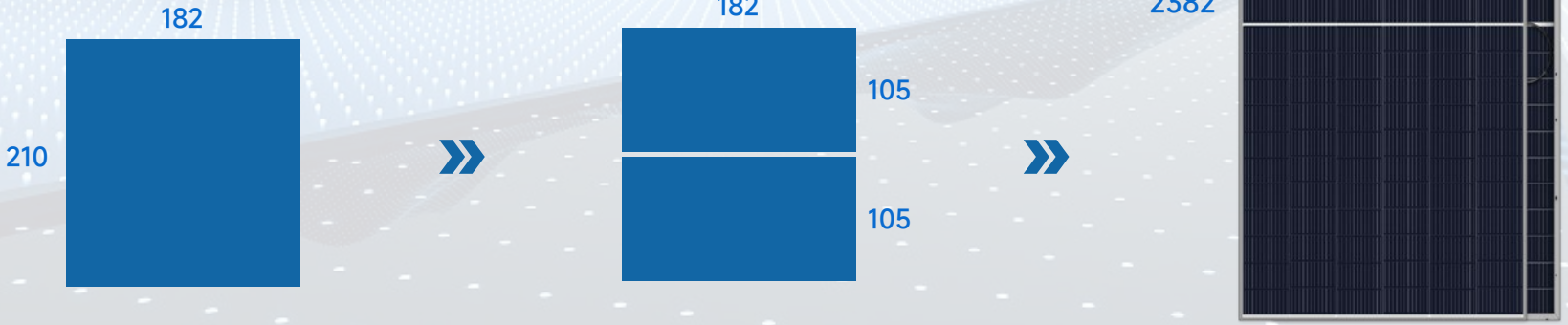
HYSOLAR

New Generation

HT 210R TOPCon

600-610W

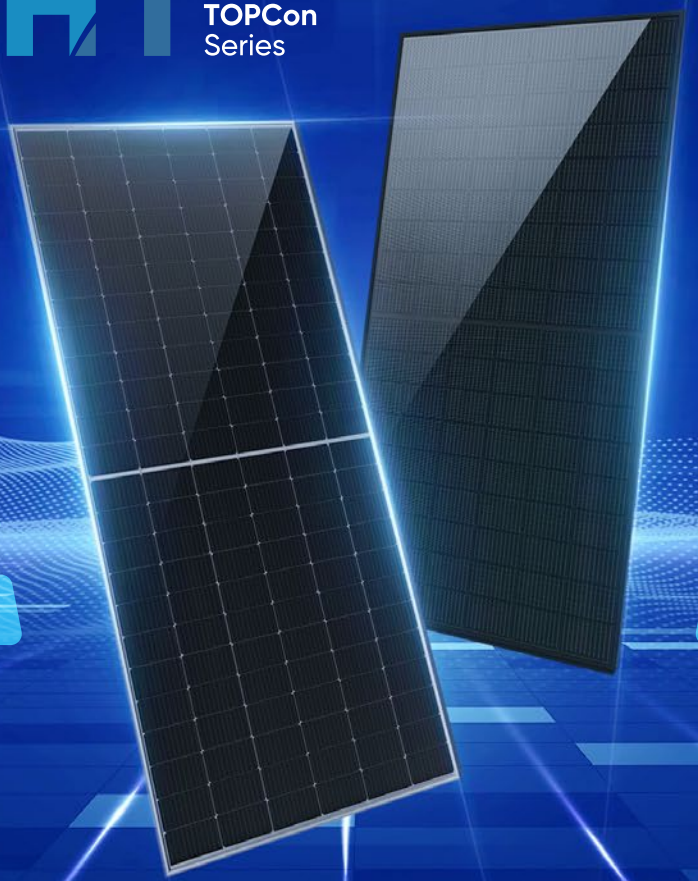
- "Golden Dimension" 2382×1134mm
- Compared with modules applied 182 cells, there's more than **40W** output increase
- Lowest transportation cost
- Lowest system cost
- Lowest non-silicon material cost



HY SOLAR TOPCon Modules Advantages

HY SOLAR

HT TOPCon Series



01 HY TOPCon cell technology

02 Diverse module types

03 SMBB & half-cell

04 Non-destructive cutting

05 High density cells encapsulating

06 Higher bifaciality

07 Lower temperature coefficient

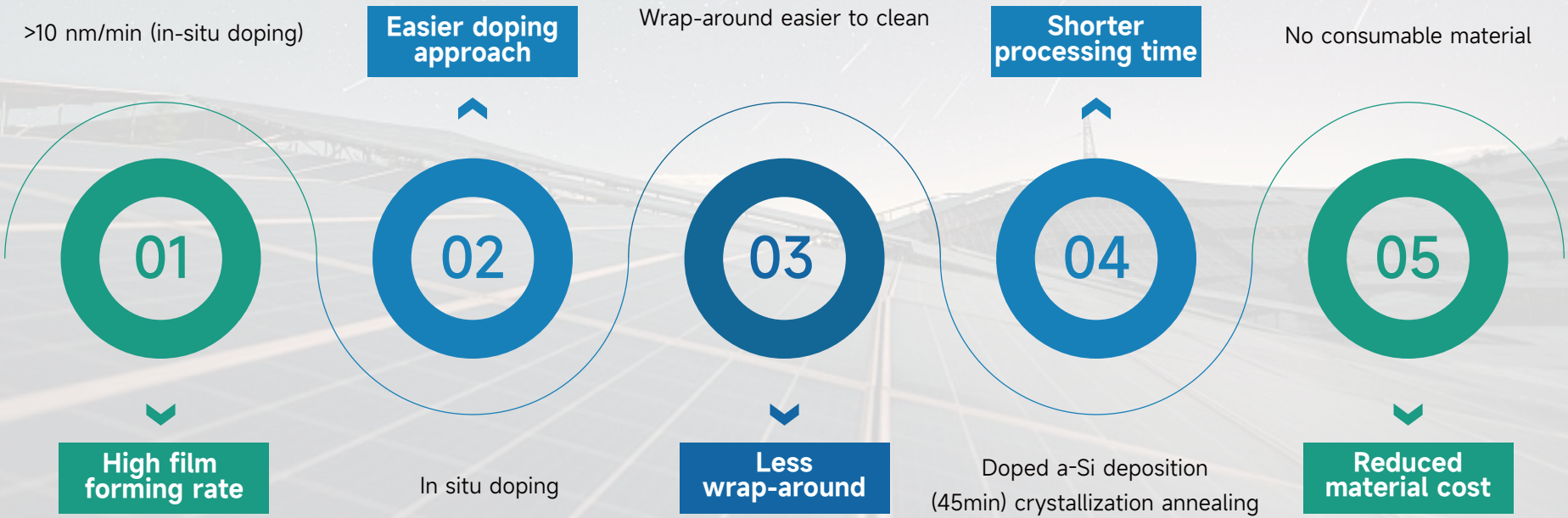
08 Better low-irradiance performance

09 Lower degradation

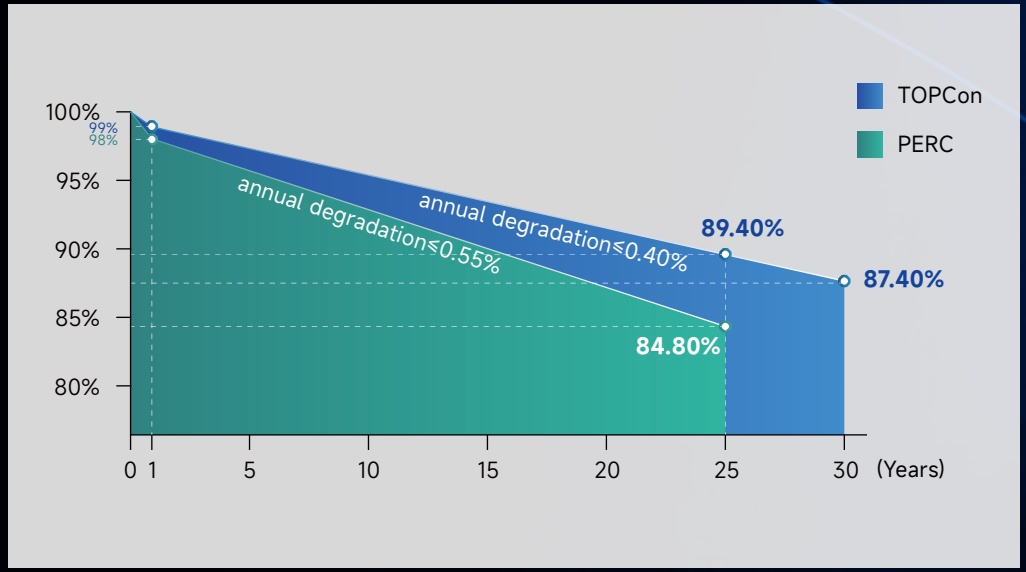
10 Lower LCOE

01 HY SOLAR TOPCon cell tech

Film deposition equipment is the key to TOPCon manufacturing.
The tech HY SOLAR adopts is PECVD tech with strong potential for comprehensive performance.



02 Lower Degradation, Longer Warranty



N-TOPCON Module Warranty

15-year product workmanship warranty, 30-year power warranty

For modules within 2 m² which installed and operating on residential rooftops: 30-year product workmanship warranty, 30-year power warranty

≤1% first year degradation, ≤0.4% of annual degradation

≥87.4% of the initial output after 30 years

30-Year Power Warranty

≤1%
1st year degradation

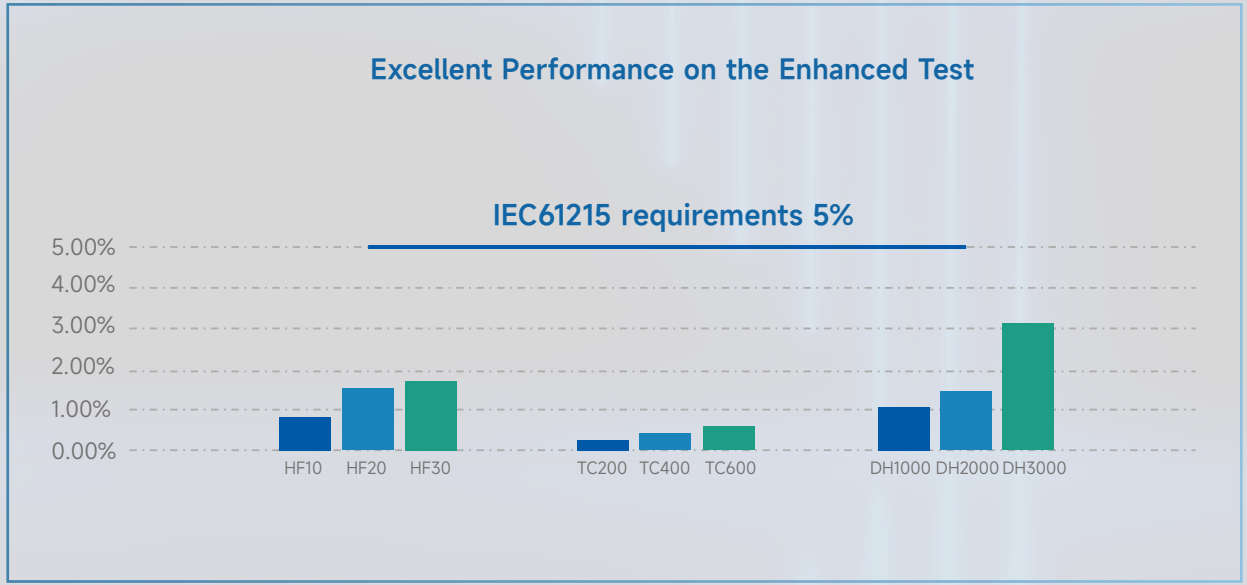
0.4%
Linear degradation

03 Excellent Module Reliability

According to IEC61215 standard test,
Modules exhibit
outstanding reliability performance

IEC61215 Test

IEC Test triple as demanding



04 Better Performance in System

HYSOLAR

Items	TOPCON	PERC Bifacial	Results
Max.Output/W	585	555	30W+ power improvement(182 72)
Bifaciality	80%	70%	10%-15% increase for the same module type
Temperatura Coefficient	-0.29%	-0.34%	Generation Gain +2%
LID	Zero-LID	~1%	Perfect – Zero LID
Low-irradiance Performance	+2%	Baseline	3% improvement under 200W/M2
Power Generation	+2%	Baseline	4%+ improvement
Hot-spot	145°C	150°C	Higher power generation compared with PERC modules

05 Lower LCOE

HYSOLAR

LCOE is the primary metric for determining client value; modules with high efficiency, output, and dependability may maximize the value we provide to our customers.

Items	HY-NT10/72GDF	HY-P10/72GDF	Comparation
Output/W	585	555	/
Dimensions/mm	2278 x 1134	2278 x 1134	/
Voc/V	52.05	50.3	/
Module number perstring (1500V)/pcs	26	26	/
Modulenumber/pcs	17094	18018	-5.1%
String number/string	657	693	-5.2%
System installation and construction cost/10,000yuan	439.53	457.17	-3.9%
Area/m^2	81538	85945	-5.1%
Total power generation/kwh	305,610,494	292,738,962	+4.4%
First year power generation/kwh	10,861,296	10,485,794	+3.9%

BOS ↓ **2%**

As the power of modules of the same type increases, the support, cable, and installation costs decrease.

LCOE ↓ **3%**

Low degradation, low power temperature coefficient, high bifaciality, high low light response, result in improved power generation.

Ep ↑ **4.4%**

The power generation increased by more than 4% when compared to the same version module.

IRR ↑ **5%**

With the advantages of low BOS cost and high volume, N-type modules can potentially enhance the IRR of the project by over 5%, given the current market price differential.

06 Project Empirical Data

Hainan project

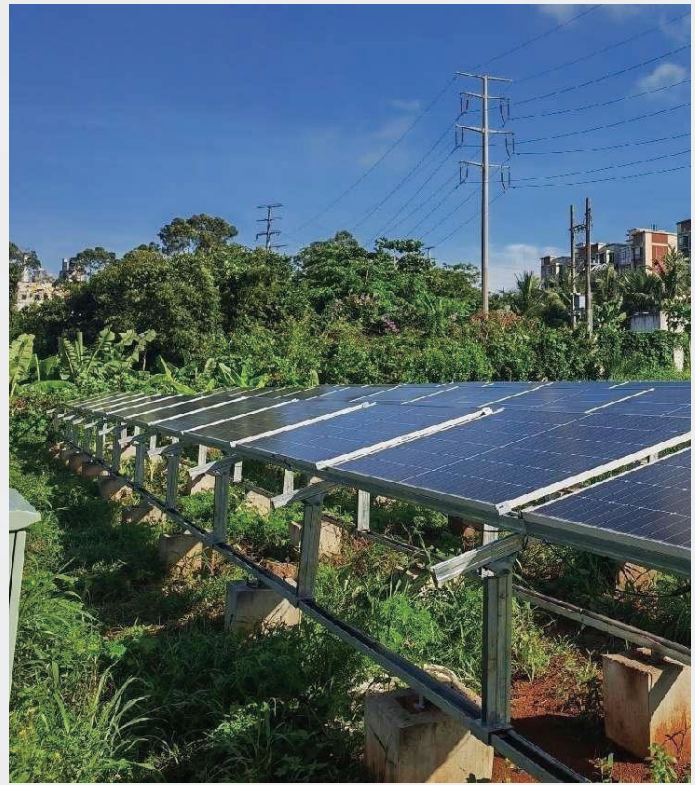
Date: May-October 2023

Ave Temp: 29.10°C

Geography: Grass

Output power gain 6.8% than PERC

Scene	The number of items be compared	Gain range % (-Perc reference)	Gain Average %
Grass	6	3.34~5.84	4.26
Color steel tile roof	1	2.99	2.99
Cement roof	4	3.37~6.19	4.80
Cement roof (white)	1	7.41	7.41
Sand	4	5.25~7.67	6.19
Brown soil	5	4.42~6.91	5.3



Project Cases

HYSOLAR

Utility-Scale
PV Power Plants

Yunnan, China
Mountain PV Project
Project size: 150MW

Guizhou, China
Mountain PV Project
Project size: 200MW

Commercial
PV Power Plants

Italy, Europe
Distributed Project
Project size: 50MW

Jiangsu, China
Distributed Project
Project size: 80MW

Residential
PV Power Plants

Pakistan, Asia
Distributed Project
Project size: 10MW

Italy, Europe
Distributed Project
Project size: 10MW

PV+ Power Plants

Guangdong, China
Agri-PV Project
Project size: 100MW

Gansu, China
Agri-PV Project
Project size: 170MW

Certifications

HY SOLAR has persisted on TOPCon as the primary technical direction of solar modules, and has received industry recognition for the entire process of "efficient" product performance. Meanwhile, our thorough global certification and continual abundant production capacity allow us to maintain our high-quality market dominance in the module application industry.

Product Certifications

System Certifications

ISO 9001
Quality assurance systems

ISO 14001
Environmental management systems

IEC/TS 62941
PV module manufacturing quality system

ISO 45001
Occupational health and safety management systems

Quality Assurance

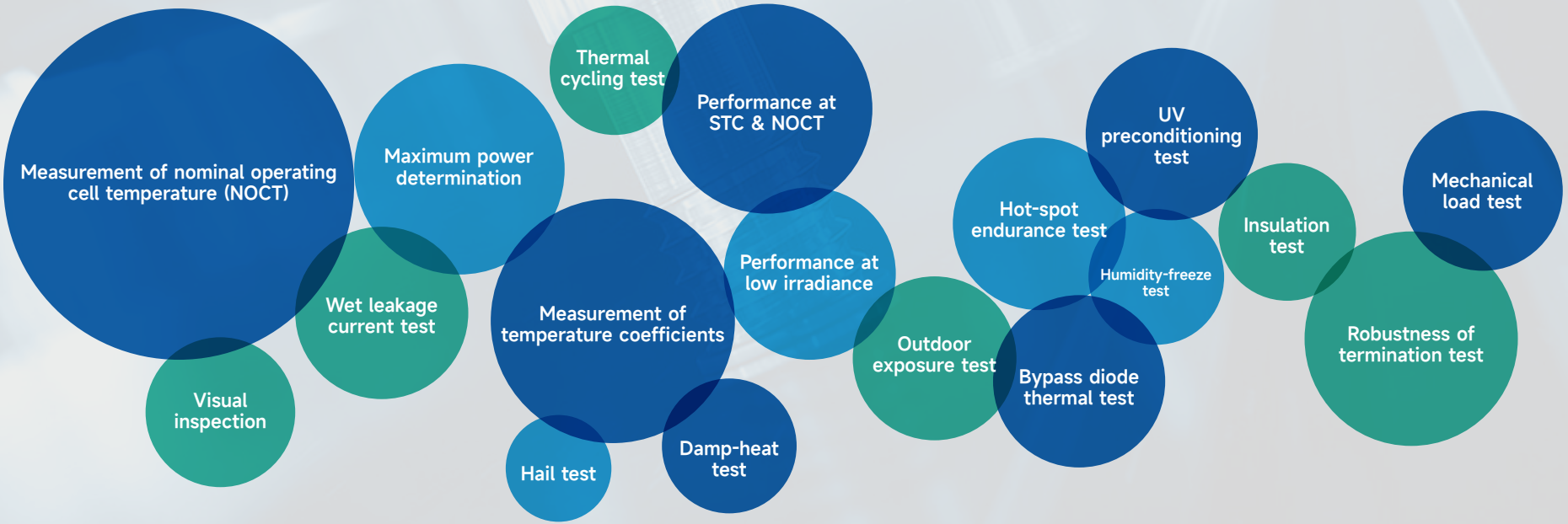
Munich RE

PV CYCLE

Innovation

Leading PV laboratory with high standard testing qualification

Leading internal laboratory which can realize 100% coverage of IEC 61215 PV products testing code!



Reliable Yield Rate

All of HY SOLAR modules would use HY SOLAR high-quality PV cells, that play a key role in ensuring high yield rate of production and high reliability of module products.
Meanwhile, they can also improve the operation stability of the equipment, assuring orders on-time delivery.

Yield rate is higher

than the average value in industry

+0.3%

Fully Automatic QC Inspection

To ensure high reliability of PV modules

Process Control

HYSOLAR

IPQC Process Control

Automatic Loading

- Test of temperature & humidity
- Test of raw material
- Test of insulated strips
- Control of EVA size and storage
- MES Data Import

Automatic Cell String Layup

- Test of temperature & humidity
- Technical parameter verification
- Control of welding temperature
- Inspection of welding quality
- Control of EVA & backboard storage
- MES Data Import 100%EL Test

Automatic Framing

- Test of raw material
- Gluing with silica gel
- Inspection of module size
- Inspection of junction box welding
- Control of temperature & humidity during module solidify

Automatic Welding

- Test of temperature & humidity
- Test of raw material
- Technical parameter verification
- Adhesion test
- EL test
- MES Data Import

Lamination & Cooling

- Control of temperature
- Vacuum pressure test
- Technical parameter verification
- Adhesion test
- Visual Inspection
- MES Data Import

Testing

- Voltage Test
- Insulation test
- Grounding test
- Control of temperature & humidity
- 100%ELTest

Qualified Modules

Full Industrial Chain Traceability

HYSOLAR

› Traceability system of the entire industrial chain

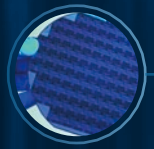
Starting from self-produced silicon materials, the origin of production is clear, providing information traceability and transparency for the entire manufacturing chain of silicon wafers, cells, and modules. The process is fully traceable, monitorable, and precisely managed, meeting customer demands.

Silicon Material

- Own silicon materials **100,000** tons
- 11N high purity
- Manufactured in Baotou, with legal and compliant labour practices

PV Cell

- Own cell capacity of **45**GW
- Utilizing PECVD technology
- Enhanced with LECO technology
- Efficiency up to **26.42**%



PV Wafer

- Own silicon wafer capacity of **75**GW
- Covers 100% N-type specifications
- Leading in industry with low carbon footprint

PV Module

- Own module capacity of **35**GW
- Full N-type coverage

HYSOLAR

ESG Management

Responsible Supplier

HYSOLAR

Carbon Footprints

We adheres to the concept of green manufacturing, and inte-grates green and low carbon philosophy into the entire proc-ess of production and manufa-cturing.

- Purchasing low-carbon material
- Increase the proportion of green power in the production process
- Multiple products passed the French ECS certification
- Waste Management and Discharge
- Reuse of silicon material

Traceability

The vertically-integrated indu-stry layout ensures the trace-ability from raw material to end product.

- N-type full PV industry integrat-ed, controlling from the origin
- Digital intelligent manufacturing system, the production data can be recorded in a complete and reliable manner

Compliance

Integrity and pragmatism are core values of the company and serve as cultural philosop-hy that motivates continuous upgrading of internal control and management.

- Internal control and compliance enforcement mechanism
- Anti-corruption and commercial bribery
- Safeguard the rights and inter-ests of all employees
- Responsible information man-agement
- Responsible Marketing

Customer Service

To get a better understanding of customer actual needs. We expect to provide professional and timely customer service.

- Full-cycle worry-free production system and complete quality assurance
- Survey on custom satisfaction
- 24-hour customer complaint handling mechanism

Leader of Clean Energy

Multiple products passed the French ECS certification.
The company passed ISO 14001 EMSC and ISO 50001 EMSC.

2022

- Invested **84.08**million in environmental protection
- Reduced **40**million tons of carbon dioxide emissions
- Was recognized as one equipped with PV manufacturing standard condition in China

2021

Awarded with the National Green Factory

Sustainable Supply Chain

The entire process of assessment selects qualified suppliers that satisfy corporate business needs.

Hierarchical management and performance assessment conduct strict supplier management.

Insists on a zero-tolerance attitude towards corruption and fraud.

Encourage localized procurement, which helps to strengthen the local economy and promotes local employment.

Social Responsibility

Public Welfare Donations

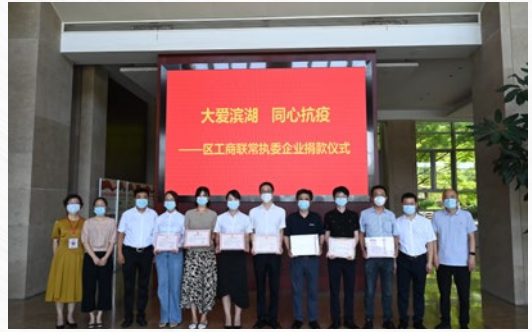
2022 donated
RMB **13.17** million
promoting rural revitalization
To assist disadvantaged groups in society

Volunteer Services

529 hours of volunteer services from **3,634** volunteers throughout 2022
To integrate volunteer services as part of employee's responsibilities

Recruiting Talents

Create equality, diversity and inclusiveness atmosphere
Providing employees with competitive compensation and welfare
To arrange democratic communication channels for employees, and listen to employees' voices



To walk with the light
Driving the green world forward

We, concentrate on the source of novel concepts for deep cultivation in order to consistently break through energy barriers.
We,the unwavering source of innovation, have fostered a bigger green dream;
We,protect every source of energy from nature, investigate the mystery of sunlight,
and return to nature with gifts from nature, so that each share of clean energy can be turned into the original green

31 GW

2022
the shipment volume of PV wafer reach 31GW

5.75 million

Equivalent to saving standard coal by 5.75 million tonnes

26.67 million

Equivalent to cutting CO2 emissions by 26.67 million tonnes

1.33 billion

Equivalent to 1.33 billion trees planted in the forest

HYSOLAR

Group Headquarter

No. 158 Nanhu Middle Road, Binhu District, Wuxi City, Jiangsu Province, China

Module Manufacturing Base

- No.1159 Gangcheng Avenue, Jiangyin City, Jiangsu Province, China
- No.99 Jiuzi Road, Chuzhou City, Anhui Province, China

Contact us

+86 510-85958787

E-mail

info@hysolar.com

WeChat(CN) WeChat Channel WeChat(EN) Facebook LinkedIn Twitter YouTube