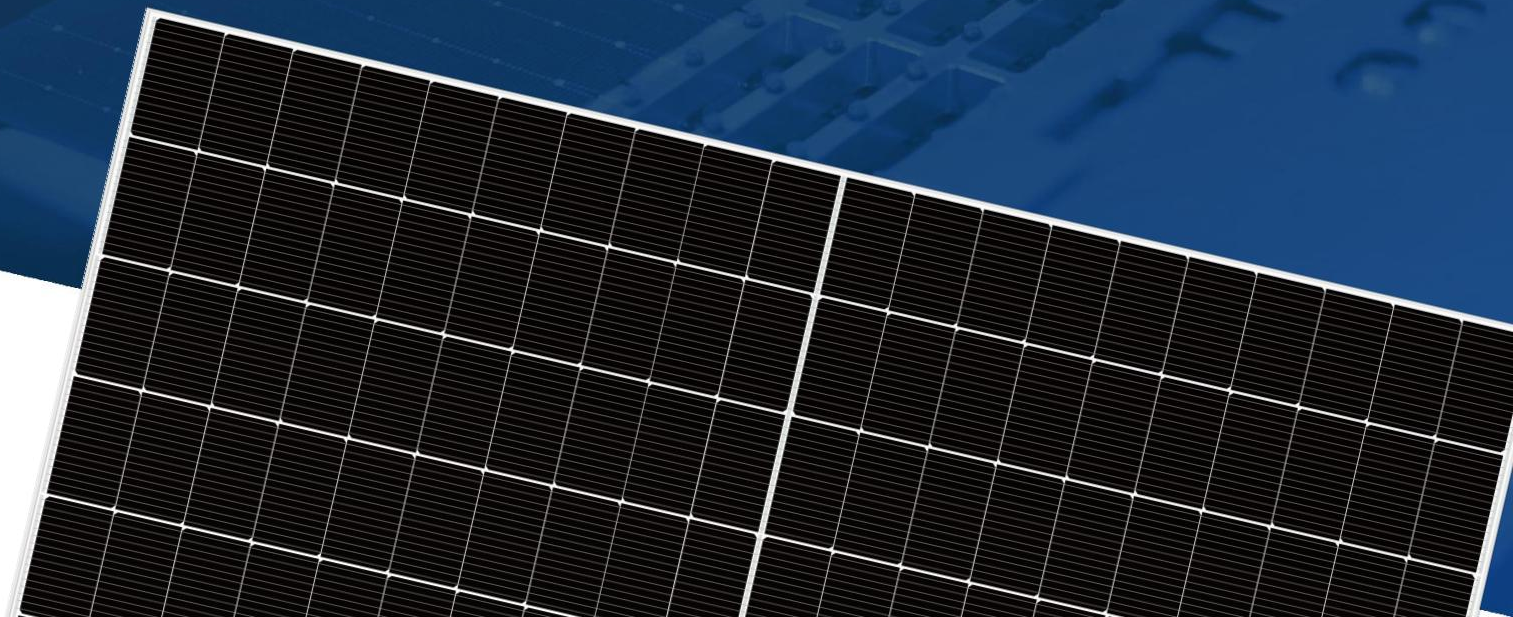
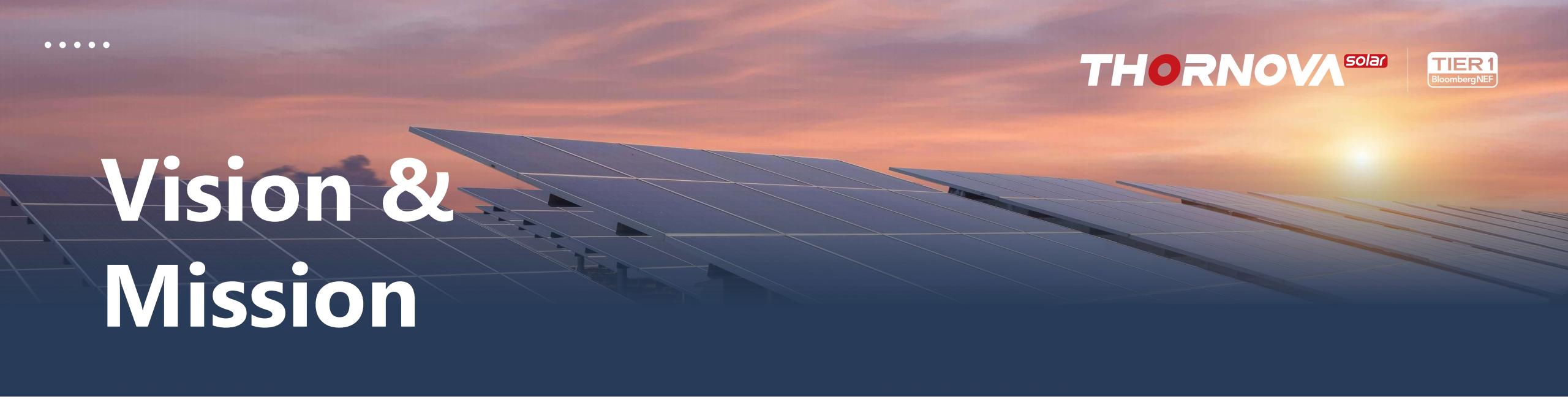
THORNOVA solar

TIER 1 BloombergNEF



Company Introduction

Jan. 2025



Vision & Mission

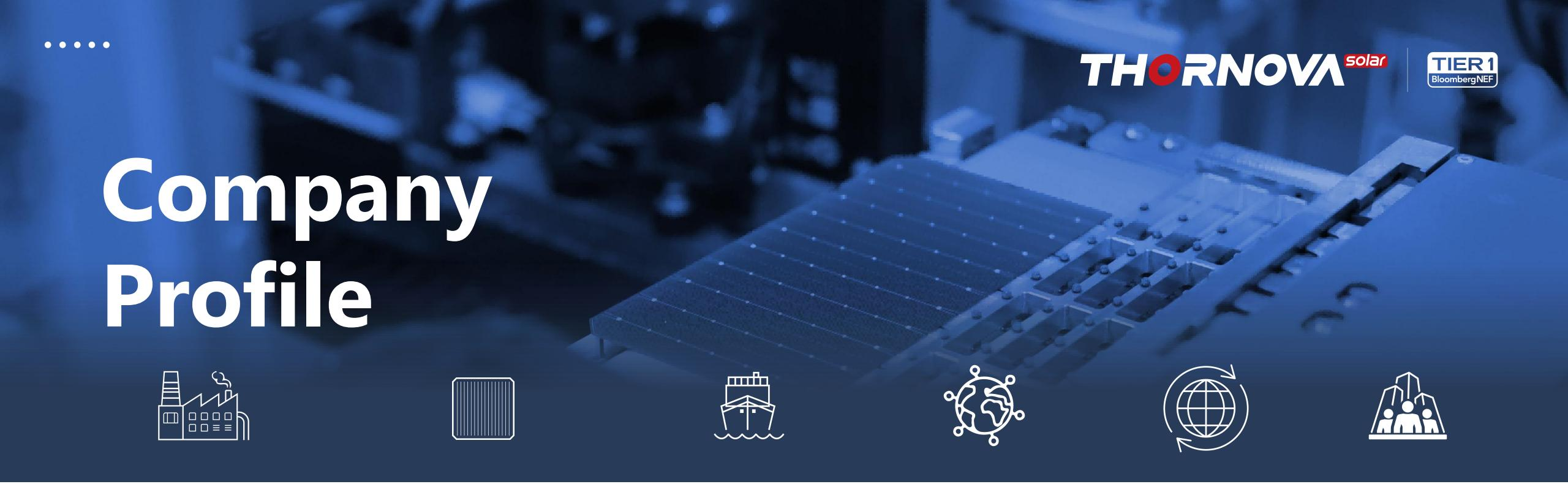
Vision

- Our vision is to become a dedicated market player in distributed PV plants by building Thornova Solar into a leading one-stop technical solutions provider globally.
- We are committed to fair and socially responsible working standards and are working towards carbon neutrality as we aim to becoming the world's leading green energy supplier in the PV business.

Mission

- We aim to become the most user-centric energy enterprise.

About us



Company Profile

9.5 GW	15.5 GW	7.1 GW	10+	20+	100+
Global Module Capacity Thereof 4.25 GW under construction	Cell Capacity Thereof 6.5 GW under construction	Global Accumulative Shipment	Global Sales & Service Offices	Shipping Countries	Global Partners

Milestones

Sunova Solar Technology Co., Ltd


200 MW production line


Expand production capacity


Sunova Group AUS PTY LTD


Brazilian branch


Signing contracts with insurance companies

Vietnam factory

Signing contracts with Munich RE

Indonesia Factory

2016

- Sunova Solar Technology Co., Ltd founded in Wuxi, China.
- Setting up first **200 MW** production facility.
- Sunova Group AUS PTY LTD founded in Australia.

2017

2018

- Sunova set up the second **200 MW** production line.
- Sunova opens branch office in Brazil.

2019

2021

- Production capacity expanded to **1 GW**.
- The annual cumulative shipment reached **2 GW**.
- Sign with PINGAN, Ariel-Re and LLYOD'S.

2022

- Produced **N-Type** modules and expanded to **2.5 GW** capacity.
- Expanding **1.5 GW** production capacity in Vietnam factory.

2023

- Became **BNEF Tier 1** player
- Building **warehouses** in Rotterdam / Itaja / Milan.
- Signed performance guarantee insurance with **Munich RE**.

2024

- Set up **1GW** differentiated product line.
- Expand **9GW** cell capacity.
- **U.S. and Indonesia** factories begin construction.
- Sunova becoming **Thornova Solar**

WUXI Factory

4 GW Module Capacity 800+ Employees

Sichuan Yibin Cell Factory

9 GW Cell Capacity

Indonesia Factory

2.5 GW Module

Under Construction

U.S. Factory

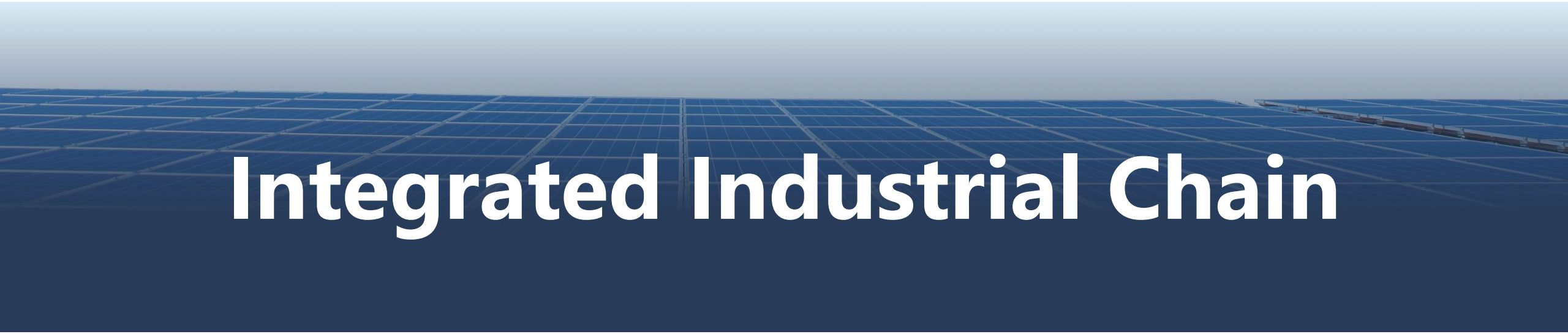
1 GW Module +3 GW Cell Capacity

Under Construction

Global Network

Regional headquarters Regional warehouse Factory

Global Distributors



Integrated Industrial Chain

Production Process - Cell

Advanced Technology:

A Mutually Beneficial Situation of Cost Reduction and Efficiency Improvement.

Why N-Type?

01 Investment Economics:

- More advanced technological processes
- Improved key equipment

→The investment economics of the current technology are more pronounced.

02 Significant Power Generation:

- Mass production cell conversion efficiency >26%.
- First-year degradation rate is ≤1%, and annual degradation is ≤0.4%.
- Bifacial rate of up to 85%.

→Increased power generation.

03 Cost Reduction:

- Use of thinner wafer ≤130μm
- Further cost reduction through optimization of BOM

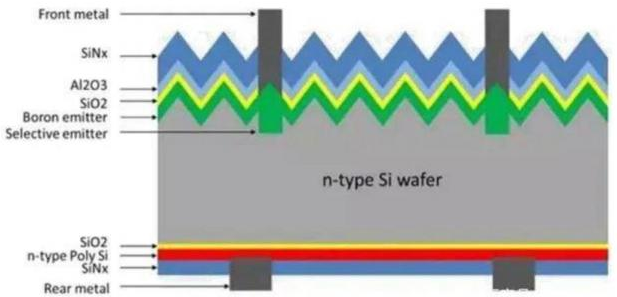
→Can increase the potential for cost reduction.

04 Great Potential for Improvement:

- Can be combined with x BC and other platform technologies.
- Theoretical efficiency of 28.7%.

→Has vast room for expansion and development potential

Introduction of N-Type Technology

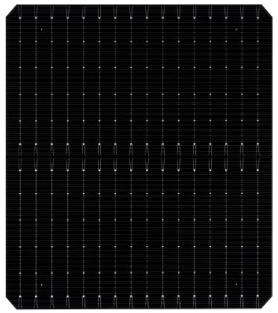


Tunnel Oxide Passivated Contact Cell

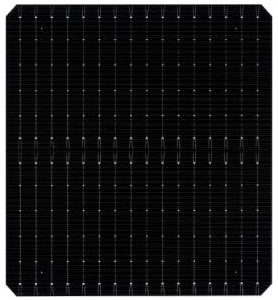
Production Process - Cell

High-Efficiency Cell Products: Reliable and Stable Power Guarantee

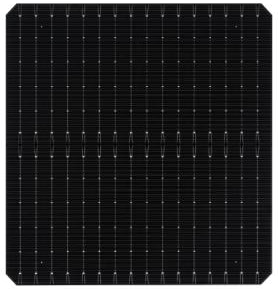
210*210 mm



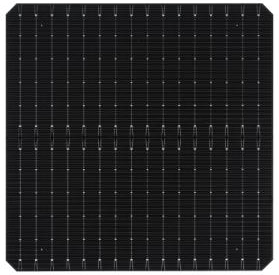
182*210 mm



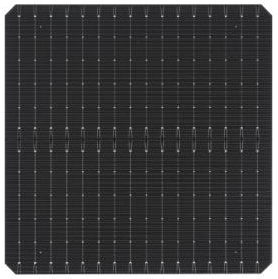
182*199 mm



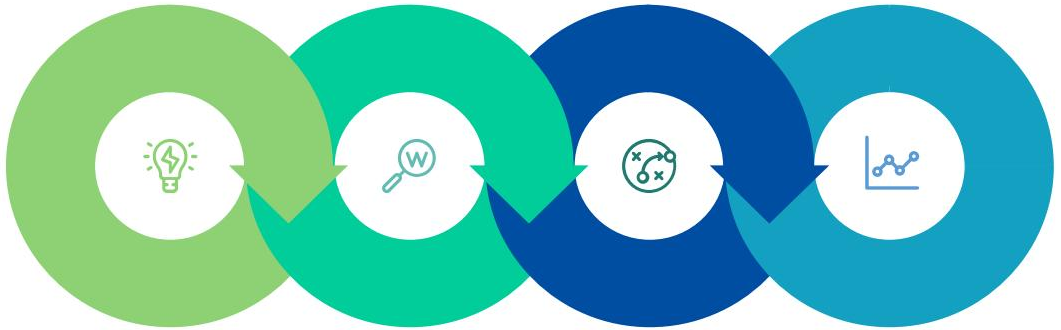
182.2*191.6 mm



182.2*182.2 mm



182.2*183.75 mm



Higher conversion efficiency

Better low irradiation response

Lower temperature coefficient

Lower LID

Potential Mass Production Efficiency:

25.6%

Our Product Introduction

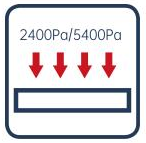
Bifacial technology enables additional energy harvesting from rear side (up to 30%)

Excellent low irradiance performance

Optimized electrical design and lower operating current for reduced hot spot loss and better temperature

30-year lifespan delivers 10-30% more power compared with conventional P-type modules

Better light trapping and current collection to improve module power output and reliability



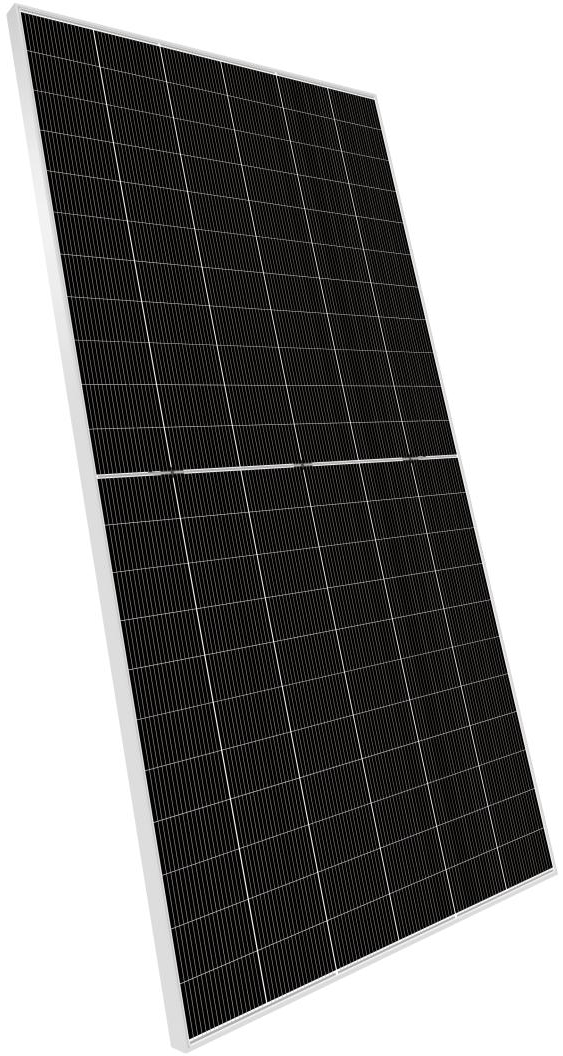
Certified to withstand 2400 Pa of wind load and 5400 Pa of snow load

The natural lack of LID in the N-type solar cell can increase power generation

Industry-leading, lowest thermal coefficient

100% triple EL test, which greatly reduces the hidden cracks rate

High Efficiency N-Type Module



Maximum Power
720 W

Higher Bifacial Rate
Up to 85%

Better Temperature Coefficient
Power temperature coefficient
(-0.30% ->-0.28%)

Linear Power Guarantee
30 years

Highest Efficiency
23.2%

Size
Cell Size：210 * 210 mm
Module Size：2384 * 1303 * 35 mm

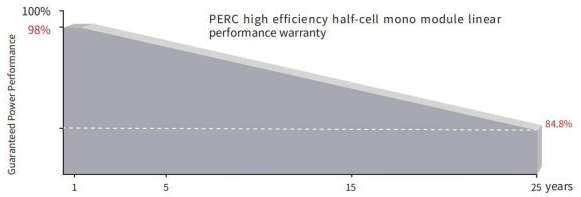
Lower Power Degradation:
First-year degradation ≤1 %,
Annual degradation ≤ 0.4%

Improved Low Irradiation Response
Excellent long and short-wave spectral response ensures continuous power generation

Linear performance warranty

PERC solar module

Single Glass



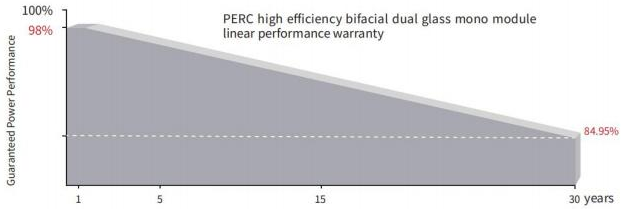
15 years
Product quality & process guarantee

25 years
Linear power guarantee

0.55 %
Annual degradation over 25 years

PERC solar module

Dual Glass



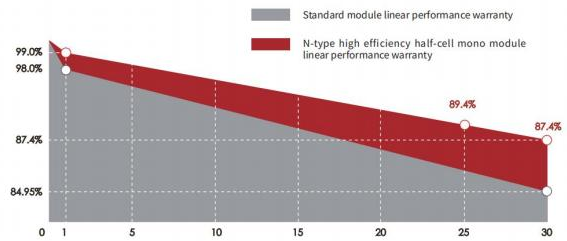
15 years
Product quality & process guarantee

30 years
Linear power guarantee

0.45 %
Annual degradation over 30 years

N-Type solar module

Single Glass



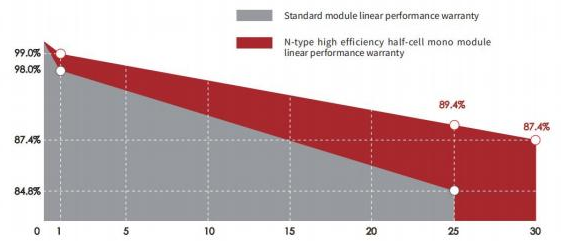
15 years
Product quality & process guarantee

30 years
Linear power guarantee

0.40 %
Annual degradation

N-Type solar module

Dual Glass



15 years
Product quality & process guarantee

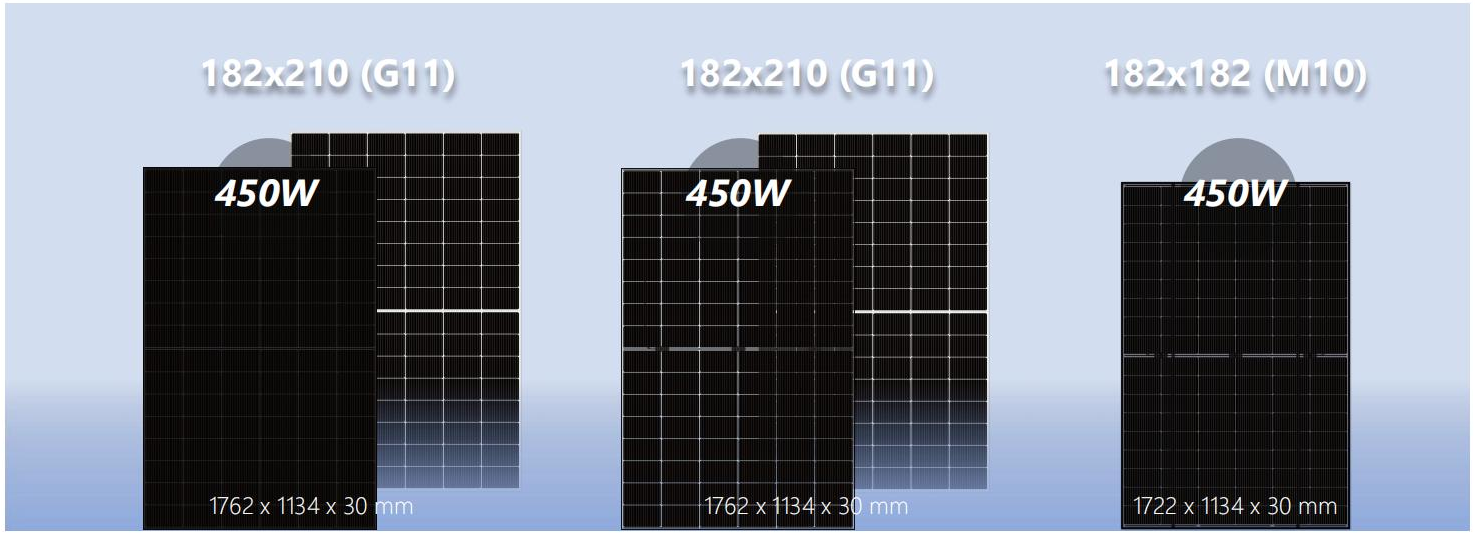
30 years
Linear power guarantee

0.40 %
Annual degradation

S Series

Tangra™

N-Type solar module

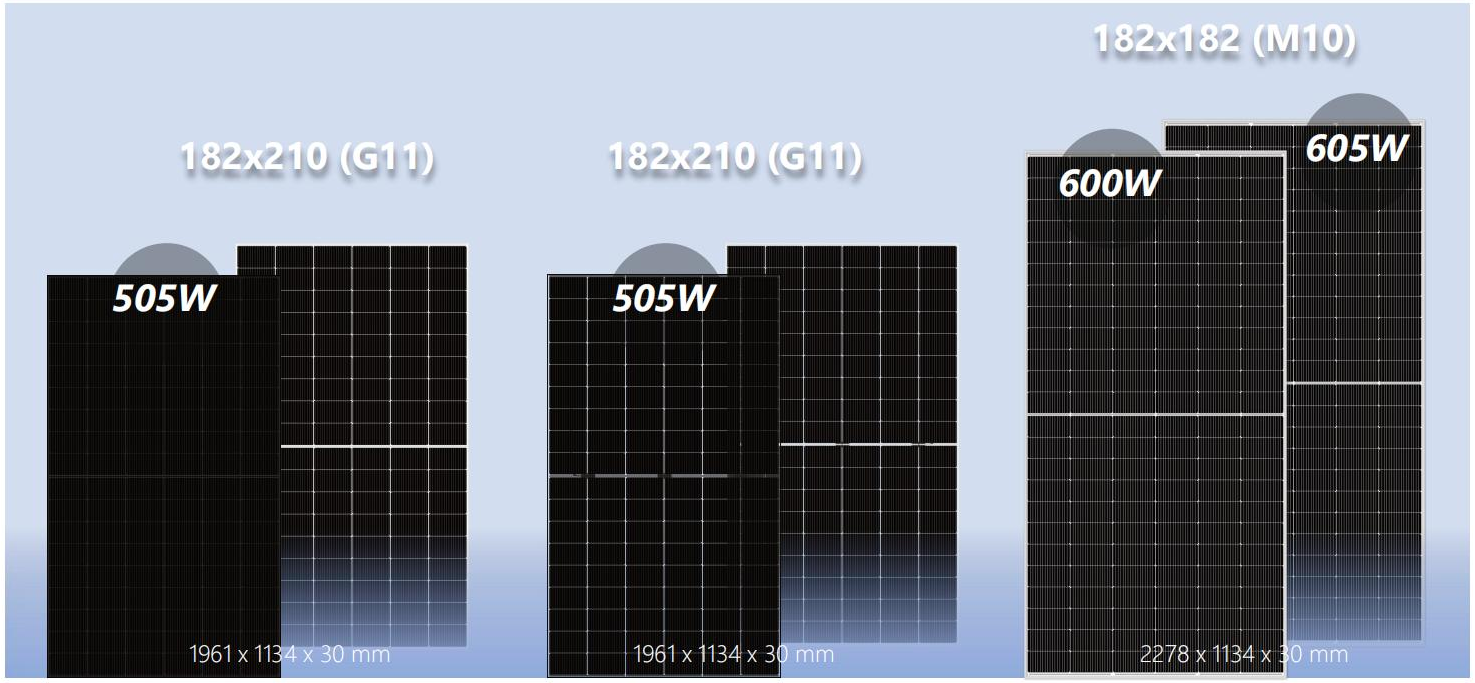


Single Glass (2×48 cells)	Dual Glass (2×48 cells)	Dual Glass (2×54 cells)
TS-SBT48(435-450)-G11 TS-SWT48(435-450)-G11	TS-BGT48(435-450)-G11	TS-BGT54(430-450)

M Series

Tangra™

N-Type solar module

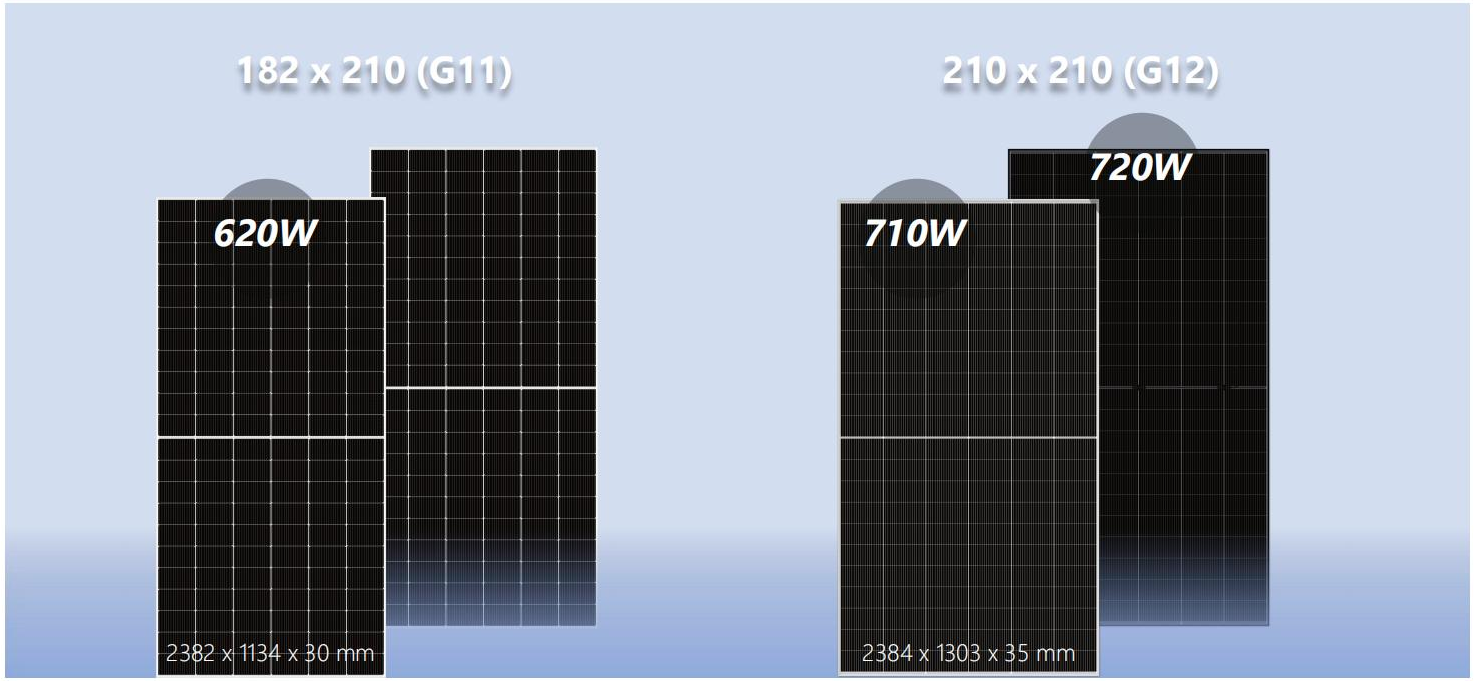


Single Glass (2×54 cells)	Dual Glass (2×54 cells)	Single / Dual Glass (2×72 cells)
TS-SBT54(485-505)-G11 TS-SWT54(485-505)-G11	TS-BGT54(485-505)-G11(All black) TS-BGT54(485-505)-G11	TS-SWT72(580-600) TS-BGT72(585-605)

L Series

Tangra™

N-Type solar module



Single / Dual Glass (2×66 cells)	Single / Dual Glass (2×66 cells)
TS-SWT66(600-620)-G11 TS-BGT66(600-620)-G11	TS-SWT66(690-710)-G12 TS-BGT66(700-720)-G12

Certification & Warranty

COMPREHENSIVE CERTIFICATES

WARRANTY INSURANCE

IEC61215/IEC61730/IEC61701/IEC62716/
IEC62804/IEC60068/UL61730

ISO 9001:	Quality Management System
ISO 14001:	Environmental Management System Standard
ISO 45001:	International Occupational Health and Safety Assessment System Standard
SA 8000:	2014 Social Accountability Management System


Environmental Management System Certification
This Proof
Sunova Solar Technology Co.,Ltd.


CERTIFICATE OF OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM CERTIFICATION
SUNOVA SOLAR TECHNOLOGY CO.,LTD.


CERTIFICATE
TÜV NORD CERT GmbH
herewith declares that
Sunova Solar Technology Co., Ltd.

Company credentials

BloombergNEF

Tier 1

Thornova Solar listed as Tier 1 module manufacturer by BNEF

Table 3: PV module manufacturers meeting BNEF's tier 1 criteria as of 1Q 2025

Firm/brand	Annual module capacity, MW/year	Firm/brand	Annual module capacity, MW/year
[illegible]	[illegible]	[illegible]	[illegible]
*Thornova Solar/Sunova**	*6,500*		
[illegible]	[illegible]	[illegible]	[illegible]

*Source: BloombergNEF. Note: Methodology here. * Denotes a company for which at least one Kiwa PVEL (formerly PV Evolution Labs) Product Qualification Program has been initiated in the past 18 months. Contact pvel@kiwa.com for access to the reports. Brands are shown in reverse alphabetical order. Companies can download the dataset of financings here. † denotes a module manufacturer that has initiated or completed technical due diligence testing with RETC within the last 18 months. For further inquiries, contact info@retc-ca.com.*

Kiwa PVEL

Kiwa PVEL
2024 Top Performer

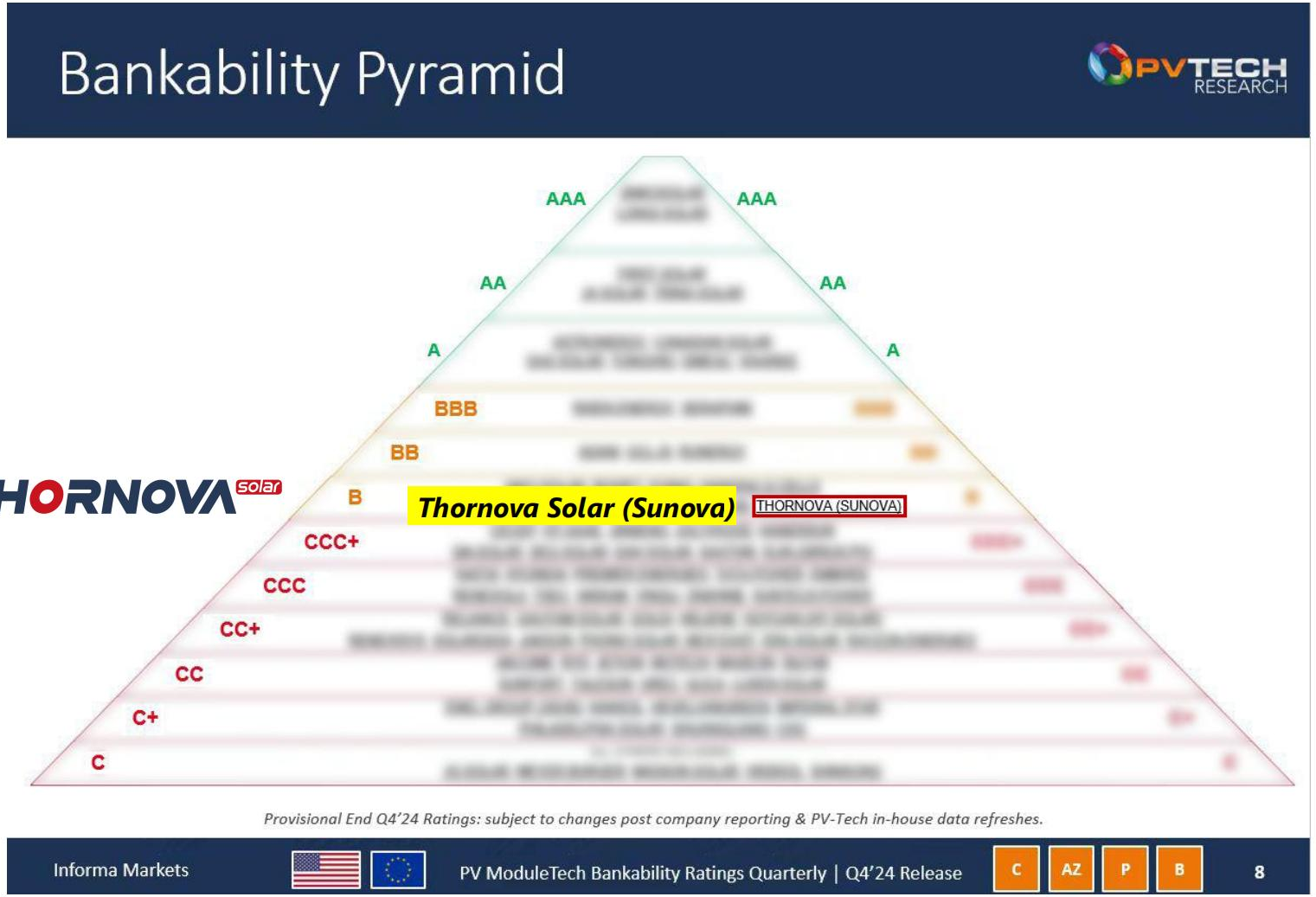
Top Performers in 5 Tests

EUPD

2024 Top PV Brand in Brazil

Sunova Solar in Brazil is part of Thornova Solar

PV TECH



Stable Finance

Excellent company financial condition

- The company's assets are in good condition and its operations are stable.
- Without the historical burden of outdated photovoltaic capacity, it has developed rapidly.

Stable cooperation with bank and government

- Significant projects receive policy and financial support from the local government.
- Collaboration with major banks and financial institutions in order to form strategic partnerships.

Sustainable financing capacity

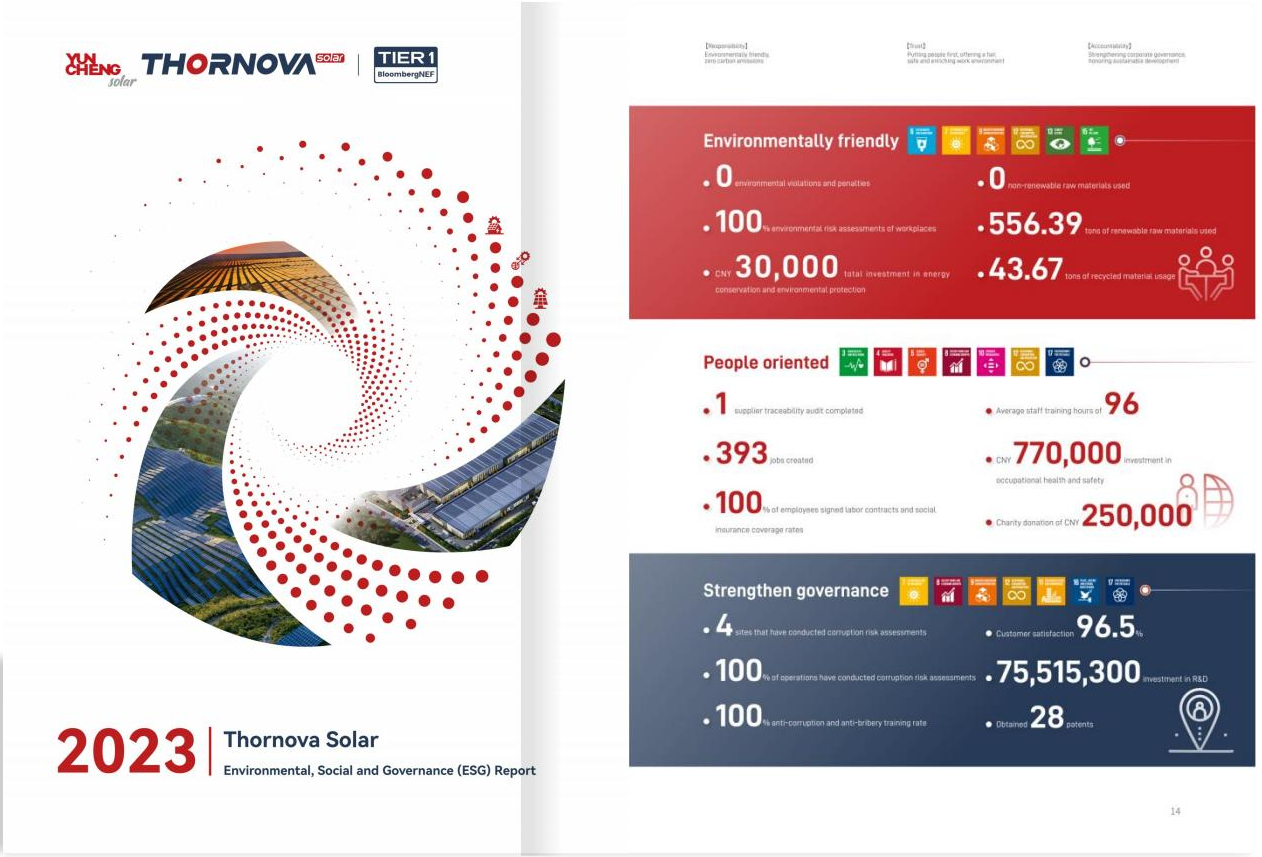
- Diverse financing methods.
- Flexible and efficient financing projects.

Sustainable Development

- Awarded the title of Green Factory

Sustainable Development

ESG Report



- ***2022 ESG report***
  Was published in December 2023
- ***2023 ESG report***
  Was published in September 2024

TÜV SÜD

Certificate Authority

Sustainable Development

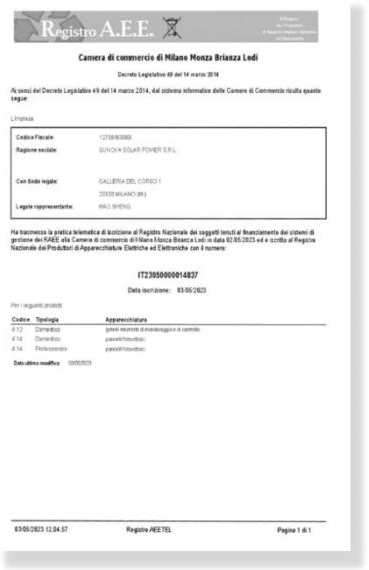
ECO Regulation Compliance Certifications

PV CYCLE

Certified for Sustainable PV Recycling

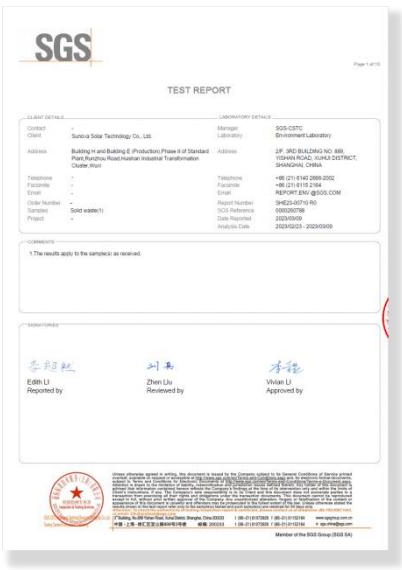
WEEE

Compliant with Electrical and Electronic Waste Regulations



A.E.E.

A.E.E Certified



SGS TCLP

Confirmed Low Toxicity through TCLP Testing

Anti-Forced Labour

- SocialAccountability8000 (SA8000)

CERTIFICATE OF SOCIAL ACCOUNTABILITY MANAGEMENT SYSTEM CERTIFICATION

Certificate No.SAZB22SA00020R0M
Unified social credit code:91320214MA1MHNTX93

This is to Certify that the Social Accountability Management System of

SUNOVA SOLAR TECHNOLOGY CO.,LTD.

is in conformity with
SA8000:2014 Standard, applies to

PRODUCTION AND SALES OF SOLAR PHOTOVOLTAIC MODULES

REGISTERED ADDRESS:BUILDING E , PHASE II OF STANDARD PLANT, RUNZHOU ROAD, HUISHAN INDUSTRIAL TRANSFORMATION CLUSTER, WUXI
OPERATION ADDRESS:BUILDING H AND BUILDING E (PRODUCTION), PHASE II OF STANDARD PLANT, RUNZHOU ROAD, HUISHAN INDUSTRIAL TRANSFORMATION CLUSTER, WUXI
LEAD AUDITOR: Eric Yu

Date of Initial Issuance: Dec. 21, 2022
Date of Expiration: Dec. 20, 2025

BCC Inc.
President:

BCC Address: Rm 1101, F11, Guoyingyuan Yihao, Xicheng District, Beijing, P.R.C.
This certificate is valid within state - specified validities of administrative and qualification licensing.
The effectiveness of this certificate shall be maintained by regular surveillance audit.
The validity of the certificate can be verified at https://sa-intl.org/sa8000-search/
The information of this certificate is also available at www.bcc-cnas.cn or www.cnca.gov.cn
Social Accountability International and other stakeholders of the SA8000 process only recognize SA8000 certificates issued by qualified bodies granted accreditation by SAAS and do not recognize any claims of SA8000 certificates issued by unaccredited organizations or organizations accredited by any entity other than SAAS

BCC

SUNOVA SOLAR ANTI-FORCED LABOR DECLARATION

Here, in Sunova Solar Technology Co., Ltd, human rights are always a top priority for us. We have a zero-tolerance policy for human trafficking or slavery. For whom works at or with Sunova Solar, we are committed to treating everyone with respect, and takes seriously and fully supports national and international efforts to end any forms or kinds of modern slavery, servitude, forced or compulsory labor, and human trafficking in any places.

As always, Sunova Solar strictly follows the "ISO 45001 occupational health and safety management system", we devoted in being a company that provides our employees with a free, fair and just platform for self-growth, and strive to transmit the highest moral, ethical and legal values to the public; Besides, we devoted in fair recruitment, promotion and compensation; illegal forced labor and child labor are prohibited.

At the same time, we opposed resolutely to discriminate on the basis of race, color, religion, gender identity, sexual orientation, national origin, age, disability or genetic information.

This commitment also extends to the use of any factory or sub-vendors who make or assemble Sunova Solar products.

We are **not** using below companies' poly silicon in Sunova Solar cells and modules production.

- Hoshine Silicon Industry (Shanshan) Co., Ltd
- Xinjiang Daqo New Energy Co., Ltd
- Xinjiang East Hope Nonferrous Metals Co., Ltd
- Xinjiang GCL New Energy Materials Technology Co., Ltd
- Xinjiang Production and Construction Corps (XPCC)

Wuxi, China, Oct. 8th, 2022

SUNOVA SOLAR TECHNOLOGY CO.,LTD 无锡尚阳电力科技有限公司

Associations and Listings

Memberships

SEIA Solar Energy Industries Association®

United Nations Global Compact

SolarPower Europe

BSW Bundesverband Solarwirtschaft

ACESOL Asociación Chilena de Energía Solar - AG

ABGD Associação Brasileira de Geração Distribuída

CPEF Consejo de profesionales en energía fotovoltaica

AFSIA Africa Solar Industry Association

Listings

BloombergNEF

PVTECH RESEARCH

Greener

Brazilian Market

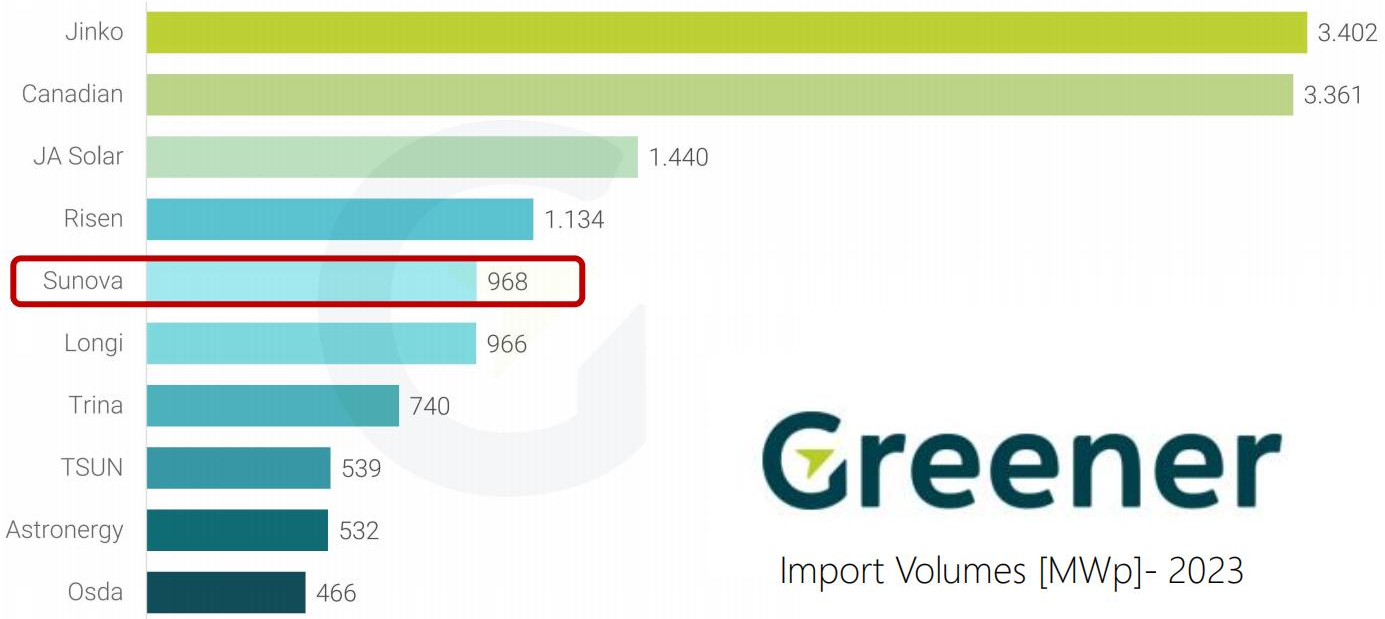
Greener Report

TOP 10

1. Canadian Solar
2. Sunova Solar
3. Jinko
4. JA Solar
5. DAH Solar
6. Trina Solar
7. Pulling Energy
8. Hanersun
9. Honor Solar
10. TSUN

10 most remembered

Of the 90 module brands for Brazil, the top 10 accounted for 77% of the total import volumes.



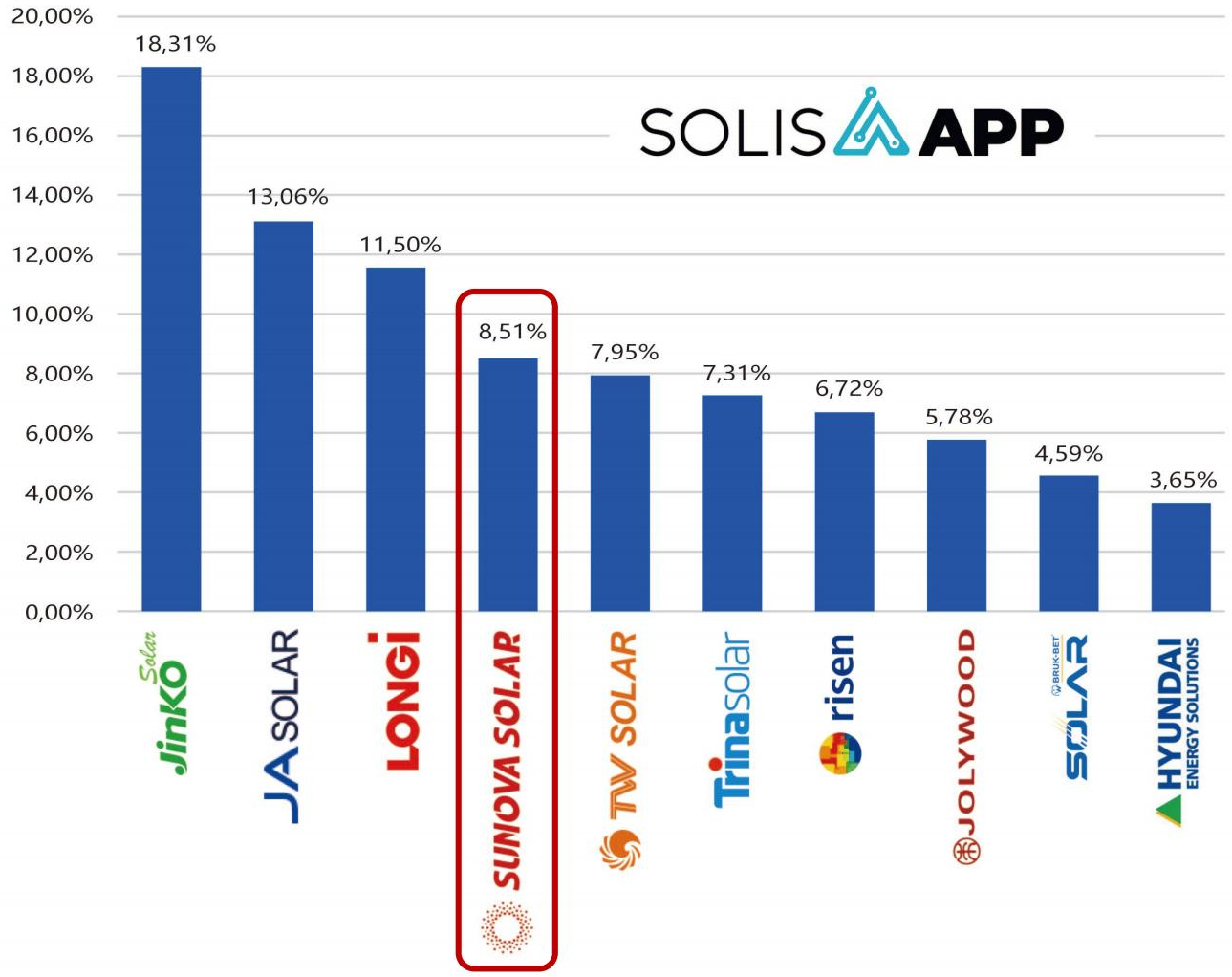
Greener

Import Volumes [MWp]- 2023

*Sunova Solar in Brazil is part of Thornova Solar

Polish Market Ranking

NO. 4



More flexible, customer-centric business support

Spare modules

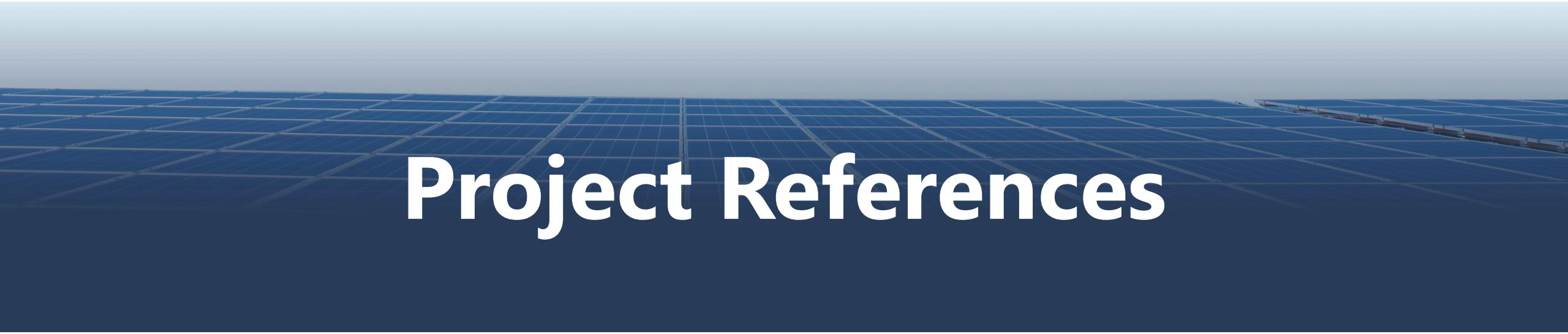
For any project >10MW, we will keep 5% of the originally delivered modules model in a nearby warehouse as spare modules

Payment Bond

Company guarantee / Bank guarantee / Letter of Credit

Flexible Payment Solutions:

OA (Sinosure, Tradewind, etc) / Letter of Credit / Confirming



Project References

Project References

300 MW

Liaoning · China

Project References

33.4MW (of 122.8MW)

Wanneperveen, The Netherlands

Project References

8.92 MW

Calarasi County, Romania

Project References

16.368 MW

Uchacq et Parentis, France

Project References

GRUPPO ALAIMO
ENERGY SERVICE COMPANY
EFFICIENZA ENERGETICA E FONTI RINNOVABILI

Financial Bank

INTESA SANPAOLO

9.99 MW

Favara, Sicilia, Italy

Project References

6.28 MW

Erval Seco RS, Brazil

Project References

5.17 MW

São Paulo, SP, Brazil

Project References

5.63 MW

Gegharkunik province, Armenia

Project References

30.1 MW

Chester, New York, United States

Project References

6.7 MW

Vauxhaul, Alberta, Canada

THORNOVA solar

ACCELERATING THE CLEAN ENERGY TRANSITION

www.thornovasolar.com