

Brief Introduction of Astronergy

High Quality, High Performance, High Efficiency



ASTRONERGY

December 2023





CONTENT

- 01** **Our Positioning**

- 02** **Our Advantages**

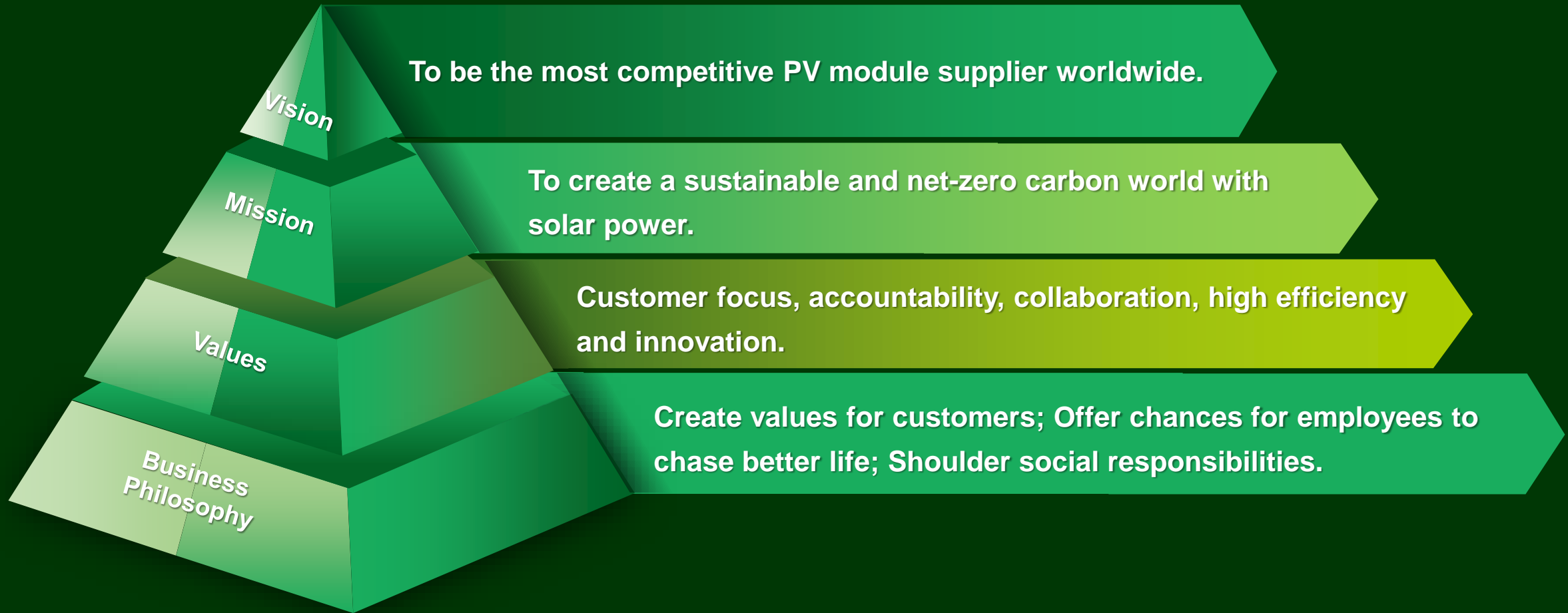
- 03** **Our Products**

- 04** **Social Responsibility**

OUR POSITIONING



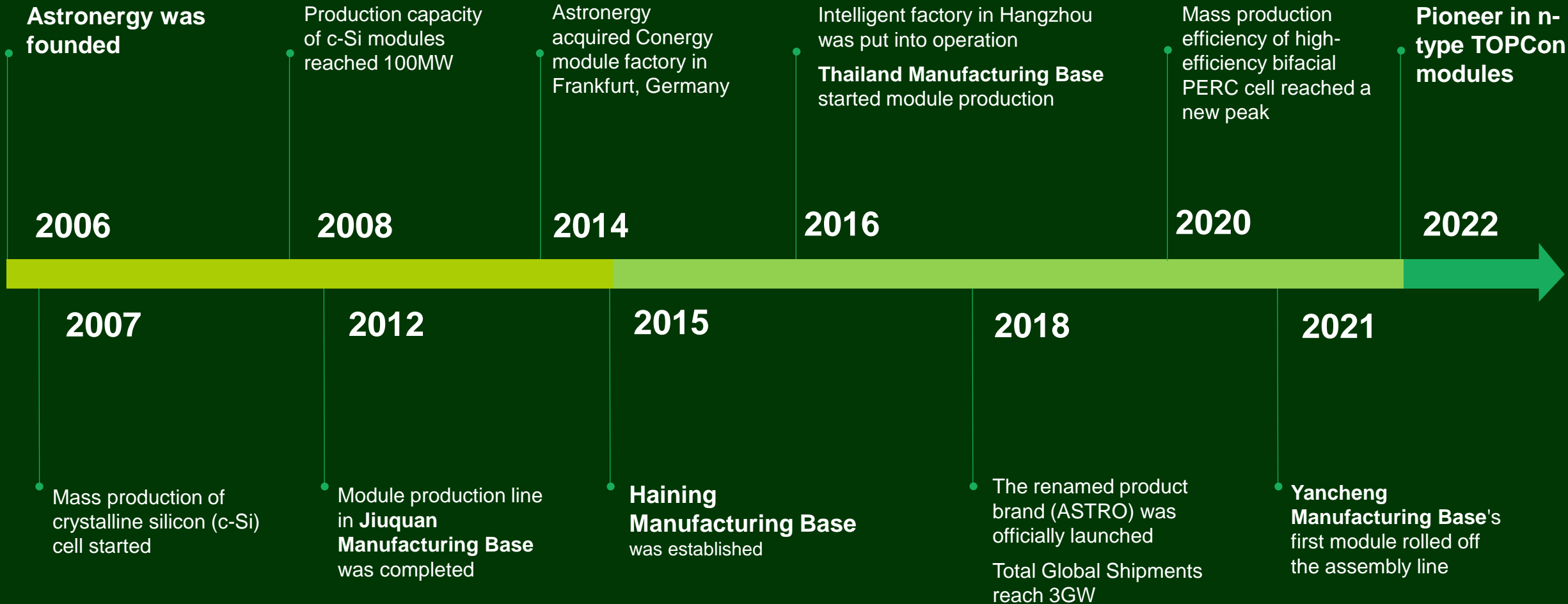
ASTRONERGY



MILESTONES



ASTRONERGY





About CHINT Group

Founded in 1984, CHINT Group Co., Ltd. (hereinafter referred to as "CHINT") is a global leading smart energy solutions provider. Over the past 39 years since its establishment, CHINT has always focused on industry and brand building, deeply implemented the strategy of "Industrialization, Technologization, Internationalization, Digitalization and Platformization", and formed three major segments of "Green Energy, Intelligent Electric and Smart Low-carbon" and two major platforms of "CHINT International Platform and Sci-tech Innovation Incubation Platform", with its business covering more than 140 countries and regions and employees of more than 40,000 worldwide.

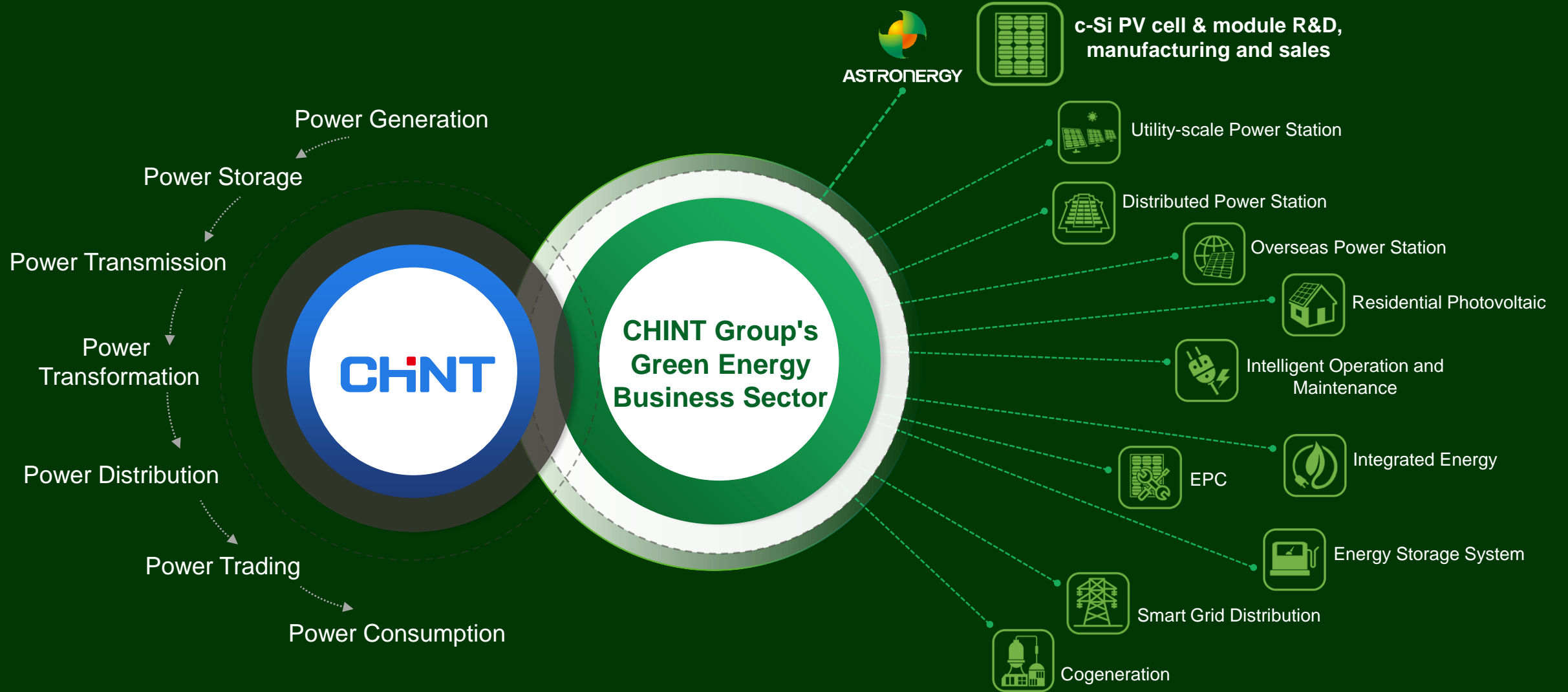
About Astronergy

Focusing on PV cells and modules, Astronergy is an intelligent manufacturing company under CHINT Group, with its photovoltaic business started from 2006. Astronergy is committed to the R&D, production and sales of high quality, high performance and high efficiency crystalline silicon solar cells and modules, and has been a pioneer in n-type TOPCon PV modules.

THE ENTIRE INDUSTRY CHAIN



ASTRONERGY



To create a sustainable and net-zero carbon world with solar power



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01 Our Positioning

02 Our Advantages

03 Our Products

04 Social Responsibility

HONORS



ASTRENERGY

No. 1 in "China's Top 100 Private Enterprises with Social Responsibility" in 2021

No. 82 in "2022 China's Top 500 Private Enterprises "

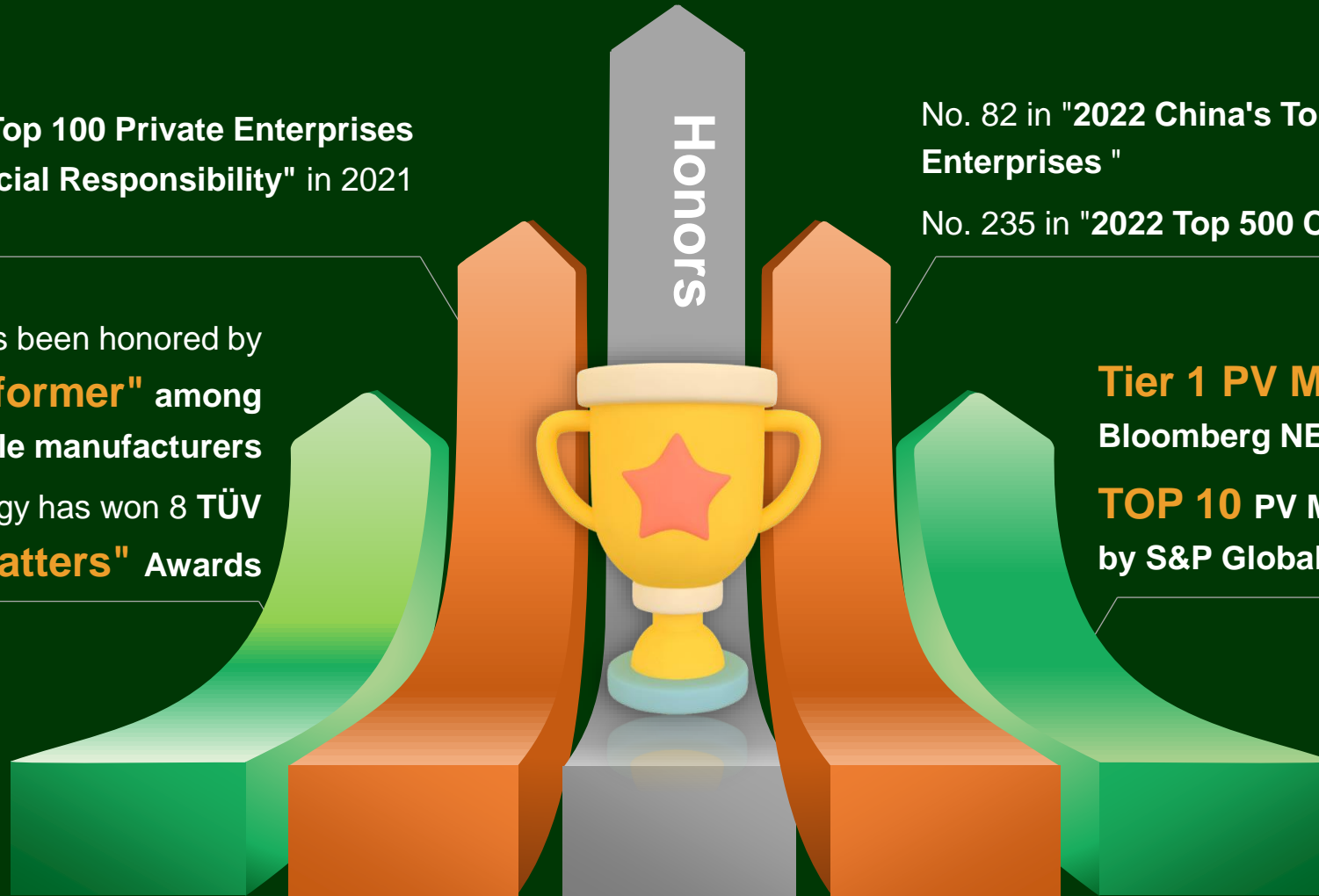
No. 235 in "2022 Top 500 Chinese Enterprises"

For 7 years, Astronergy has been honored by PVEL as **"TOP Performer"** among module manufacturers

For 4 times, Astronergy has won 8 TÜV Rheinland **"All Quality Matters"** Awards

Tier 1 PV Module Maker listed by Bloomberg NEF

TOP 10 PV Modules Suppliers released by S&P Global

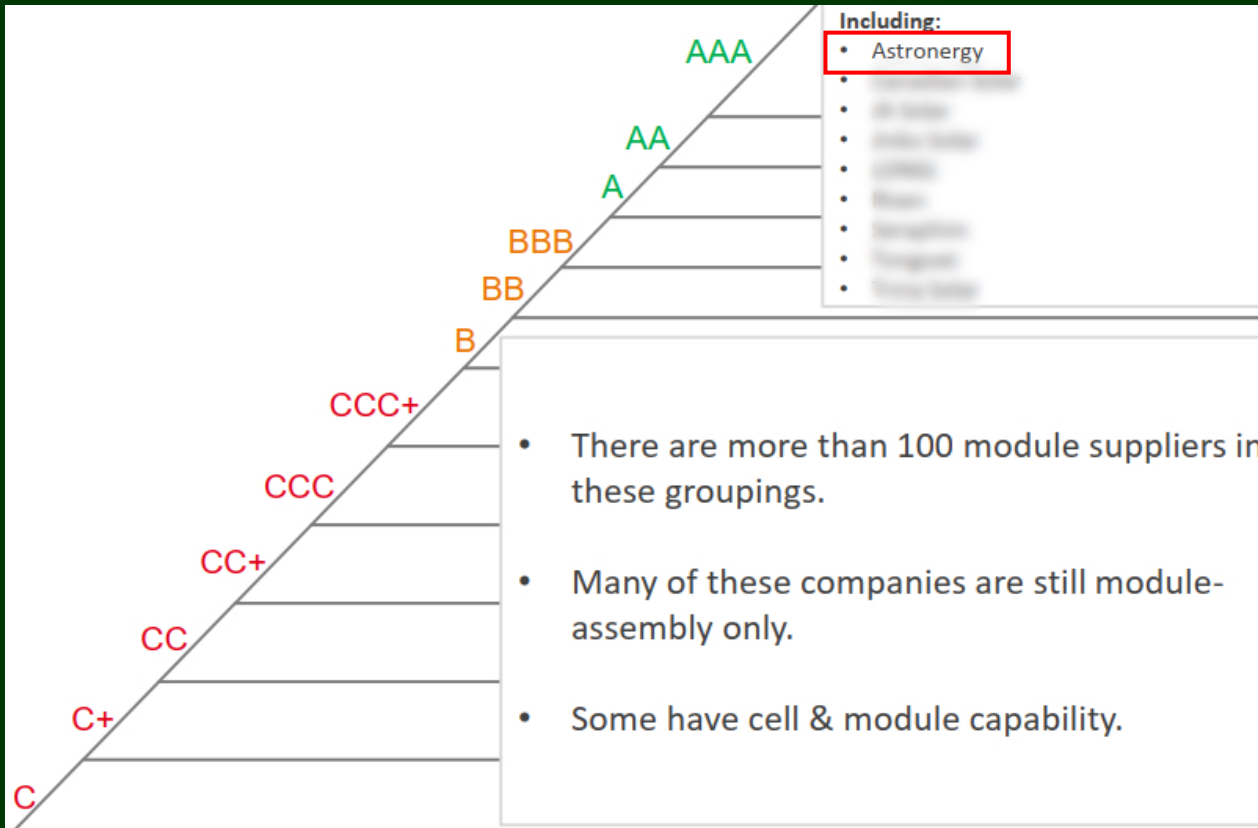


BANKABILITY

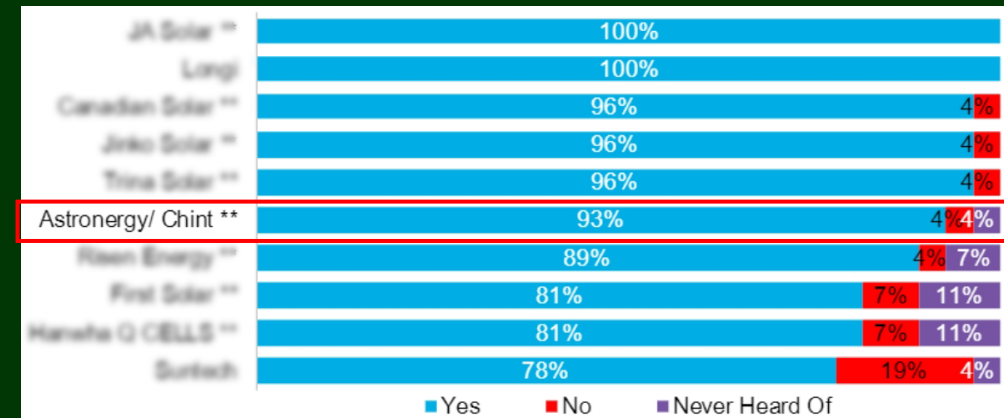


ASTRONERGY

Due to its stable financial situation, reliable product quality, and outstanding brand value, Astronergy bankability rating continues to rise. According to the Bankability Ratings released by **PV ModuleTech**, Astronergy has been in the upper for multiple consecutive quarters; In the annual "PV Module and Inverter Bankability" released by **Bloomberg New Energy Finance (BNEF)**, Astronergy bankability rating has risen from seventh place on the 2022 list to **sixth place on the 2023 list**.



PV ModuleTech 2023 Bankability Ratings



Year of 2023



Year of 2022



KEY FIGURES



ASTRONERGY



18.34 Billion USD
2022 CHINT Group Revenue



45000+
Employees Worldwide



140+
Countries and Regions
Where Businesses
Cover



3.02 Billion USD
PV Modules Revenue in 2022



TOP 6*
2023 H1 PV Modules
Shipments among
All Suppliers Worldwide



20 GW
2022 PV Modules
Production Capacity
Worldwide



11 GW
Cumulative Capacity of PV Power
Stations Owned by CHINT Group



8.3 Million Tons
CO₂ Emissions Reduced
per Year



8.3 Billion kWh
Green Electricity
Provided for the Whole
Society per Year

To create a sustainable and net-zero carbon world with solar power

GLOBAL PRESENCE



ASTRONERGY

60 GW+

Total Global Shipments

140+

Countries



Haining, HQ
R&D, MFG Center



Manufacturing Base
In Yancheng



Manufacturing Base
In Jiuquan



Manufacturing Base
in Thailand

Global Headquarters

Global Sales Offices

Global Sales Channels

Global R&D Center

Global Manufacturing Bases
(mass production)

Global Manufacturing Bases
(under construction)

To create a sustainable and net-zero carbon world with solar power

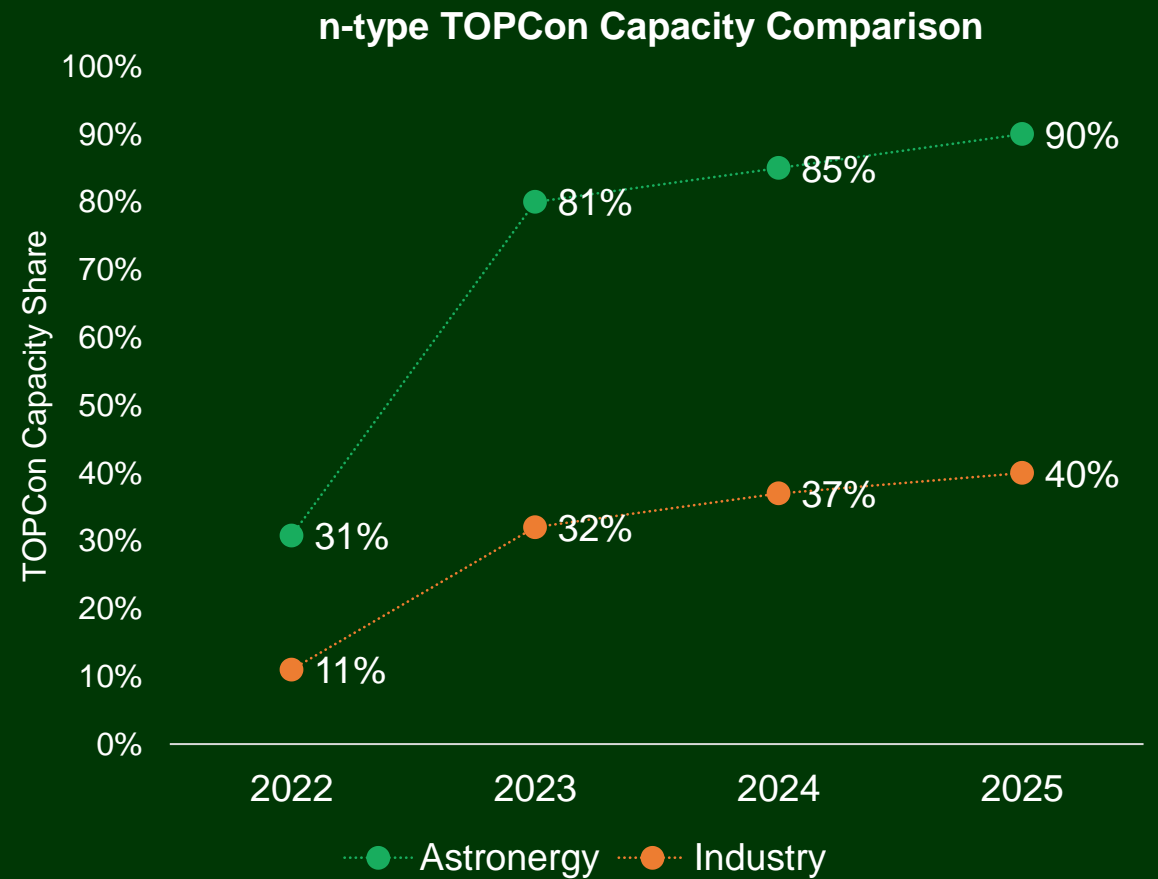
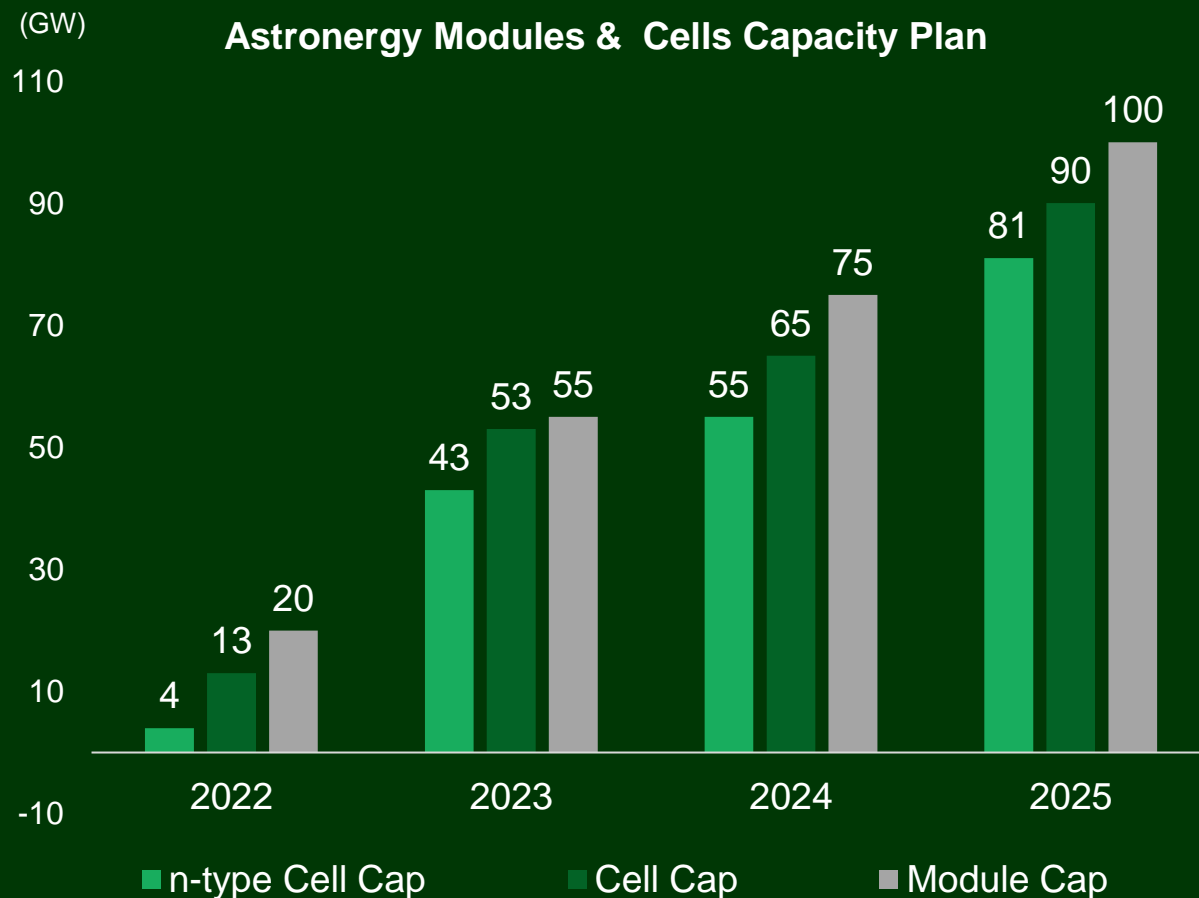
CAPACITY PLANNING



ASTRONERGY

Astronergy's TOPCon cell production capacity will increase to **43GW** in 2023.

In 2025, the **TOPCon capacity share of Astronergy will be $\geq 90\%$** vs. **industry $\leq 40\%$** .



GLOBAL PARTNERS



ASTRONERGY



FINANCIAL SUPPORT



ASTRONERGY

Actively involved in the financial investment sector, the company has established investment and financing companies such as Zhejiang Civil Investment Bank, Wenzhou Civil and Commercial Bank, Zheshang Insurance, and CHINT Finance, and has been investing in new energy, electrical and many other fields.

We have established comprehensive cooperation with major domestic and foreign financial institutions such as China Credit Insurance, China Development Bank, Export Bank, ICBC, IFC, Standard Bank, Shinhan Bank, SCB, CITI, etc., with financing ratio and financing cost leading in the industry.





CONTENT

- 01** Our Positioning

- 02** Our Advantages



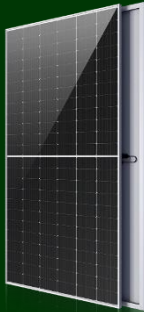
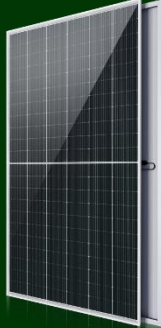
- 03** Our Products

- 04** Social Responsibility

MODULE PRODUCTS ITERATION & INNOVATION



ASTRONERGY

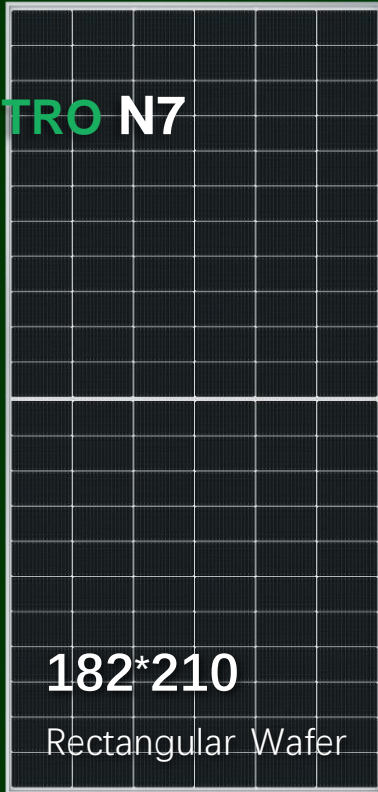
<p>4BB</p> <p>Polycrystalline PERC</p> <p>Black Silicon Technology</p>	<p>5BB</p> <p>High Efficiency Monocrystalline</p> <p>PERC Technology</p>	<p>G1 158.75</p> <p>PERC SE</p> <p>Half-cut</p>	<p>M6 166</p> <p>22.5%+PERC</p> <p>MBB</p> <p>Half-cut</p>	<p>M10 182</p> <p>23%+PERC+MBB</p> <p>Half-cut</p> <p>Non-destructive Cutting</p>	<p>G12 210</p> <p>23.2%+PERC+MBB</p> <p>Half-cut</p> <p>Non-destructive Cutting</p> <p>High-Density Encapsulation Design</p>	<p>n-TOPCon 182</p> <p>High Efficiency</p> <p>High Bifaciality</p> <p>Better Low-irradiation Performance, Low Temperature Coefficient, Low Degradation</p>
ASTRO 1	ASTRO 2	ASTRO 3	ASTRO 4	ASTRO 5	ASTRO 6	ASTRO N
<p>325~350W</p> <p>17.8%</p> 	<p>375~390W</p> <p>19.3%</p> 	<p>405~425W</p> <p>20.7%</p> 	<p>440~460W</p> <p>21.1%</p> 	<p>540~555W</p> <p>21.5%</p> 	<p>650~670W</p> <p>21.6%</p> 	<p>635W</p> <p>22.8%</p> 

MAIN PRODUCTS



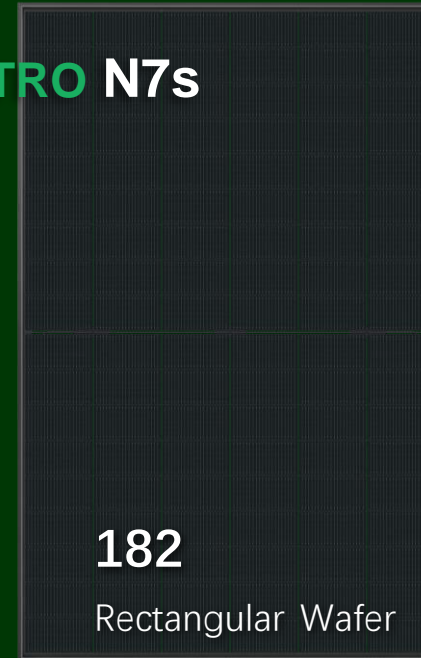
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ASTRO N7



- n-type **TOPCon 3.0** PV cell
- Light redirecting film (for double-glass series)
- SMBB tech
- Higher power
- Higher efficiency
- Higher reliability
- Higher power generation per watt
- Lower BOS & Lower LCOE

ASTRO N7s



- n-type **TOPCon 3.0** PV cell
- RSD device (Optional)
- ZBB-TF tech
- Higher power
- Higher efficiency
- Higher reliability
- Higher power generation per watt
- Lower BOS & Lower LCOE



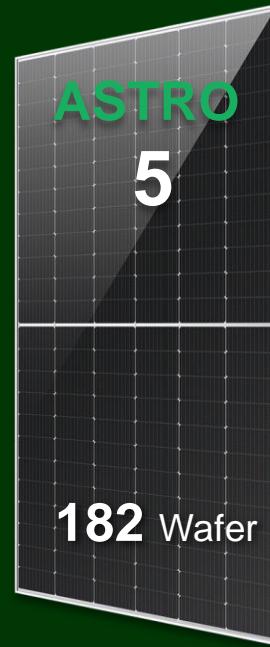
MAIN PRODUCTS



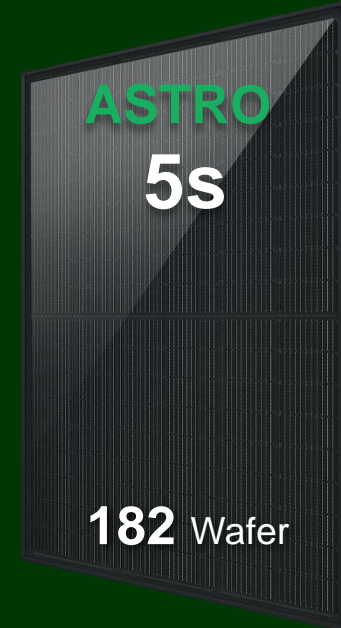
ASTRONERGY



- n-type **TOPCon** cell
- The series includes two products to meet variable PV application scenarios



- High-efficiency **PERC+**
- Suitable for utility-scale power stations and distributed power stations



- High-efficiency **PERC+**
- Featuring “light, efficient, quality and aesthetic”, especially for residential PV rooftops



To create a sustainable and net-zero carbon world with solar power



The Thinking Factories

- Supported by Big Data
- AI Quality Inspection
- The 1st to Achieve AI Automatic Detection of EL Defects
- Automatic Monitoring of the Entire Process
- Fully Automated Production
- Automatic Batching by Unmanned Vehicles
- Localization of Production Equipment

Top Level of Intelligent Manufacturing

2016: Sino-German Intelligent Manufacturing Demonstration Base

2020: Intelligent Photovoltaic Pilot Demonstration Enterprise

The World's First PV "Internet + Transparent Factory"



Scribing Machine



Automatic Glass Laminating Machine



Intelligent Assembly Line



Automatic Feeding and Bar Code Sticking Machine



Series Welding Machine



Banding Machine



Laminating Machine



90 Degree Flip Inspection



Group Box All-in-one Machine



Process Control

MES (Manufacturing Execution System)

- Collects, feedback and verifies statistics for the control of manufacturing abnormality.



SPC (Statistical Process Control)

- Monitors key quality control points, ensure process stability, timely alarm and avoid unqualified.



Quality Control App

- Digital documents for statistic reserve and timely control.



AI Quality Detection

- Intercepts and reports defects in production process to improve products quality.

INTELLIGENT AI DETECTION



ASTRONERGY

Key Process Detection

Semi-finished Product Detection

Finished Product Detection

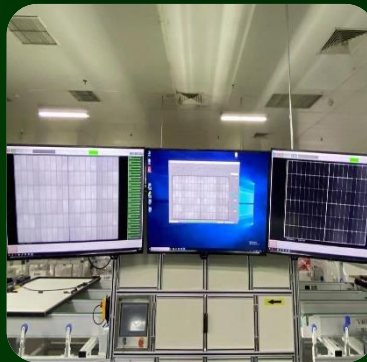
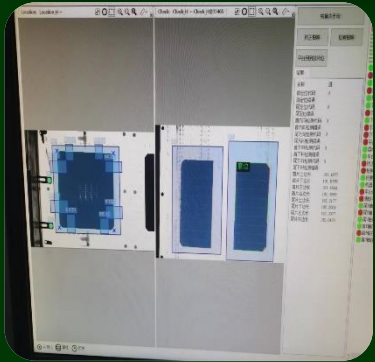
CCD Detection

Serial AI Detection

Pre-lamination
EL & VI Detection

Post-lamination
Detection

Post-lamination EL Detection
& Final Detection



HIGH RELIABILITY & HIGH QUALITY



ASTRONERGY

25-30 Years Power Warranty

Systemized Quality Control Measures

Rigorous Testing Procedures

Certificates with ISO9001, ISO14001 and OHSAS18001...

World-class suppliers and partners



With strong testing capabilities, Astronergy has obtained the qualifications of **CNAS Laboratory**, **CSA Witness Laboratory**, **TÜV Rheinland Witness Laboratory**, **Intertek "Satellite Program" Laboratory** and other qualifications, and **conducts more than 30 rigorous tests internally for PV modules.**

LEADING TECHNOLOGY LEADS TO HIGH PERFORMANCE



ASTRONERGY

1st

Tier 1

Mono-PERC cell efficiency is **23.4%**, leading in PV industry

The average efficiency of **n-type TOPCon cells** reaches **25.75%***,

and the average optimal efficiency of **n-type TOPCon** produced from pilot line hits **26.4%+***. (*Data as of Nov. 24, 2023)



20%

The number of R&D personnel with **intermediate titles and above** at the national level accounts for **over 20%**



311

(as of Aug., 2023)

311 Patents: **232** Utility Model Patents

72 Invention Patents

7 Appearance Design Patents



Cell R&D



Module R&D



Product Project



Project Management



Advanced Technology Management



IP Management



GLOBAL R&D COOPERATION



ASTRONERGY

Explore the "industry university research" integration mode with Shanghai Jiao Tong University, Zhejiang University, Zhejiang University of Technology, Hangzhou University of Electronic Science and Technology, New South Wales, Chinese Academy of Sciences Ningbo Institute of Materials and other universities and research institutions, integrate global innovation resources, and promote enterprise R&D innovation and talent training. Deeply cooperate with domestic and foreign frontline equipment and material manufacturers, carry out collaborative innovation in the industrial chain, and promote industry material innovation and industrialization.

Hangzhou Dianzi University

High-efficiency Monocrystalline PERC Cell Technology

Shanghai Jiao Tong University

New Tunnel Passivated High-efficiency Solar Cell & Module Technology

Zhejiang University

Key Technologies of Low-cost and High-efficiency Solar Cells



UNSW SYDNEY

Hydrogen Passivation Project

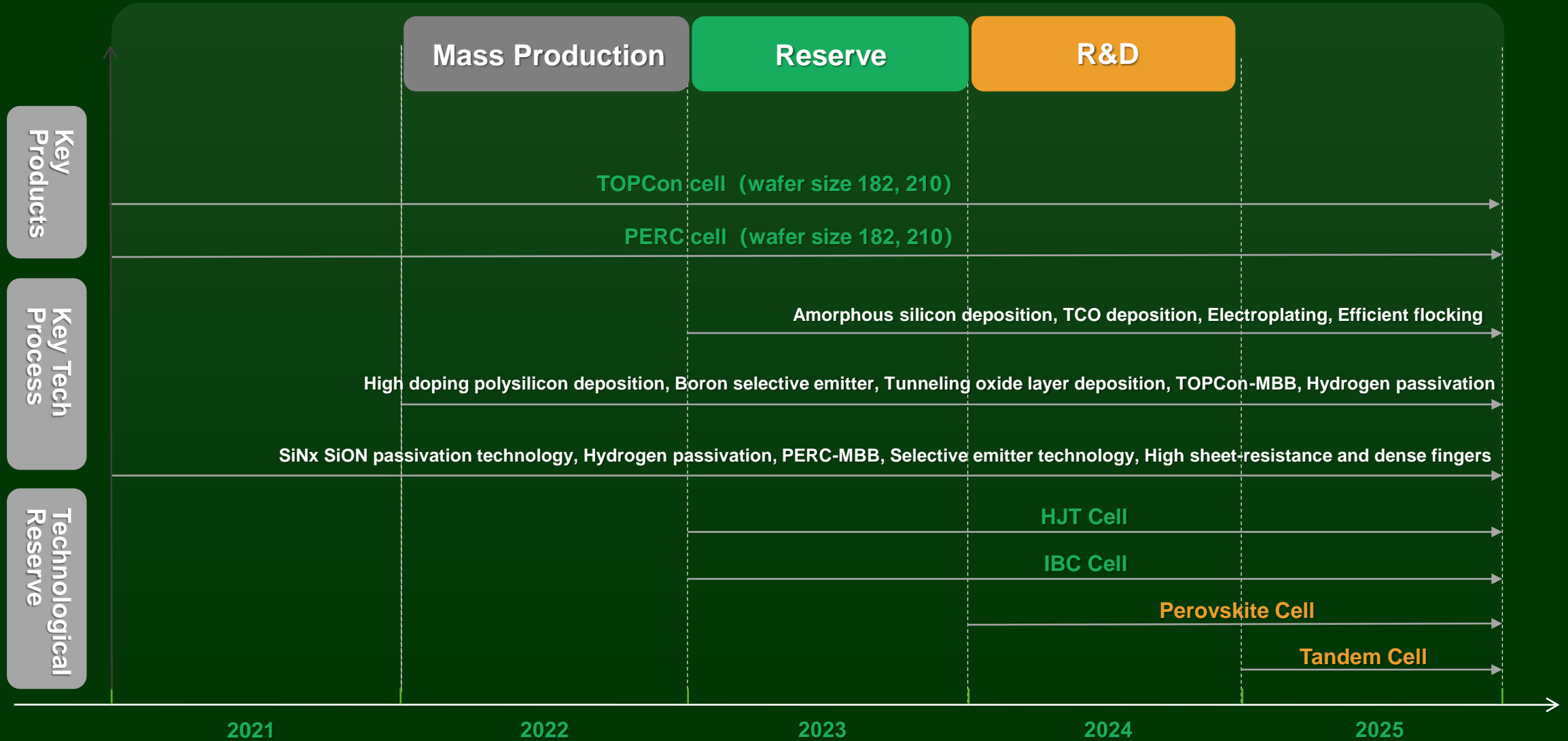
Zhejiang University of Technology

n-type Passivated Contact High-efficiency Bifacial Crystalline Silicon Solar Cells

R&D ROADMAP



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APPLIED CASES



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Utility-scale PV Power Stations

- Benban Solar Park Project in Egypt, 165MW
- Agriculture-Solar Hybrid PV Power Station in Wenzhou, 150MW
- Forest-Solar Hybrid Power Station in Jiangshan Quzhou, 200MW
- Utility-scale Project in Zhangjiakou, Hebei Province, 70MW
- Goonumbla Project in Australia, 89MW
- Barreiras Project in Brazil, 50MW
- Insua Power Station in Portugal, 48.5MW
- Utility-scale Project in Yongchang, Gansu Province, 200MW
- Utility-scale Project in Qiongjie, Tibet, 10MW
- Top Runner Project in Baicheng, Jilin Province, 100MW

.....



Midden-Groningen Solar Park, one of the Largest Power Stations in the Netherlands
103MW | The Netherlands



China's First Sand-Solar Hybrid Power Station
310MW | Kubuqi, Inner Mongolia, China



The Largest Fishing-Solar Hybrid Project in Asia
550MW | Wenzhou, Zhejiang Province, China



Claresholm Solar Farm, one of the Largest Solar Power Plant in Canada
132MW | Southern Alberta, Canada

APPLIED CASES



ASTRONERGY

Distributed Rooftop PV Power Stations

C&I PV Rooftop

- Logistics Warehouses Rooftop Solar Projects in Serbia, 10MW
- Hikvision Rooftop Project in Hangzhou, Zhejiang Province, 10MW
- Jintian Copper BIPV Power Station in Ningbo, Zhejiang Province, 30MW
- C&U Group Rooftop Project in Wenzhou, Zhejiang Province, 23MW
- Roof Project in Changxing Economic Zone, Huzhou, Zhejiang Province, 20MW
- Geely Automobile PV Rooftop Project in Linhai, Zhejiang Province, 10.3MW

.....

Residential PV Rooftop

- Residential Project in Kecheng District, Quzhou, Zhejiang Province, 30MW

.....



Roof Photovoltaic Power Station of Hangzhou East Railway Station
10MW | Hangzhou, Zhejiang Province, China



Hangzhou Civic Center Podium Roof Photovoltaic Power Station
1.2MW | Hangzhou, Zhejiang Province, China



Hervey Bay Rooftop
16 kW | Australia



Project "Million Rooftops for Zhixi"
4MW | Quzhou, Zhejiang Province, China



CONTENT

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- 04** Social Responsibility

CORPORATE SOCIAL RESPONSIBILITY



ASTRONERGY

In May 2023, Astronergy globally published its **2022 Environmental, Social and Governance (ESG)** Reports (hereinafter referred to as “the ESG Report”), delivering on its actions and results on promoting sustainable and stable development and practicing UN SDGs and UNGC 10 Principles to all stakeholders.

Corporate Governance
Sustainable Management



Goal 8
Decent Work and Economic Growth



Goal 9
Industry, Innovation and Infrastructure



Goal 16
Peace, Justice and Strong Institutions

R&D investment over than RMB:

250 million

Legal proceedings related to corruption and unfair competition:

0

Conduct due diligence and environmental assessment dimension screening in terms of supplier’s social impact:

100 %

Customer complaint tracking and rectification rate:

100 %

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Climate Change
Environment-friendly



Goal 6
Clean Water and Sanitation



Goal 7
Affordable and Clean Energy



Goal 13
Climate Action

Scope I+II emission intensity:

30.49 tCO₂e/MW

Energy intensity:

0.46

tons of standard coal/MW

Environmental violations:

0

Achieved

3 %

reduction in overall energy consumption

CORPORATE SOCIAL RESPONSIBILITY



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Career Development
Social Welfare



Goal 3
Good Health and Well-Being



Goal 10
Reduced Inequalities



Goal 4
Quality Education



Goal 11
Sustainable Cities and Communities



Goal 5
Gender Equality

Employee satisfaction score:

82.49

which has been on the rise for two consecutive years

Incidents of discrimination, harassment, forced labor or child labor:

0

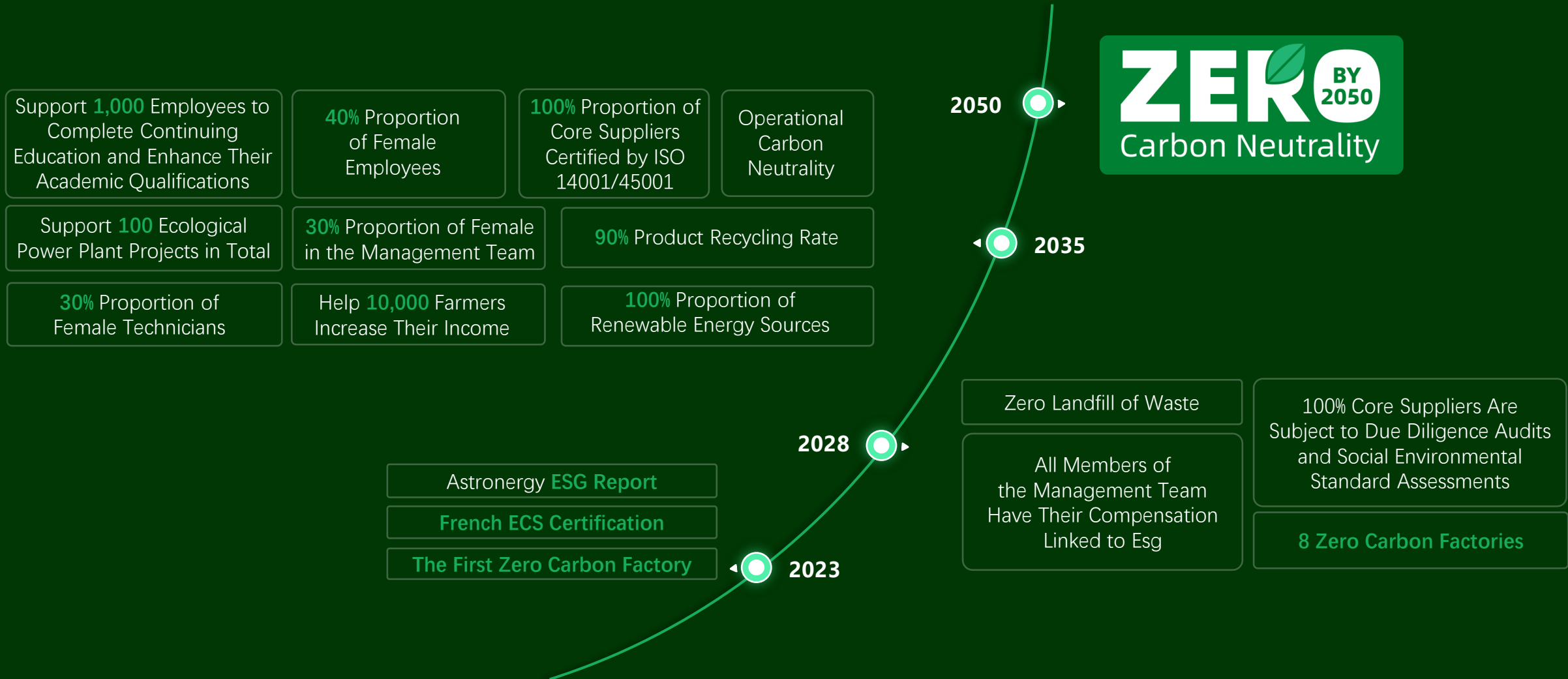
Factories awarded ISO 45001 and ISO14001 certificates:

100 %

CORPORATE SOCIAL RESPONSIBILITY



ASTRONERGY



CORPORATE SOCIAL RESPONSIBILITY



ASTRONERGY

United Nations Global Compact

10,000 companies
+ 4,000 non-businesses

Company Information

Company: CHINT GLOBAL/ Zhejiang Chint Electrics Co.
www.chint.com

Type: Company
Country: China
Sector: Electronic & Electrical Equipment
Ownership: Publicly Listed
Engagement Tier: Participant
Global Compact Status: Active
Participant Since: 24 May 2021
Letter of Commitment

Principles and Global Goals Addressed in their most recent CoP

Next Communication on Progress (CoP) due on: 2022-05-30

1 NO POVERTY, 2 ZERO HUNGER, 3 GOOD HEALTH AND WELL-BEING, 4 QUALITY EDUCATION, 5 GENDER EQUALITY, 6 CLEAN WATER AND SANITATION, 7 AFFORDABLE AND CLEAN ENERGY, 8 DECENT WORK AND ECONOMIC GROWTH, 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE, 10 REDUCED INEQUALITIES, 11 SUSTAINABLE CITIES AND COMMUNITIES, 12 RESPONSIBLE CONSUMPTION AND PRODUCTION, 13 CLIMATE ACTION, 14 LIFE BELOW WATER, 15 LIFE ON LAND, 16 PEACE, JUSTICE AND STRONG INSTITUTIONS, 17 PARTNERSHIPS FOR THE GOALS

PUBLISHED ON	TITLE	LEVEL
2021-05-30	Communication on Progress	Learner

Note: Responsibility for the content of participants' public communication related to the Ten Principles of the UN Global Compact and their implementation lies with participants themselves and not with the UN Global Compact.

UN GLOBAL COMPACT

CHINT

IN ZHEJIANG

Green energy solutions provider CHINT joins United Nations Global Compact

2021-06-21 15:10:18 source: CHINT

Zhejiang Chint Electrics Co. Ltd., a Zhejiang-based leading global provider of smart green energy solutions has recently joined the United Nations Global Compact (UNGC).

Launched In 2000, the UNGC is the largest corporate sustainability initiative in the world, with more than 9,500 companies and 3,000 non-business signatories based in over 160 countries, and more than 70 local networks. It is a call to companies everywhere to align their operations and strategies with ten universally accepted principles in the areas of human rights, labor, environment, and anti-corruption, and to take action in support of UN issues embodied in its sustainable development goals (SDGs).

Joined the United Nations Global Compact (UNGC)

Appear on the official website of the United Nations, which endorses the CHINT brand and brings the following benefits:

- Share experiences and learn from each other with consensus companies and organizations.
- Expand CHINT's resources for **overseas public welfare activities**.
- Obtain the most **authoritative sustainable development policy** information and connection.
- Establish **partnerships with United Nations agencies**, including the International Labor Organization, the office of the United Nations High Commissioner for human rights, the United Nations Environment Program and the United Nations Development Program.
- Improve the **ECO VADIS** corporate social responsibility score of **10 +** to maximize business opportunities.

CORPORATE SOCIAL RESPONSIBILITY



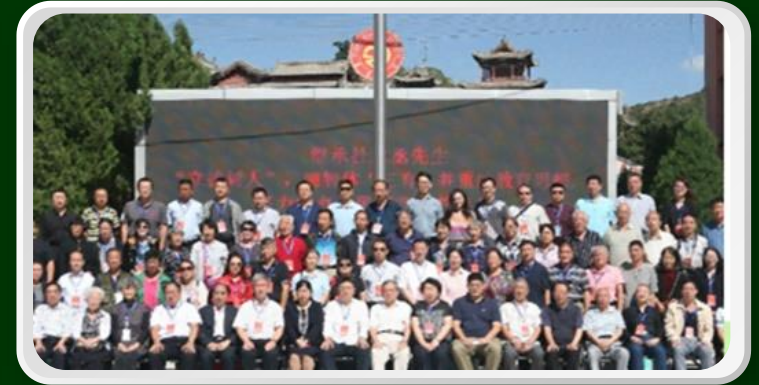
ASTRONERGY

Charity Activities in China

- CHINT Group has always been devoted to building an **extraordinary CSR management system** and improving social responsibility performance throughout all aspects of business operation.
- CHINT Group has **donated more than 54 million dollars** to social welfare such as precise poverty alleviation, school donation, epidemic relief, industry promotion and ecological protection.



Promote photovoltaic projects in the countryside to increase farmers' family income and protect environment.



Provide scholarship of 20 million dollars so far for educational institutions to help students in need and reward excellent students



Set up innovation award of more than 1 million dollars to encourage talents and promote development of the electric-power industry



Donated 1.5 million dollars of emergency supplies to the rescue operations in Henan flood



Collaborate with China Society for Promotion of the Guangcai Program and actively participate in targeted poverty alleviation

CORPORATE SOCIAL RESPONSIBILITY



ASTRONERGY

Overseas Charity Activities



Donated over 1,000 boxes of food and necessary living materials to more than 1,000 families in need in 40 underdeveloped areas in Egypt in April 2021.



"CHINT, Let Love Shine" continues to bring clean energy experiences to schools, hospitals and welfare institution around the world



CHINT associated with Foundation Frenó Al Icus, launching the "Pedal against stroke" virtual low-carbon challenge to draw attention to the problem of stroke and improve people's awareness and vigilance.



Global relay to fight the pandemic together. Donated overseas more than 200k masks, 10k protective clothes and 50 respirators.



Helped Rebuild Homes in the Earthquake Areas of Turkey by providing urgently needed materials



Launched an initiative to combat the devastation that caused by the storm Philomena: that is, donated 5% of the amount of CHINT surge protections sold online to the tree recovery.



ASTRONERGY

High Quality, High Performance, High Efficiency

www.astronergy.com



Follow us on LinkedIn @ Astronergy Solar

