

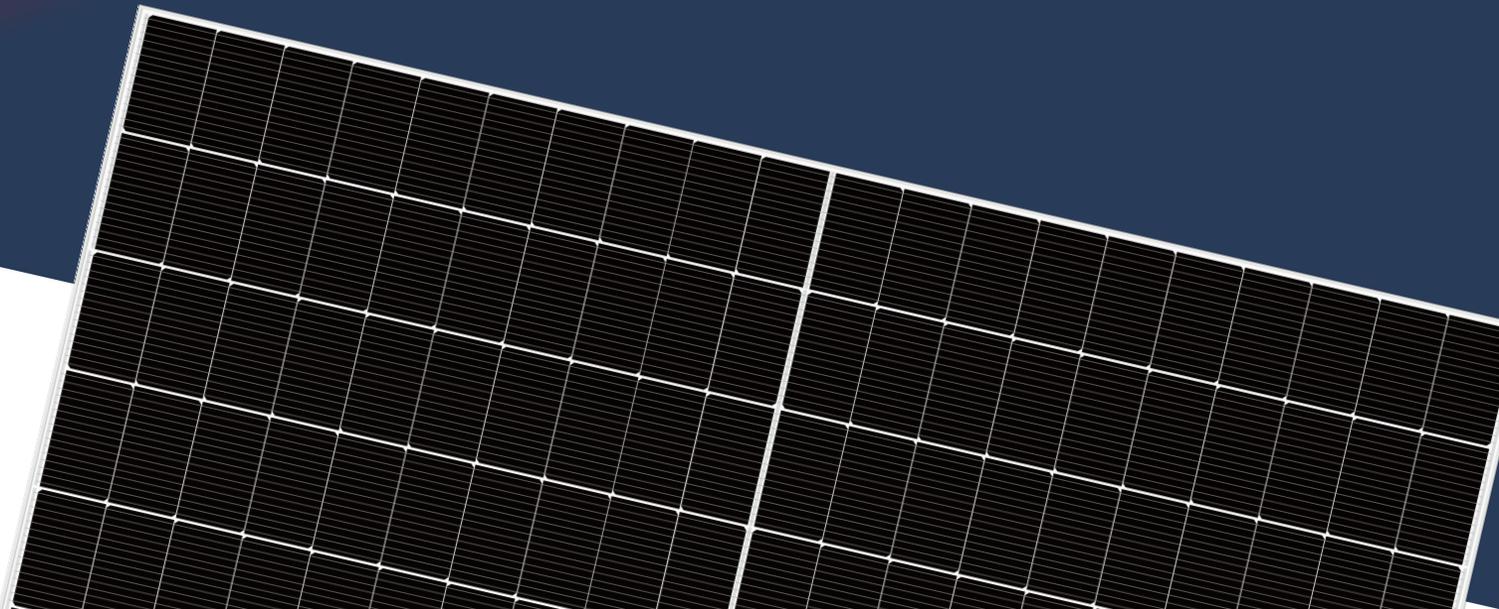
**THORNOVA** solar



**SUNOVA SOLAR**



*Company Introduction  
September 2024*





# Vision & Mission

## Vision

- *Our vision is to become a dedicated market player in distributed PV plants by building Thornova Solar & Sunova 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



**5.5GW**

Global Module Capacity

**5GW**

Under Construction

**12.5GW**

Cell Capacity

**5.3GW**

Global Accumulative Shipment

**10+**

Global Sales & Service Offices

**20+**

Shipping Countries

**100+**

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

2017

2018

2019

2021

2022

2023

2024

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

- Sunova set up the second 200 MW production line.

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

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

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

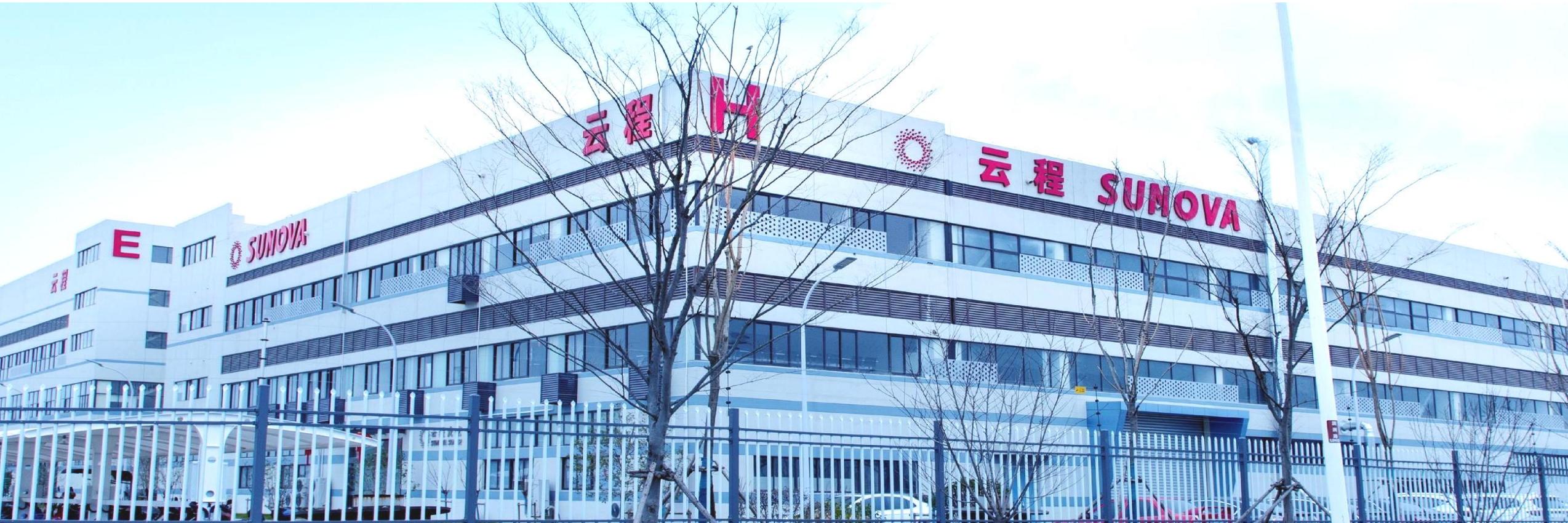
- Set up 1GW differentiated product line.
- Expand 9GW cell capacity.
- U.S. and Indonesia factories begin construction.
- Sunova becoming Thornova Solar



# WUXI Factory

4 GW Module Capacity

800+ Employees





# Vietnam Factory

1 GW Module Capacity





# Sichuan Yibin Cell Factory

9 GW Cell Capacity





# Indonesia Factory

2.5 GW Module + 2.5 GW Cell Capacity





# U.S. Factory

3 GW Module +1 GW Cell Capacity





# Global Network





# Global Distributors





# Integrated Industrial Chain

# Production Process - Cell

## Advanced Technology:

A Mutually Beneficial Situation of Cost Reduction and Efficiency Improvement.

## Why TOPCon?

### 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.

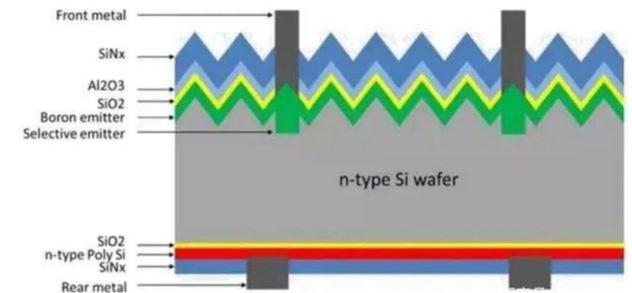
### 03 Cost Reduction:

- 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 TOPCon Technology

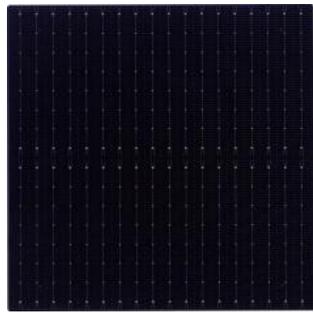


Tunnel Oxide Passivated Contact Cell

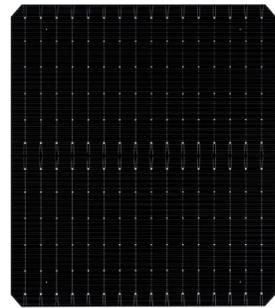


# Production Process - Cell

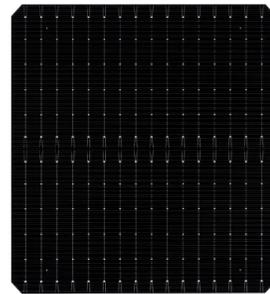
**High-Efficiency Cell Products:** Reliable and Stable Power Guarantee



210\*210 mm



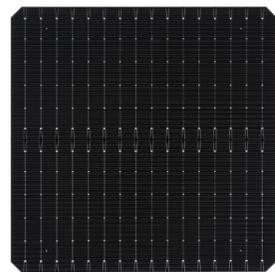
182\*210 mm



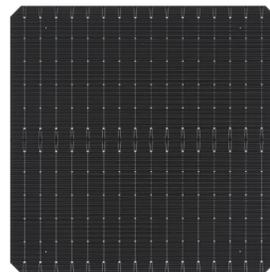
182\*199 mm



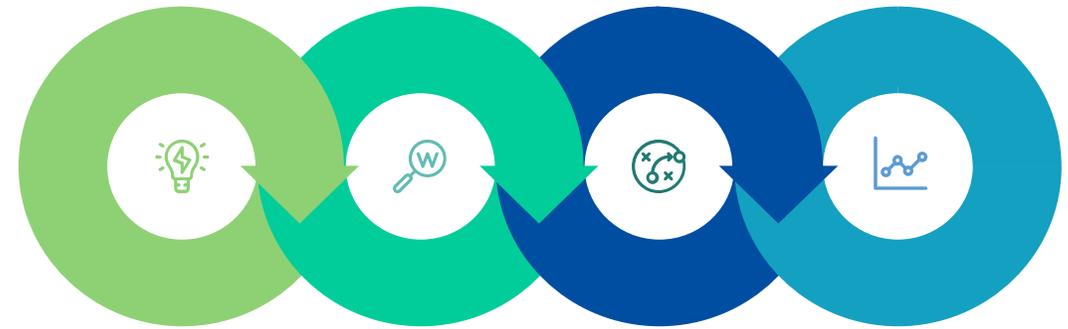
182.2\*191.6 mm



182.2\*182.2 mm



182.2\*183.75 mm



Higher conversion efficiency

Better low irradiation response

Lower temperature coefficient

Lower LID

Mass production efficiency **25.6%**



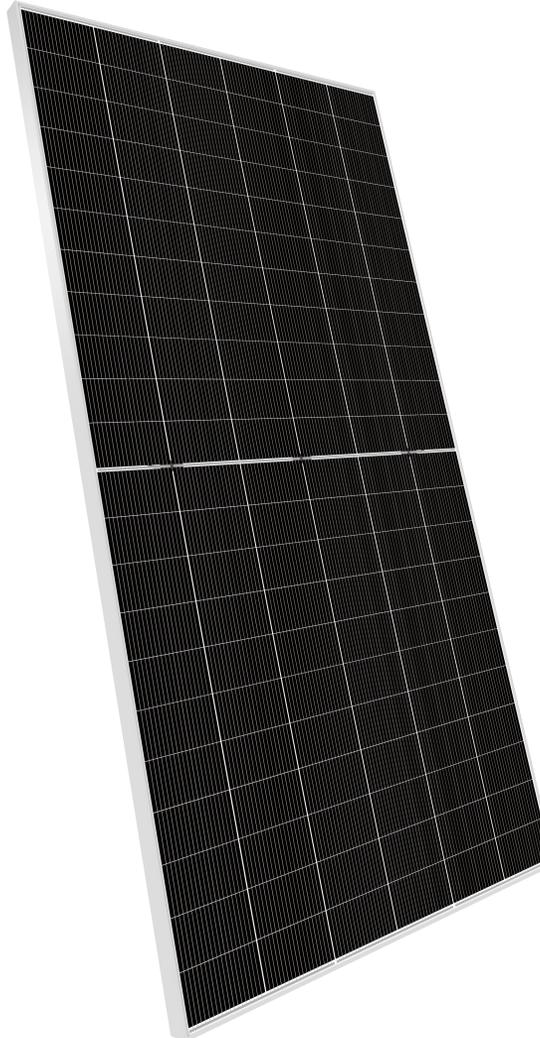
# High Efficiency N-Type Module

**Maximum Power** ▶  
710 W

**Higher Bifacial Rate** ▶  
Up to 85%

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

**Linear Power Guarantee** ▶  
30 years



◀ **Highest Efficiency**  
22.9%

◀ **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



# N-Type Series **Tangra**™



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

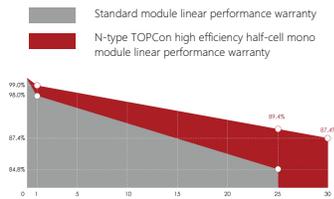


Industry-leading, lowest thermal coefficient

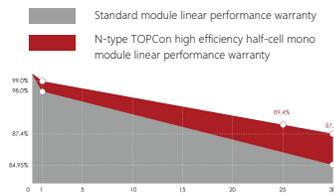


100% triple EL test, which greatly reduces the hidden cracks rate

## Half-Cell Mono Module



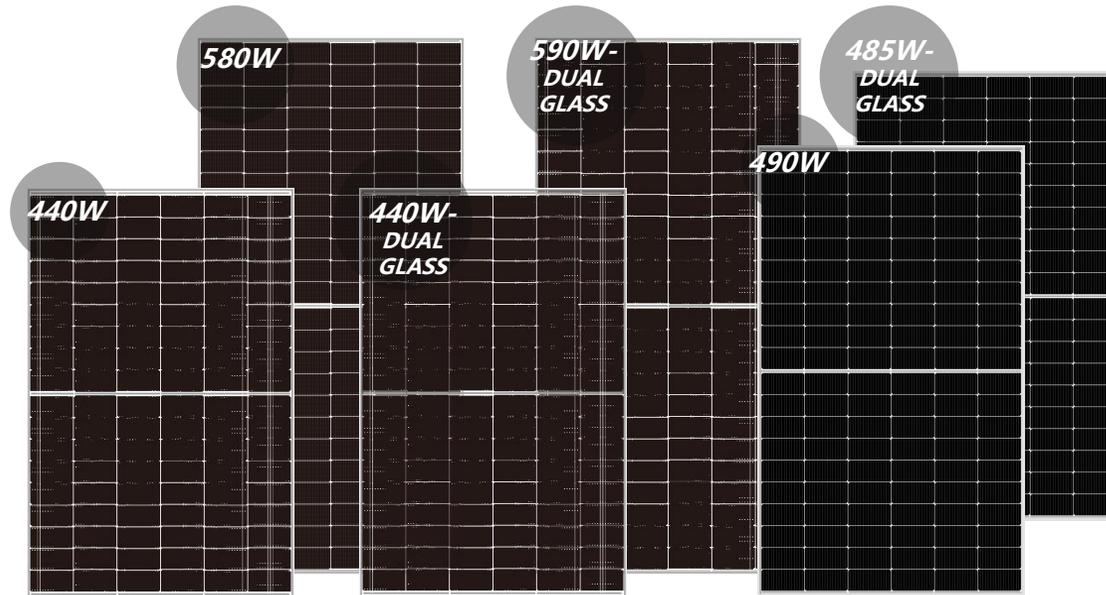
## Bifacial Dual Glass Module



**15** years  
Product quality & process guarantee

**30** years  
Linear power guarantee

**0.40**%  
Annual degradation



## S

- Tangra S (425-440)-54MDH
- Tangra S Pro (Alpine ) (425-440)-54MDH
- Tangra S (470-490)-60MDH
- Tangra S Pro (470-485)-60MDH

## M

- Tangra M (520-535)-66MDH
- Tangra M Pro (520-535)-66MDH
- Tangra M (565-585)-72MDH
- Tangra M Pro (565-585)-72MDH

## L

- Tangra L (615-635)-78MDH
- Tangra L Pro (615-635)-78MDH
- Tangra L (625-645)-60MDH-G12
- Tangra L Pro (625-645)-60MDH-G12
- Tangra L (690-710)-66MDH-G12
- Tangra L Pro (690-710)-66MDH-G12

## WARRANTY INSURANCE





# N-Type Series **Tangra™ HD**



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

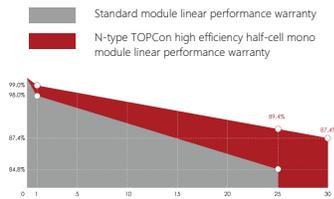


Industry-leading, lowest thermal coefficient

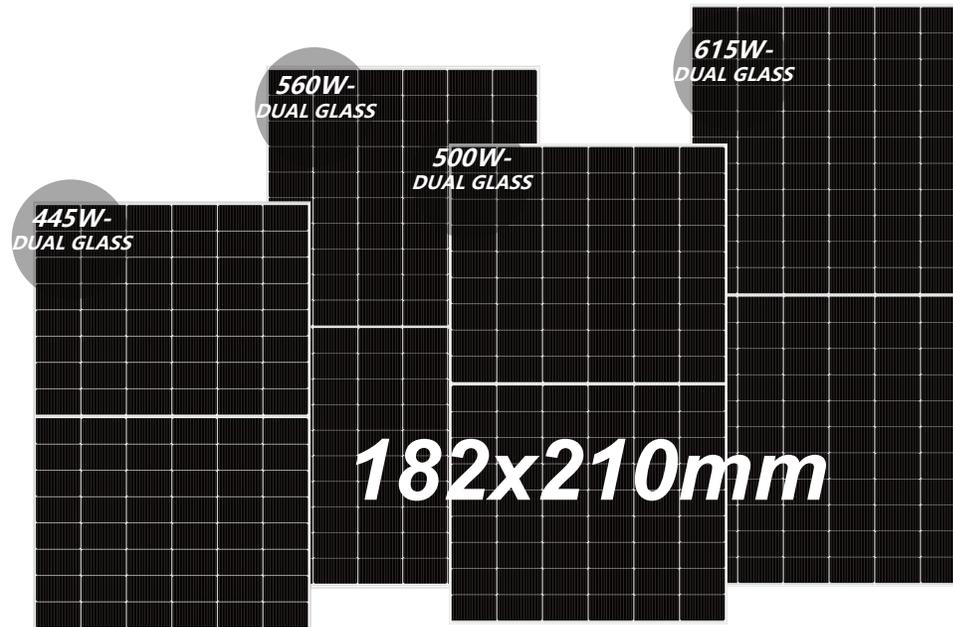
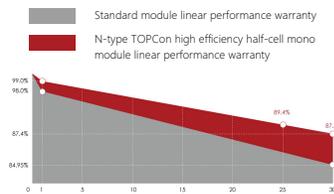


100% triple EL test, which greatly reduces the hidden cracks rate

Half-Cell Mono Module



Bifacial Dual Glass Module



## 182x210 HD (G11)

- Tangra S Pro HD (435-445)-48MDH-G11
- Tangra S Pro HD (485-500)-54MDH-G11
- Tangra M Pro HD (545-560)-60MDH-G11
- Tangra L Pro HD (595-615)-66MDH-G11

## 182x199.6 HD (G13)

- Tangra S Pro HD (460-480)-54MDH-G13
- Tangra M Pro HD (515-530)-60MDH-G13
- Tangra M Pro HD (565-585)-66MDH-G13
- Tangra L Pro HD (620-640)-72MDH-G13

## 182x188 HD (G9)

- Tangra S Pro HD (435-455)-54MDH-G9
- Tangra S Pro HD (470-490)-60MDH-G9
- Tangra M Pro HD (515-535)-66MDH-G9
- Tangra M Pro HD (585-605)-72MDH-G9

## WARRANTY INSURANCE

**15** years  
Product quality & process guarantee

**30** years  
Linear power guarantee

**0.40**%  
Annual degradation





# 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





# Our Product Introduction



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



Excellent low irradiance performance



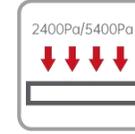
Optimized electrical design and lower operating current for reduced hot spot loss and better temperature



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



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



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Industry-leading, lowest thermal coefficient



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



# Company credentials



# BloombergNEF

# Tier 1

Thornova Solar listed as Tier 1 module manufacturer by BNEF

Table 4: PV module manufacturers meeting BNEF's Tier 1 criteria as of 3Q 2024

Firm/brand	Annual module capacity, MW/year	Firm/brand	Annual module capacity, MW/year
Shingora*	10,000	Lexipon Energy*	3,000
Ting*	10,000	Jaywood*	10,000
Waseed*	12,000	Joko Solar*	110,000
WSP*	4,000	Johar*	2,000
Wuhan Solar*	3,000	JR Solar**	90,000
Ying*	90,000	JT SAAS**	3,000
Yongqi*	70,000	Keenon Solar*	2,000
Yonke Solar	20,000	THORNOVA solar	5,500
Sunova Power/TH Solar	3,000	SUNOVA SOLAR	5,500
Sunova/Phosco Solar*	4,000	ST Solar Institute Solar*	3,000
Solargem*	3,000	Ting*	10,000
Singbin	12,000	DMSC (Dongfeng Magnetics)*†	12,000
Sunergy/Hyperion*	21,000	QAS Solar**	21,000
Shen Energy*	40,000	Cheng An Energy**	90,000
Sunova Photovoltaic*	4,000	Canadian Solar*	91,000
Sonesta*	3,000	Sonac Solar*	3,000
Oslo Solar	3,000	Alpha Hubs**	20,000
New East Solar*	1,000	Alpha Delivery (China Solar)	3,000
New Solar Power/REC*	1,000	Alu Solar*	20,000
Waseed*	10,100	ALSolar*	2,000
Luohu Solar	3,000	AluminaSolar*	4,000
Long Green**	120,000	Total	1,090,700

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](mailto:pvel@kiwa.com) for access to the reports. Brands are shown in reverse alphabetical order. Companies can download the dataset of financings [here](#). † denotes companies that have initiated or completed technical due diligence testing with RETC over the last 18 months.



# Kiwa PVEL



Kiwa PVEL  
2024 Top Performer

*Top Performers in 5 Tests*

**THORNOVA** solar





EUPD

# 2024 Top PV Brand in Brazil



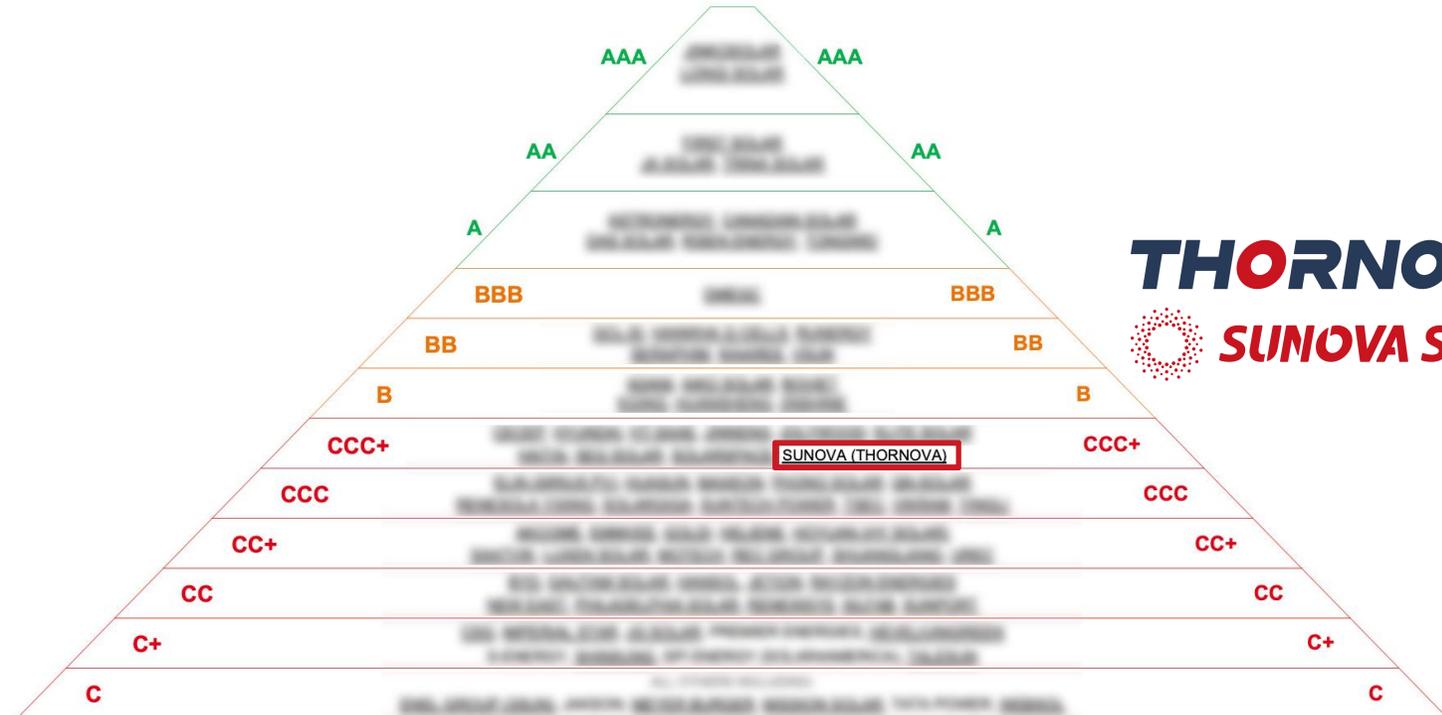


# PV TECH

## Bankability Pyramid



# CCC+



Provisional End Q2'24 Ratings: subject to changes post company reporting & PV-Tech in-house data refreshes.





# 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**  
**Will be Published in September 2024**



Certificate Authority



# Sustainable Development

## ECO-Certified



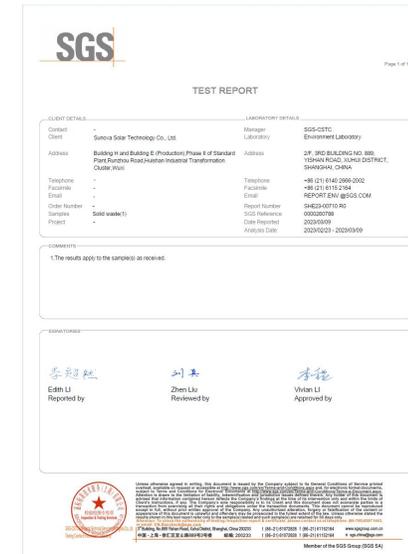
Certified for Sustainable PV Recycling



Compliant with Electrical and Electronic Waste Regulations



A.E.E Certified



Confirmed Low Toxicity through TCLP Testing



# Anti-Forced Labour

SocialAccountability8000 (SA8000)



## 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 transmitt 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)



# Associations we are members of





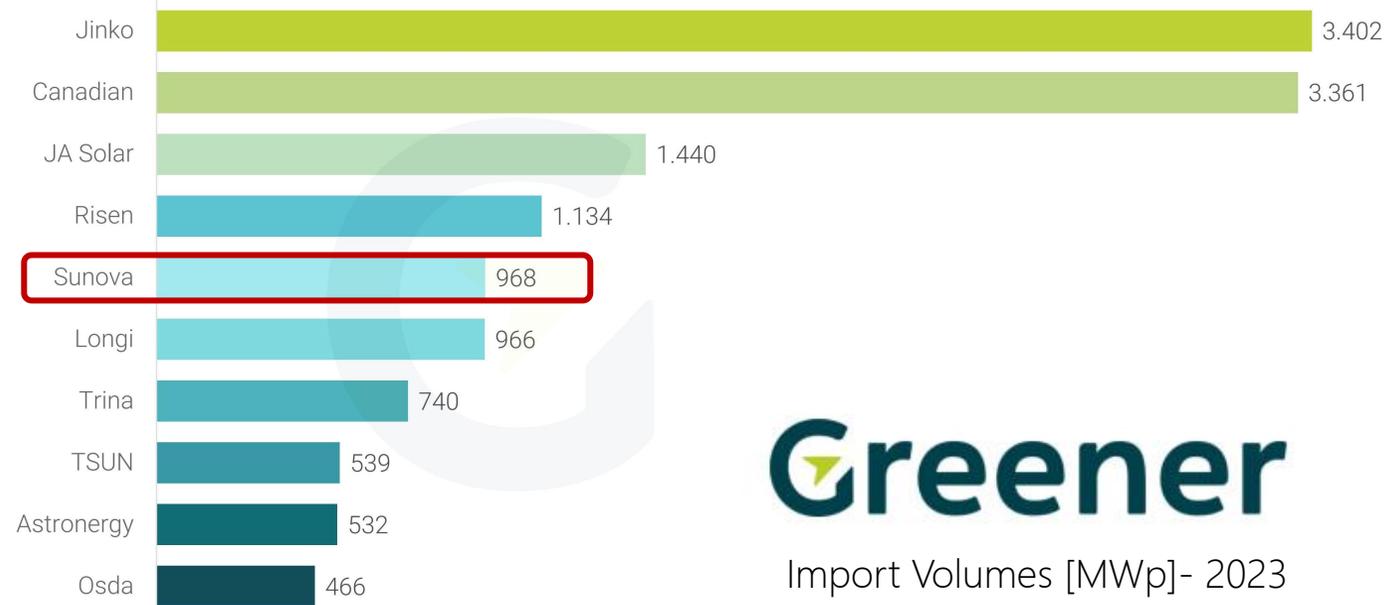
# Brazilian Market Greener Report

## 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.



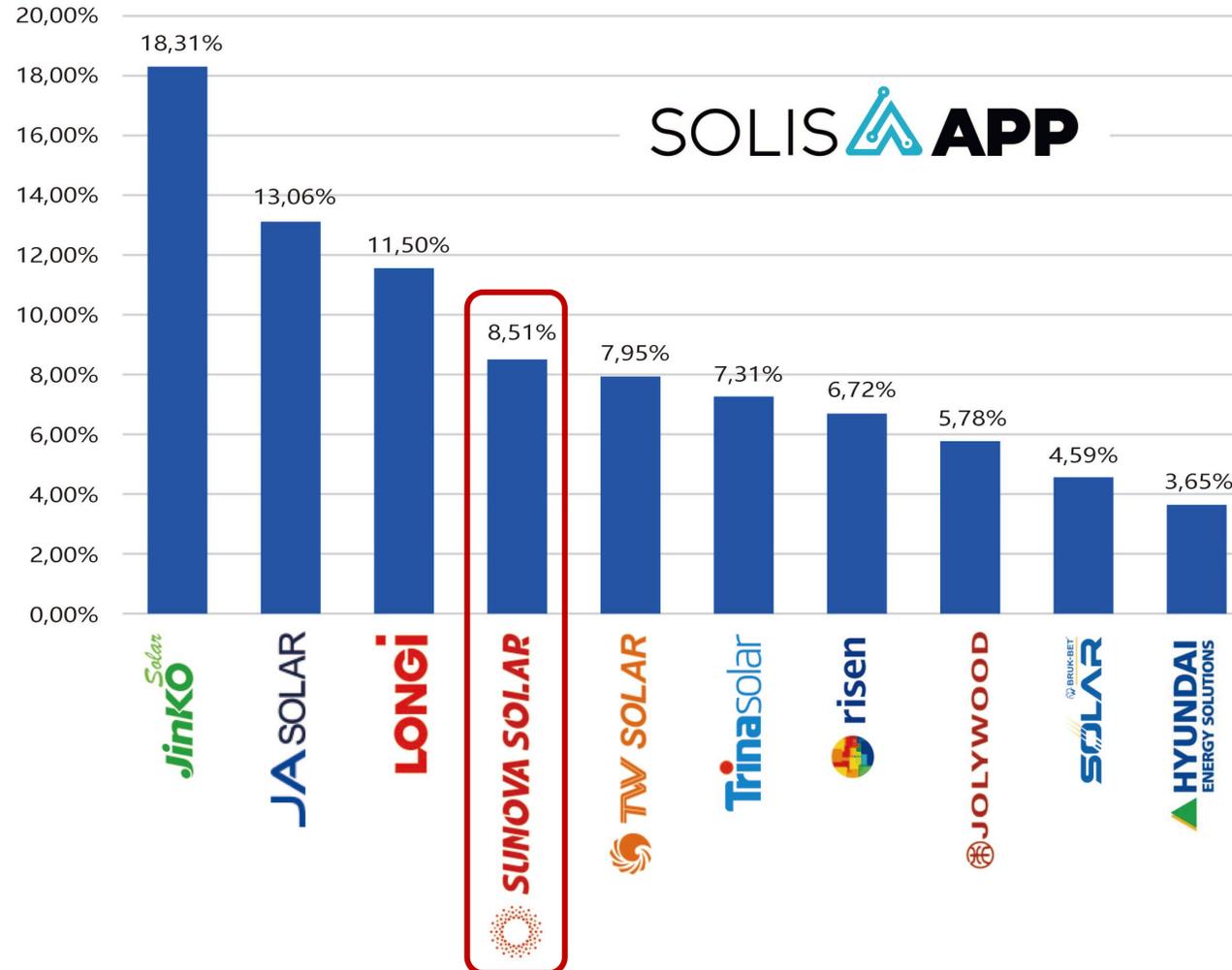
**Greener**

Import Volumes [MWp]- 2023



# 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



Module: Zosma™ M 550



中国华能集团有限公司  
CHINA HUANENG GROUP CO., LTD.

300 MW

Liaoning · China





# Project References



Module: Zosma™ M 540

**Powerfield**

Financial Bank

**LB≡BW & Rabobank**

122.8 MW

Wanneperveen, The Netherlands





# Project References



8.92 MW

Calarasi County, Romania





# Project References



16.368 MW

Uchacq et Parentis, France





# Project References



Module: **Tangra™ L Pro 690**



Financial  
Bank



9.99 MW

Favara, Sicilia, Italy





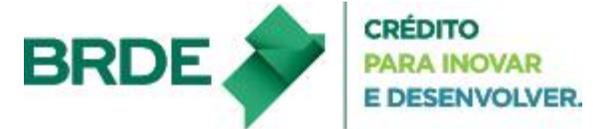
# Project References



Module: **Tangra™ M 575**



Financial  
Bank



6.28 MW

Erval Seco RS, Brazil





# Project References



Module: Zosma™ M550

**Âmbar**  
ENERGIA

Financial  
Bank

**btg** pactual

5.17 MW

São Paulo, SP, Brazil





# Project References



Module: **Tangra™ M Pro 570**

5.63 MW

Gegharkunik province, Armenia





# Project References



Module: TS-BG72(550)

LIGHTSTAR

30.1 MW

Chester, New York, United States





# Project References



6.7 MW

Vauxhaul, Alberta, Canada



A background image of a trade show or conference. It shows several groups of people in business attire networking. Some are standing and talking, while others are seated at tables. The scene is brightly lit, typical of an indoor exhibition space.

# ACCELERATING THE CLEAN ENERGY TRANSITION

[www.sunovathornova.com](http://www.sunovathornova.com)