

TONGWEI SOLAR

MARTIN
PRODUCT & TECHNOLOGY DEPARTMENT

Tongwei Solar



01

ABOUT TONGWEI



WORLD'S FIRST PV COMPANY LISTED ON THE
FORTUNE GLOBAL 500

60.000

Global
employees

200+

Subsidiaries
worldwide

43

Years in business
Established in 1982

Based in Chengdu, the capital of Sichuan Province, the most international city complex in West China.



"DUAL GREEN" STRATEGIES



GREEN AGRICULTURE

GREEN ENERGY



TONGWEI AGRICULTURAL
DEVELOPMENT



FEED & FISHERY



TONGWEI FOOD



GREEN FOOD



YONGXIANG



POLYSILICO
N



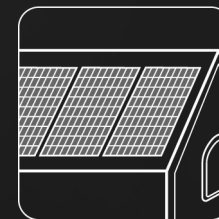
TW SOLAR



SOLAR CELL



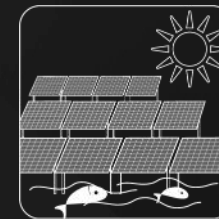
TW SOLAR
TECHNOLOGY



PV MODULE



TW NEW ENERGY



"FISHERY+PV"
INTEGRATION

FULLY INTEGRATED PV INDUSTRY CHAIN



METALLURGICAL-GRADE SILICON

300,000 tons



POLYSILICON

900,000 tons



20^{GW}
INGOT



WAFER

40+^{GW}



150+^{GW}
SOLAR CELL



PV MODULE

90+^{GW}

Grid-connection capacity

4,67^{GW}
"FISHERY+PV" INTEGRATION



✓ Low Carbon
Low Carbon Footprint

✓ Green
Green Manufacturing

✓ Responsible
Labor Traceability

 **"FISHERY+PV" INTEGRATION**

Project capacity

300MW

Location

**Binzhou City,
Shandong
Province, China**

WORLD'S PV INDUSTRY LEADER

TOP 1

Global shipment



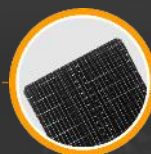
POLYSILICON



"A"
PV ModuleTech
Bankability Ratings

TOP 1

8 Global shipment
Consecutive Years



SOLAR CELL



Top Performer

KIWA-PVEL
Extended Testing

TOP 5

Global shipment



PV MODULE



Tier 1 de Bloomberg
Module Manufacturer

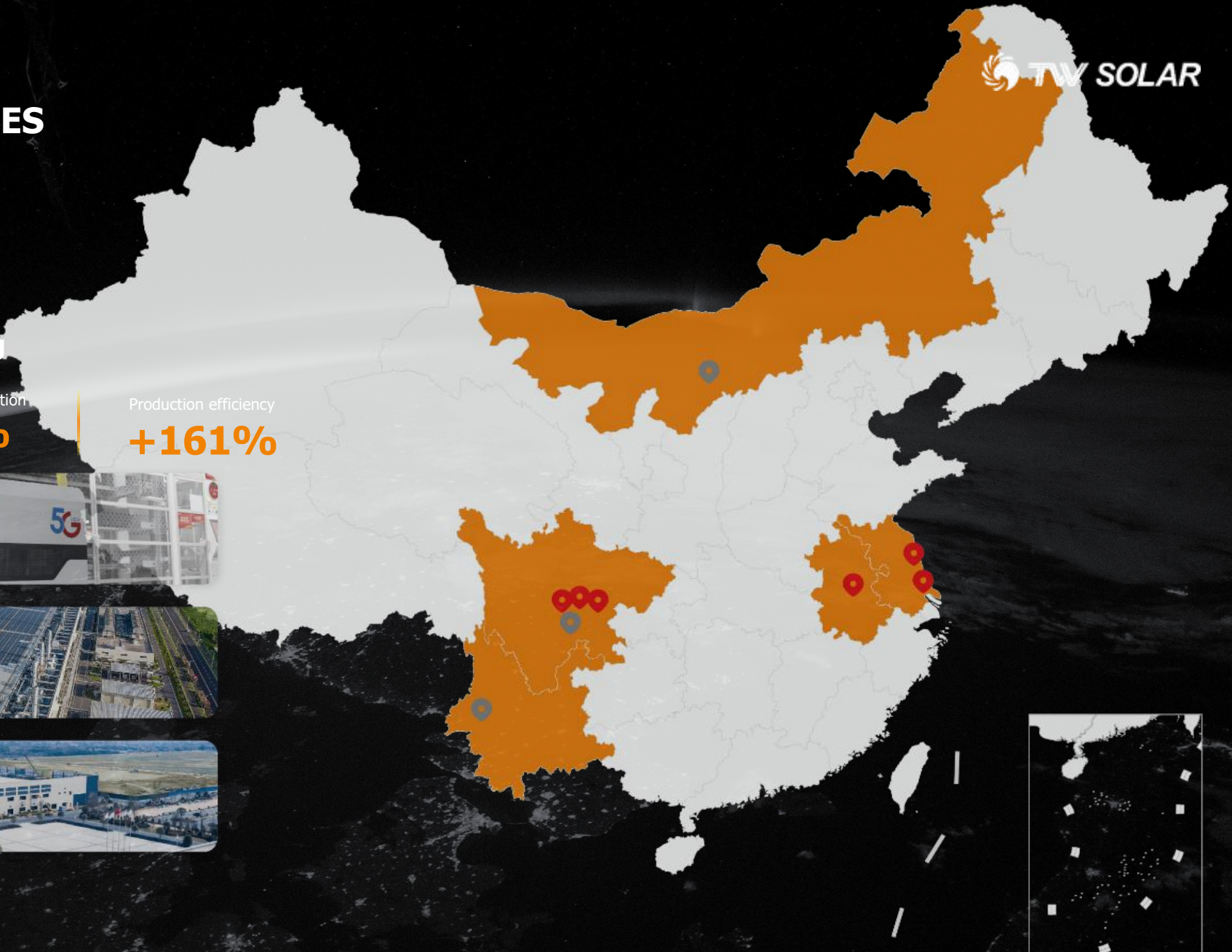


**Top 6 Wood Mackenzie
Global Solar Module
Manufacturer Ranking 2024**

PRODUCTION BASES

5G Smart Manufacturing

Labor	Energy consumption	Production efficiency
-62%	-30%	+161%



ESG INITIATIVES

A- STaR **AA** WIND
A+ IIGF **AA** CSI

FIRST PRIZE
 UNIDO Global Call 2023
 Clean Energy Innovation

BB MSCI

 2024 MSCI ESG Rating

B/B

 CDP Climate Change Program /
 CDP Supply Chain Program 2023

2023 Bloomberg
 Green ESG 50

2023 Forbes China **Forbes**
 ESG Innovative Enterprises

2024 Fortune China
 ESG Influential Listing

57 **S&P Global**
 2024 S&P Global ESG Score
TOP 1 in China's Semiconductor Industry

ER2

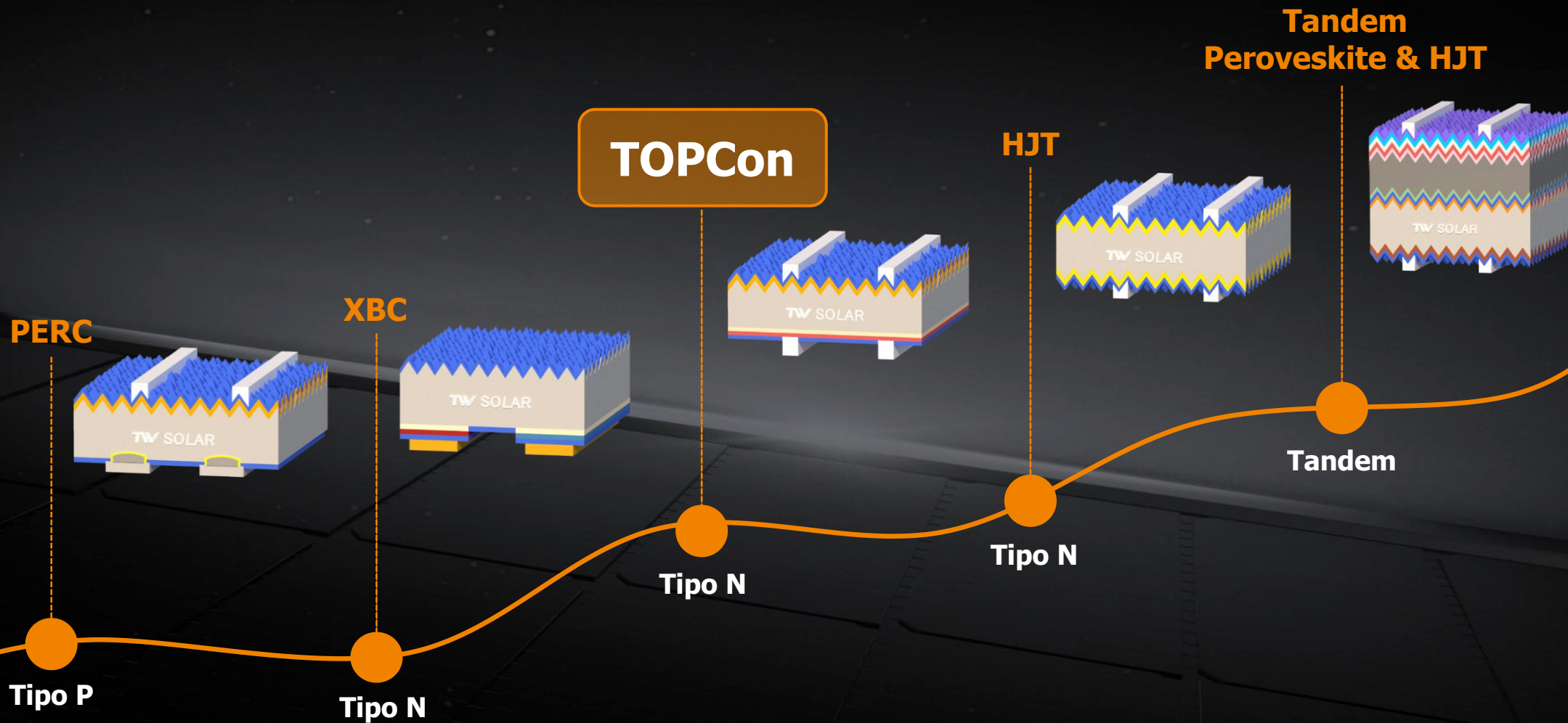
 2024 Sustainable Fitch Entity Rating
TOP 1 in PV Industry

GOLD **ecovadis**
 2024 Ecovadis Sustainability Rating
TOP 3% in Global Companies
Global TOP 1 PV Manufacturer & 1st to Achieve Gold Medal

02

TECHNOLOGY & PRODUCTS





TONGWEI SOLAR PV CELL

Core R&D Global Leading

150GW+

Existing Capacity

200GW+

Global Shipment as of 2024

NO.1

Global Shipments for 8 Consecutive Years

The first GW-level HJT production line in China
Cell efficiency is up to 26.49%

Industry's first
Large-size PECVD Poly TOPCon cell pilot line

Industrialized TOPCon cell mass production
Average conversion efficiency reaches 26.9%+

Establish a world-class HJT and
perovskite R&D team

Deploy in all-back-contact solar cell
Technology development

PARTNER

Trinasolar
天合光能

Jinko Solar
Leading Your Feet to Solar

LONGI

JA SOLAR
晶澳太阳能

阿特斯

ASTROENERGY

risen
东方日升

DASOLAR

协鑫
GCL

TCL 中环

S

海泰新能
Haitai Solar

DMEGC
SOLAR

亿晶光电

YINGDE SOLAR
中国·英德

CW Enerji

SEMMEID PERKINS
ENERGY

ocells

ALFA

KIVANC

kalyon-pv

ELIN

arçelik

gazoglu
solar
enerji

HT-SMAE

PEAK PV
SOLAR

DAXLER
Energy

WAAREE
One with the Sun

Smart
SOLAR TECHNOLOGIES

SOLAR

TATA POWER SOLAR

EMMVEE

REC
SOLAR'S BEST THOUGHT

Premier
Energies

HD

JETION
SOLAR
Essence Green Energy

中节能太阳能
CECEP SOLAR

华耀
HUA YAO

JAKSON

REDSOLAR

SUNTECH
BE UNLIMITED

AKCOME

正信光电
ZNSHINE SOLAR

CDS

中来股份
JOLYWOOD

SVMAN

HUASUN

.....

TONGWEI GLOBAL INNOVATION R&D CENTER

T2&T3

TBC CELL &
MODULE
PILOT LINE

19K^{m²}

est. Q2,2022

T1

11K^{m²}

TNC CELL
PILOT LINE

T4 9K

MODULE
R&D CENTRE

^{m²}

T6

57K^{m²}

HJT+ GW-LEVEL
PEROVSKITE CELL

T5

12K^{m²}

TEST CENTER

**WORLD'S
LARGEST &
MOST ADVANCED**

SINGLE-AREA
PHOTOVOLTAIC TEST
CENTER

270k^{m²}

R&D total area

108k^{m²}

R&D workshop Area



Shuangliu District, Chengdu City, Sichuan Province, China

SMART MANUFACTURING

Tongwei **Module SN** enables "One-Stop" **full traceability** of data throughout the entire production process, including materials, quality, and equipment.

Module SN



INDUSTRY 4.0 → INDUSTRY 5.0



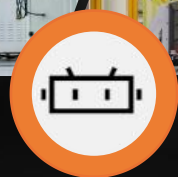
200+
Smart Manufacturing Lines



World's 1st
Industry 4.0 Solar Cell Production Line



99.999% Stability
in Exclusive 5G Network

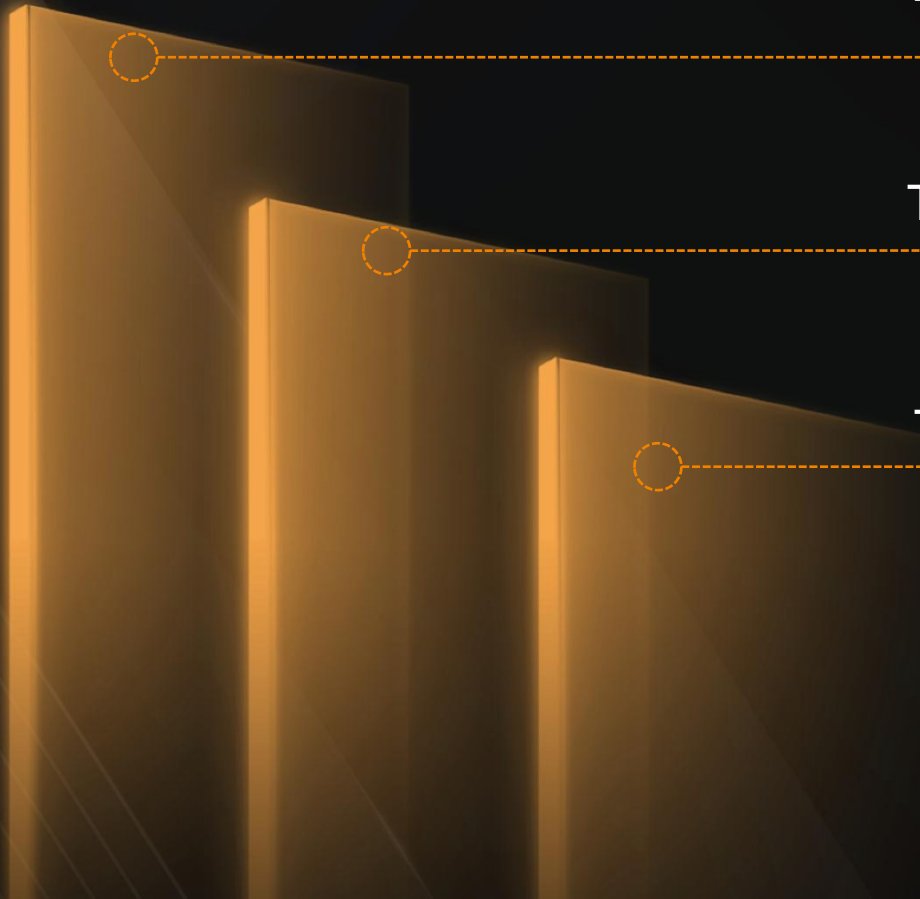


300
Smart Transport Robots



World's 1st
5G Application Base in PV Industry



 **WORLD RECORDS MADE BY TONGWEI**

TWMNF-66HD **778.5W** **TNC 2.0**
2384*1303mm Maximum Efficiency 25.06%

TWMNH-66HD **682.8W** **TNC 2.0**
2382*1134mm Maximum Efficiency 25.28%

TWMHF-66HD **790.8W** **HJT**
2384*1303mm Maximum Efficiency 25.46%

FLAGSHIP PRODUCTS

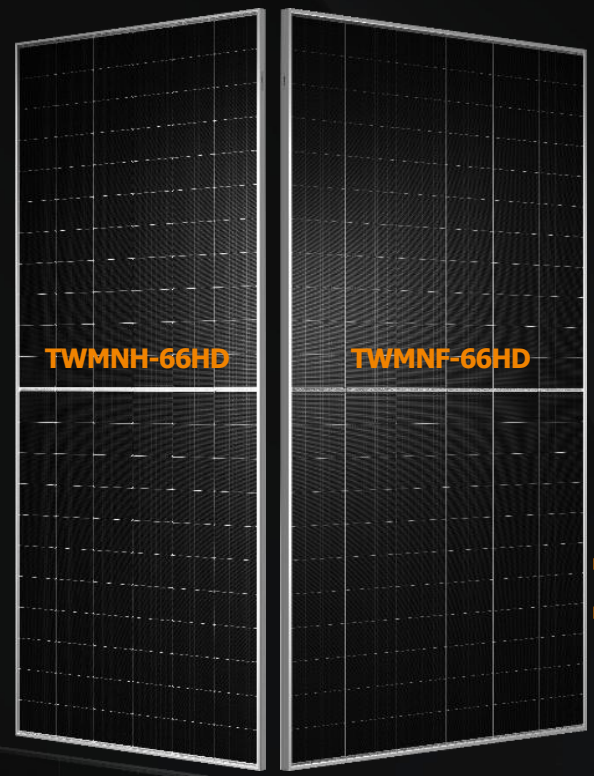
TNC 2.0



15 YEARS
MATERIAL WARRANTY

30 YEARS
POWER WARRANTY

Tongwei Gene
NEP
N-Type · Efficiency · Power Up



12 YEARS
MATERIAL WARRANTY

30 YEARS
POWER WARRANTY

TNC 2.0 TECHNOLOGY PANORAMA

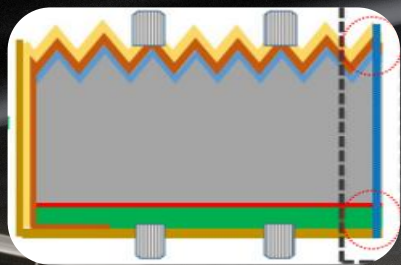
TPE

*Tongwei Passivation Edge

Repair of the cell cutting edge

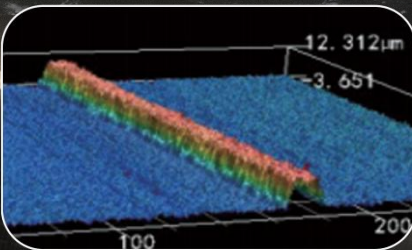
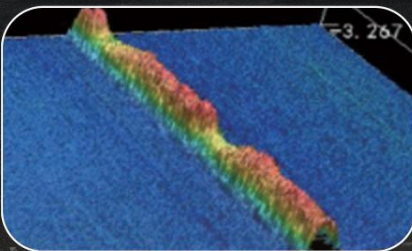
POWER INCREASE

5W/MODULE



STENCIL PRINTING

Better current transmission thanks to smooth shape, better aspect ratio.

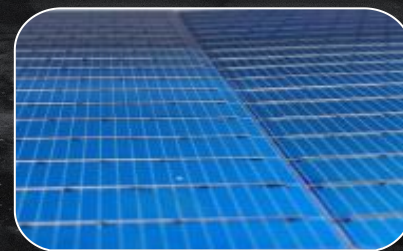


908 TYPE CELL

*Tongwei Patent

Less shading, more light on the surface

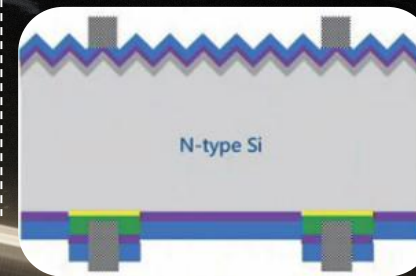
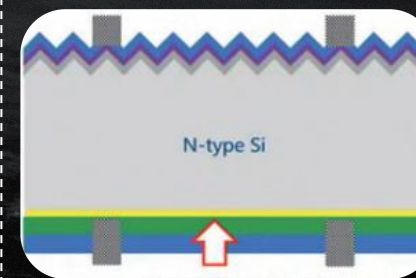
3% LESS SHADED AREA

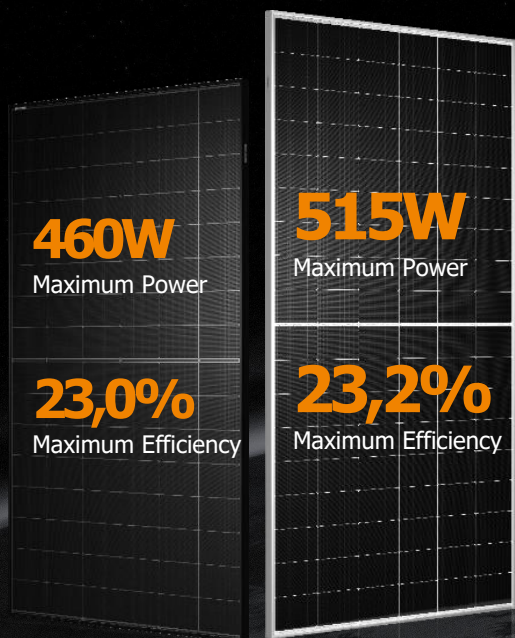


POLY TECH

Reduced optical loss thanks to improved passivation and contact performance.

MAXIMUM BIFACIALITY UP TO 88%



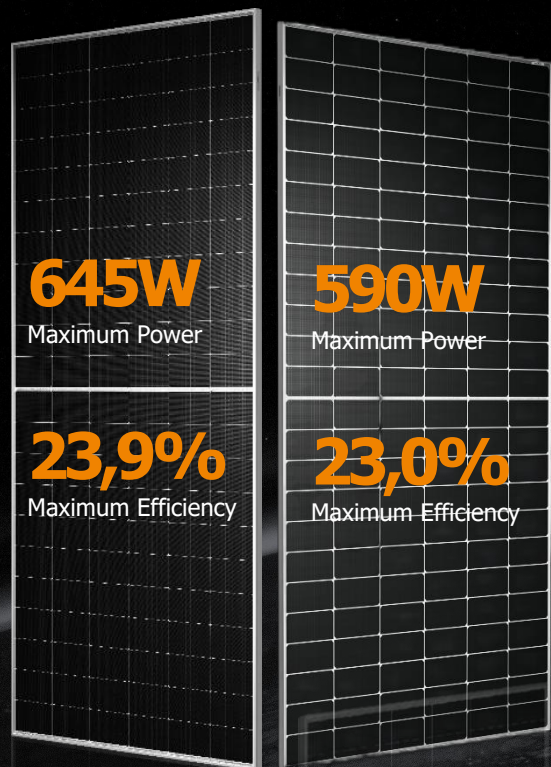


TWMNH-48 SERIES Double-glass Monofacial

TWMNH-54HD Bifacial

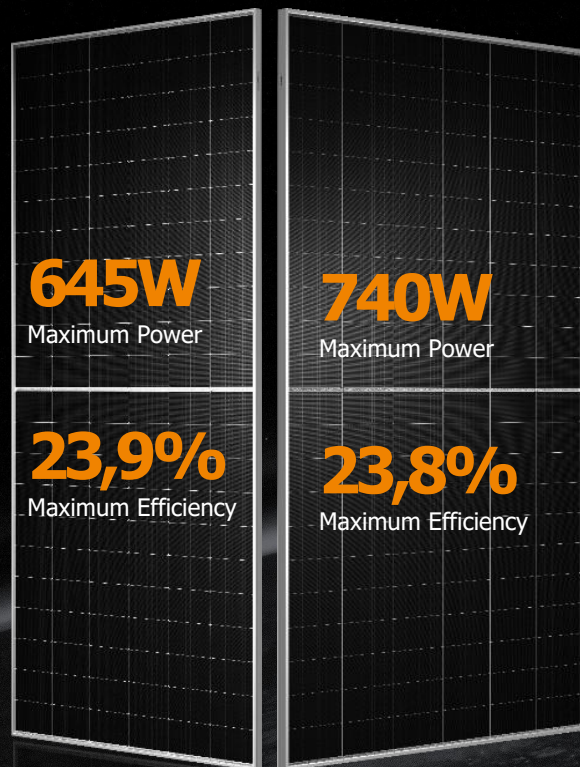
OUTPUT	Up to 460W	Up to 515W
EFFICIENCY	23.0%	23.2%
GLASS	2.0+2.0mm	2.0+2.0mm
DIMENSION	1762*1134*30mm	1961*1134*30mm
WEIGHT	23.7 kg	27.0kg
BIFACIALITY	80±5%*	80±5%

1st year degradation ≤1%, annual degradation ≤0.4%.



	TWMND-72HD Bifacial	TWMNH-66HD Bifacial
OUTPUT	Up to 590W	Up to 645W
EFFICIENCY	23.0%	23.9%
GLASS	2.0+2.0mm	2.0+2.0mm
DIMENSION	2278*1134*30mm	2382*1134*30mm
WEIGHT	31.5kg	32.5kg
BIFACIALITY	80±5%	80±5%

1st year degradation ≤1%, annual degradation ≤0.4%.



	TWMNH-66HD Bifacial	TWMNF-66HD Bifacial
OUTPUT	Up to 650W	Up to 740W
EFFICIENCY	24.1%	23.8%
GLASS	2.0+2.0mm	2.0+2.0mm
DIMENSION	2382*1134*30mm	2384*1303*33mm
WEIGHT	32.5kg	37.3kg
BIFACIALITY	80±5%	80±5%

1st year degradation ≤1%, annual degradation ≤0.4%.

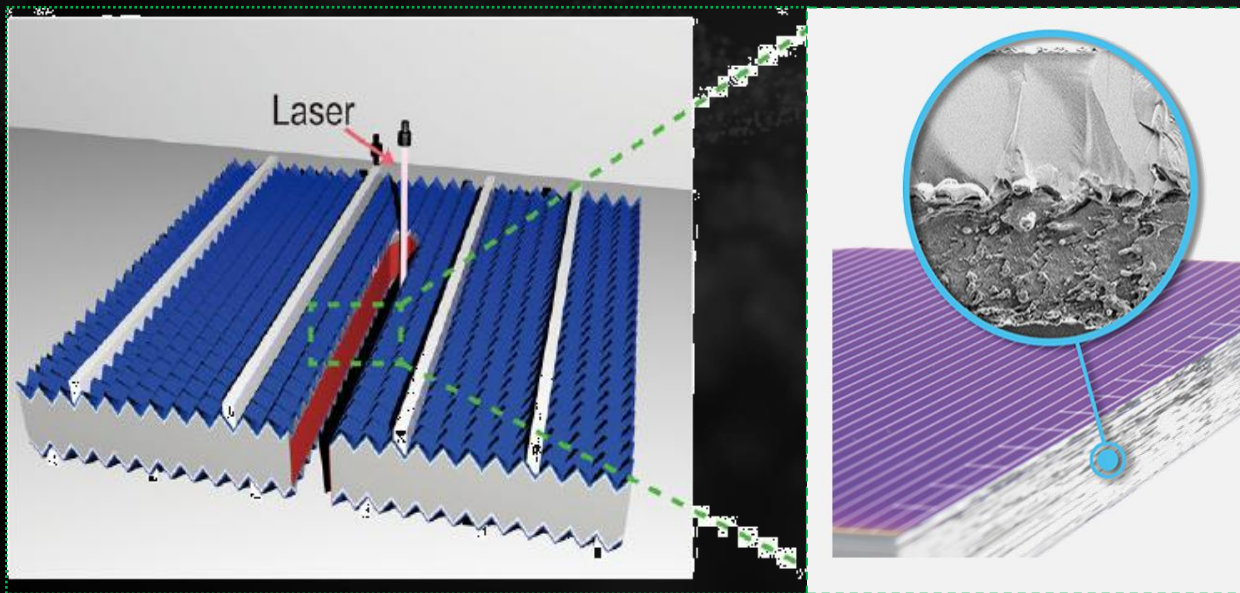
TNC 2.0 TECHNOLOGY – TPE TONGWEI PASSIVATION EDGE

THE DEVELOPMENT CONTEXT

Laser cutting of cells causes some degree of damage.

THE ADVANTAGES OF TPE

TPE repairs cutting damage and increase cell efficiency and module power.



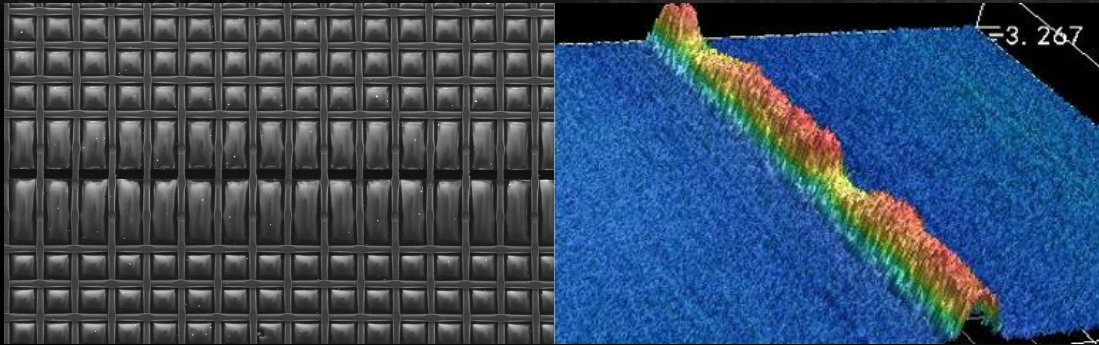
Output power of module

↑ 5W

TNC 2.0 TECHNOLOGY – STENCIL PRINTING

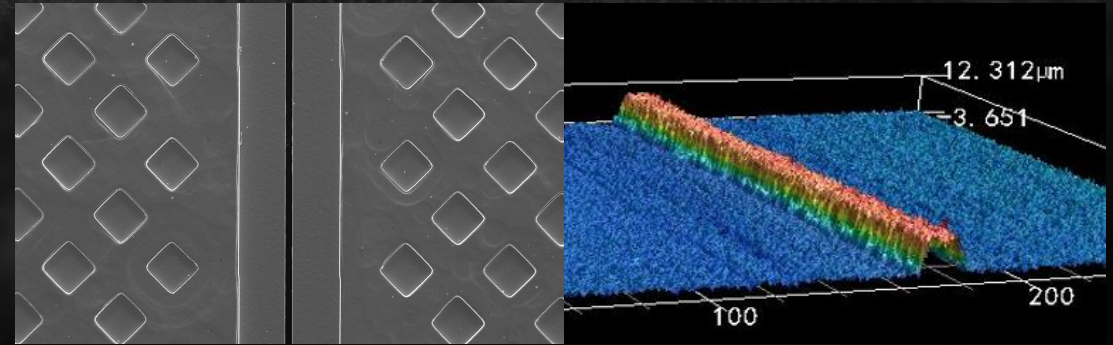
SCREEN PRINTING

Uneven grid shape due to mesh shading, affects current transmission.

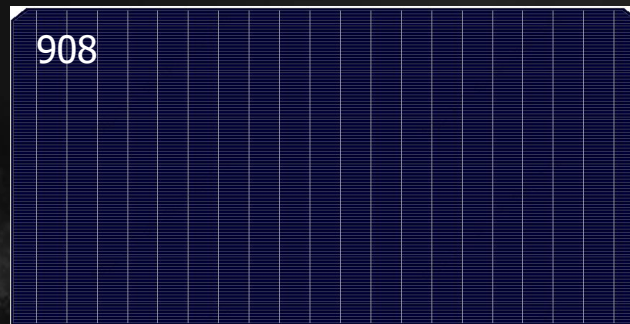
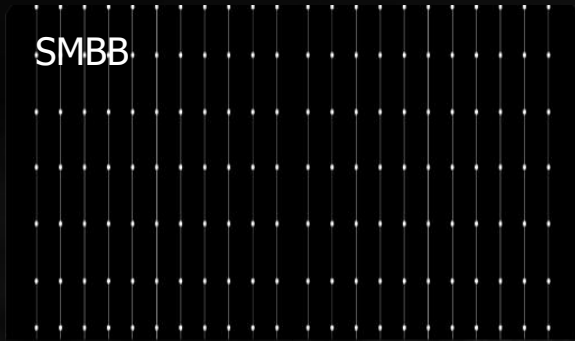


STENCIL PRINTING

Full openness on steel screen, less difficulty for silver paste, better current transmission effect thanks to the smooth grid shape.



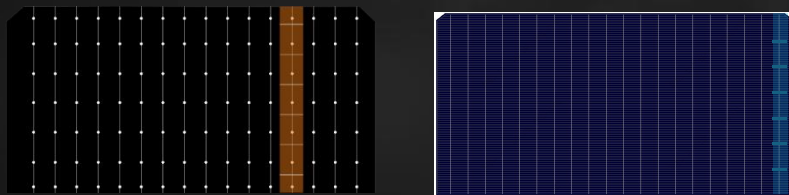
TNC 2.0 TECHNOLOGY – 908 TYPE PV CELL



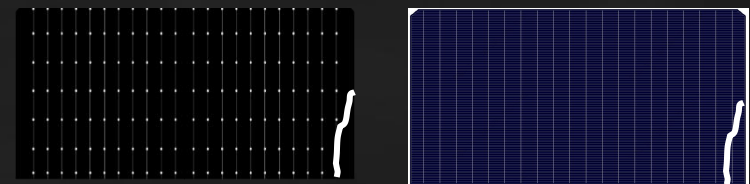
Redesigned PV cell brings as result **3% less shaded area***, more light absorption on the front side.

*With stencil printing

Shorter current transmission distance, less power loss



Reduced power loss due to microcracks



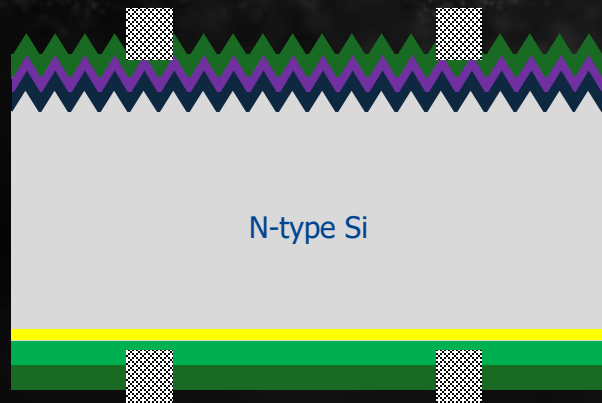
TNC 2.0 TECHNOLOGY – POLY TECH

- **BACKGROUND**

Doped poly-Si layer causes absorption of free carriers, leading to optical loss.

- **TONGWEI'S SOLUTION**

Laser removal + aluminum oxide passivation, ensures passivation and contact performance while reducing optical loss.



TOPCon cell structure

Max. Bifaciality

88%

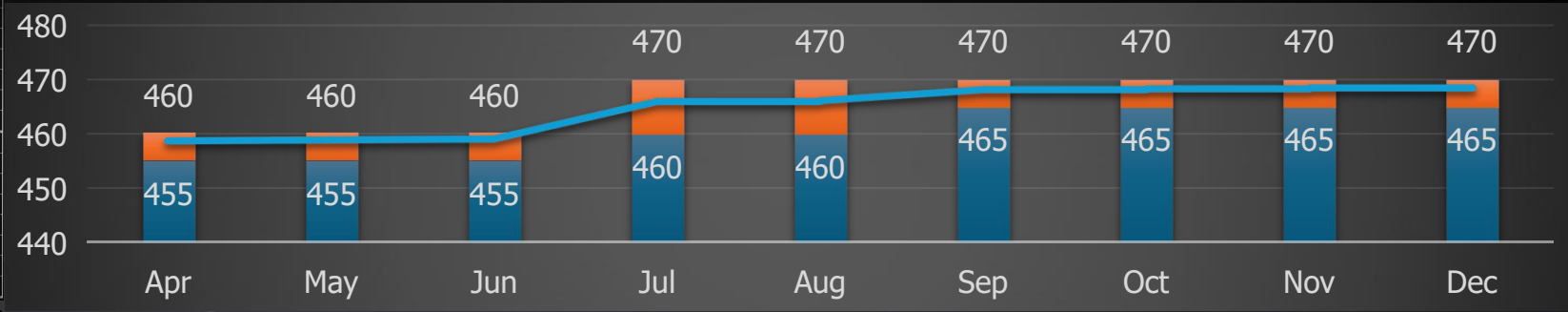


TOPCon-Poly Tech cell structure

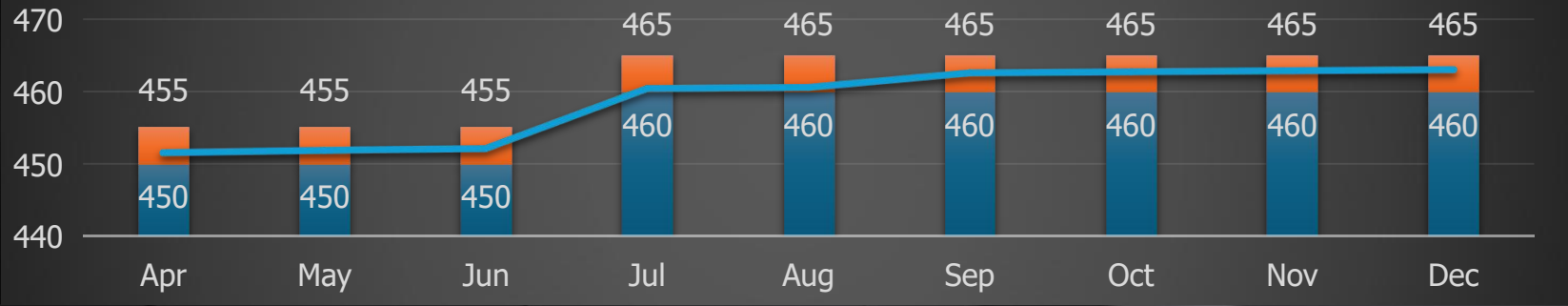
OUTPUT POWER ROADMAP 3Q2025-1Q2026

— Average Power (Wp)

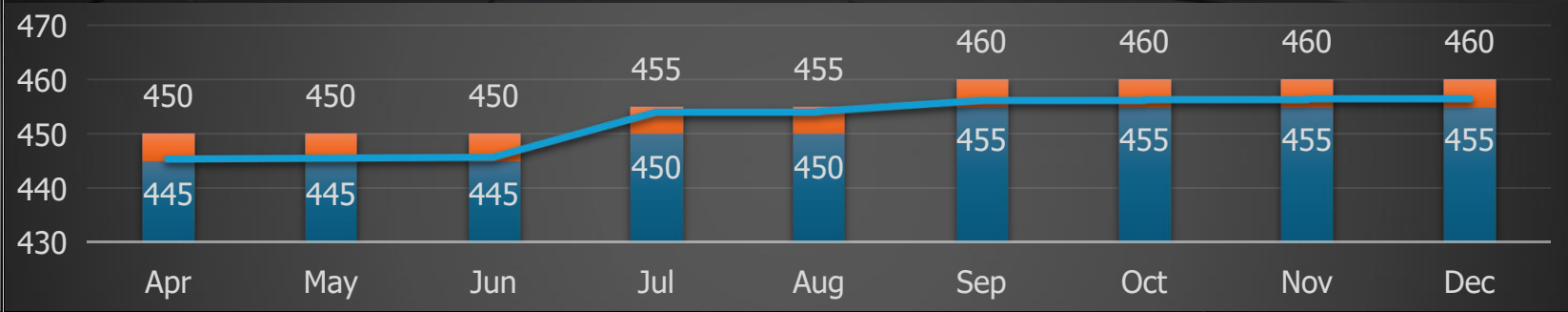
TNC 2.0
Monofacial-Dual Glass
TWMNH-48HW
 White Mesh
 2.0 Glass



TNC 2.0
Monofacial-Dual Glass
TWMNH-48HE
 All Black
 2.0mm Glass



TNC 2.0
Bifacial-Dual Glass
TWMNH-48HD
 Transparent
 2.0mm Glass

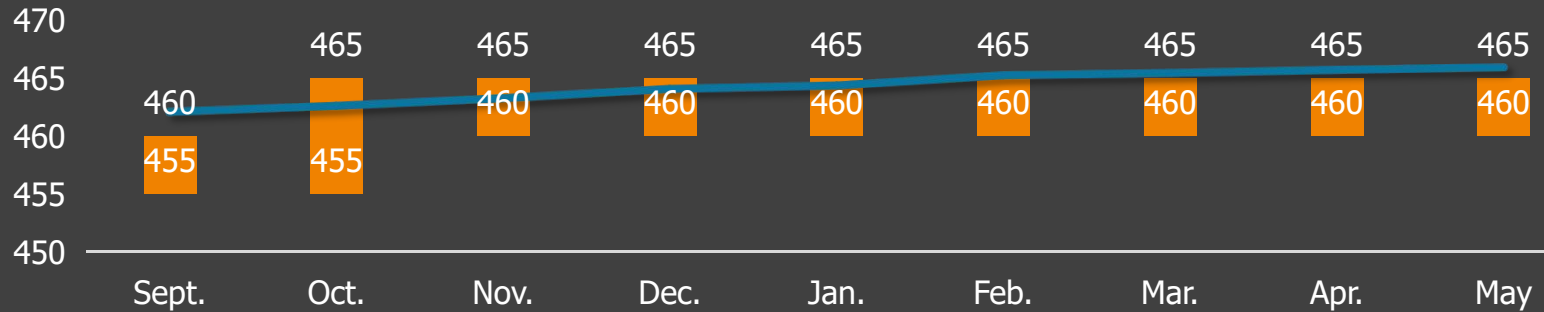


OUTPUT POWER ROADMAP 3Q2025-1Q2026

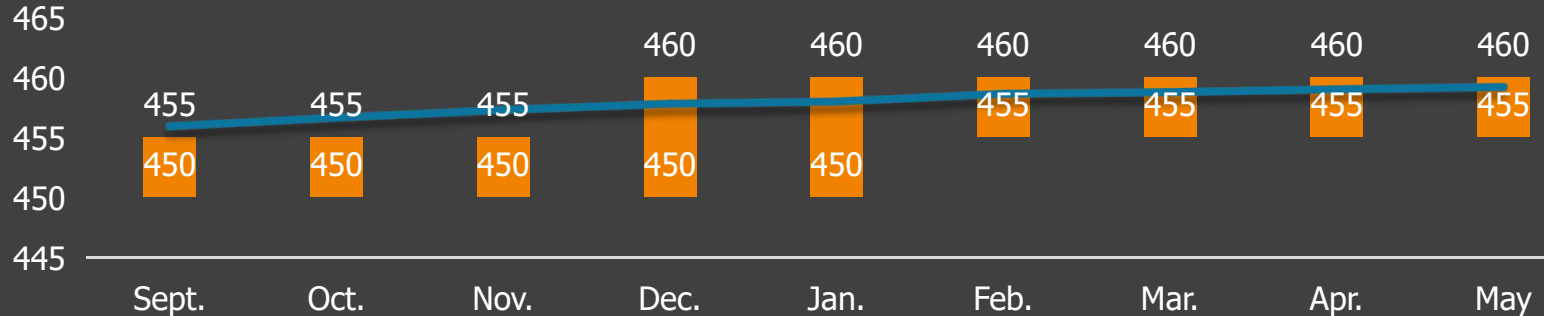
TNC 2.0
Monofacial-Dual Glass
TWMNH-48HW
 White Mesh
 2.0 Glass



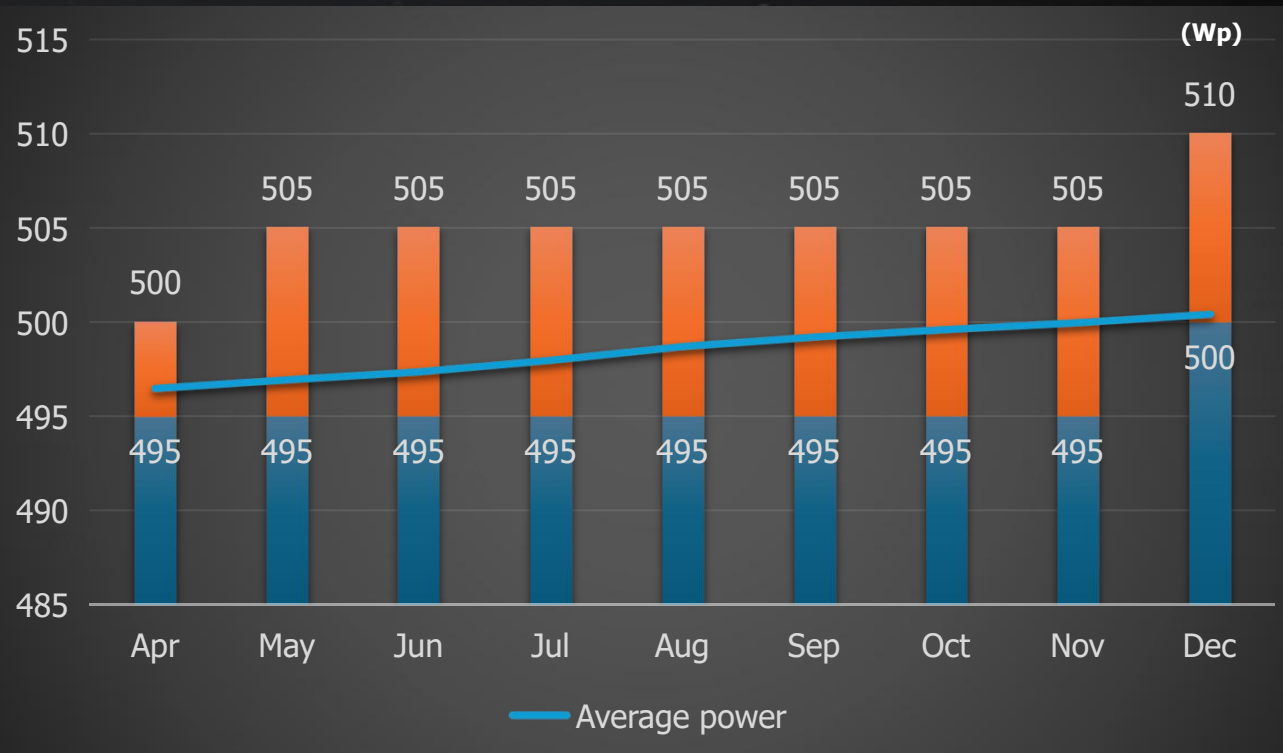
TNC 2.0
Monofacial-Dual Glass
TWMNH-48HE
 All Black
 2.0mm Glass



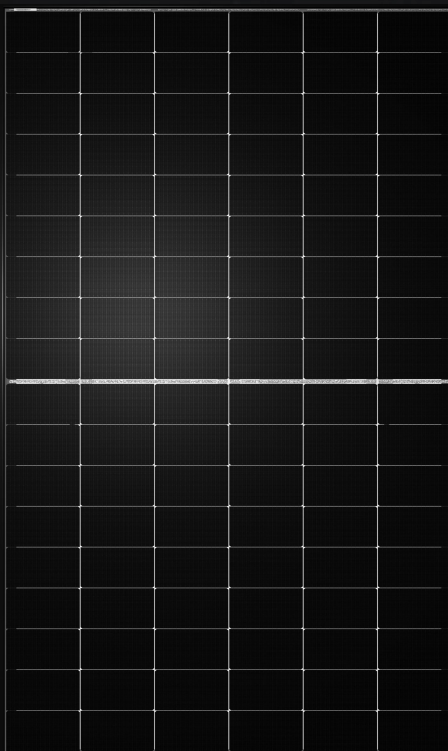
TNC 2.0
Bifacial-Dual Glass
TWMNH-48HD
 Transparent
 2.0mm Glass



OUTPUT POWER ROADMAP 3Q2025-1Q2026



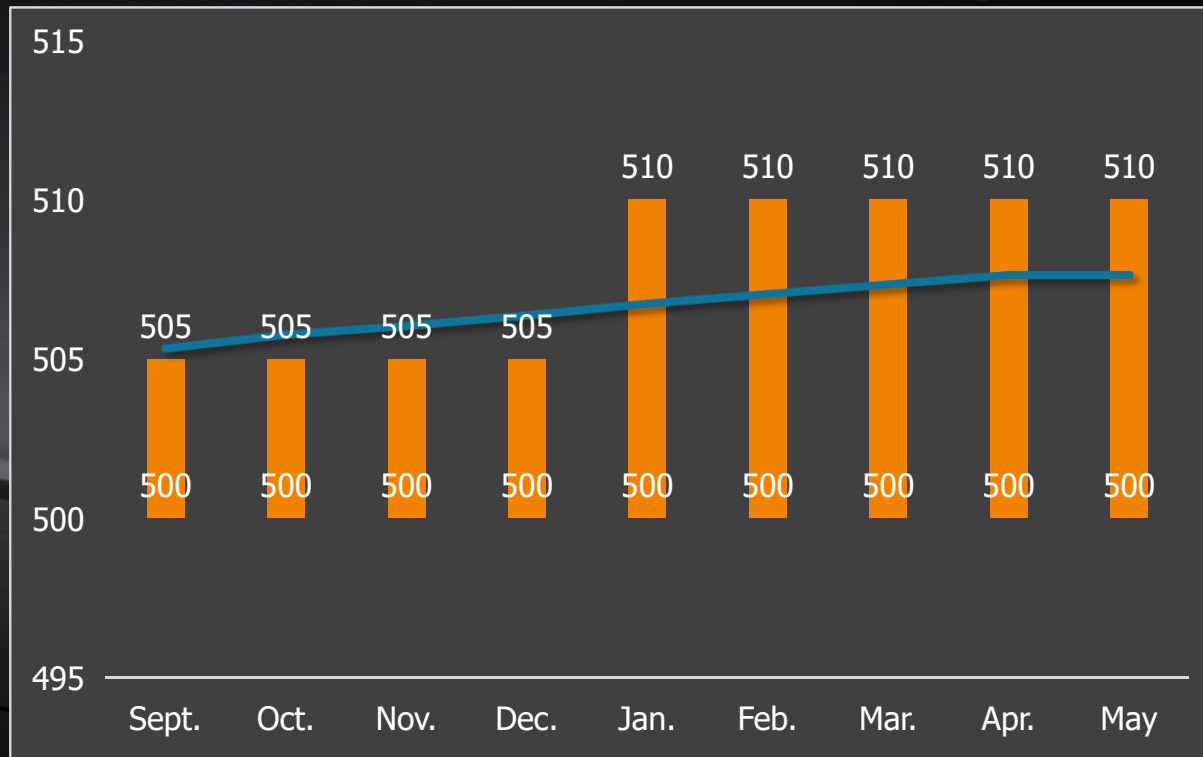
OUTPUT POWER ROADMAP 3Q2025-1Q2026



TWMNH-54HD

Bifacial-Dual Glass

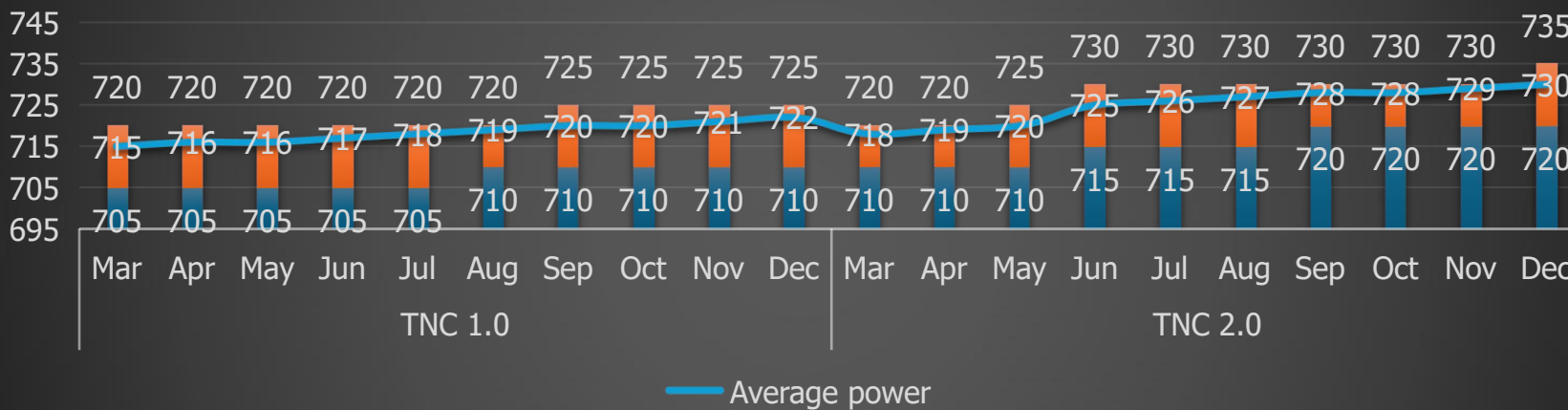
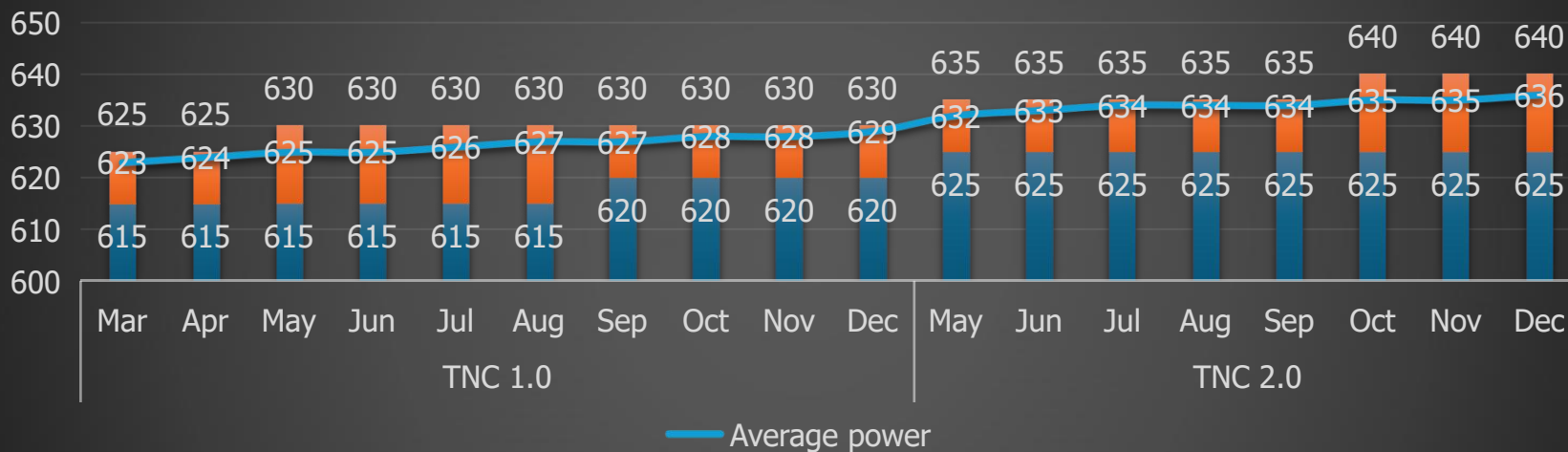
Transparent 2.0mm Glass



TNC 1.0 & 2.0 ROADMAP 3Q2025-2Q2026

TNC 1.0

TNC 2.0

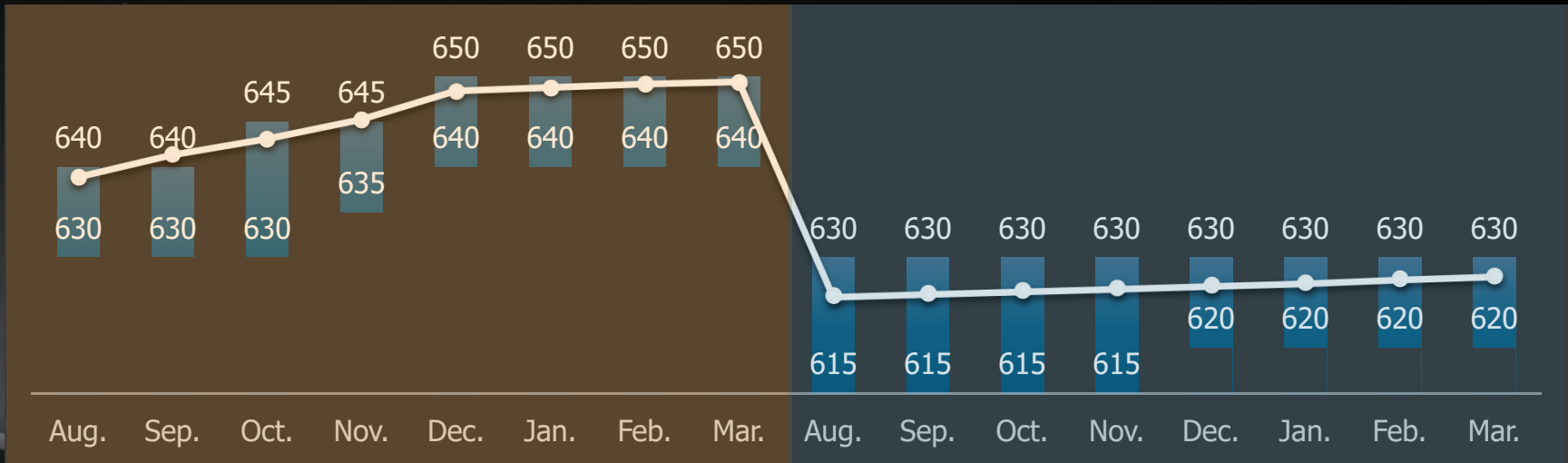


TNC 1.0 & 2.0 ROADMAP 3Q2025-1Q2026

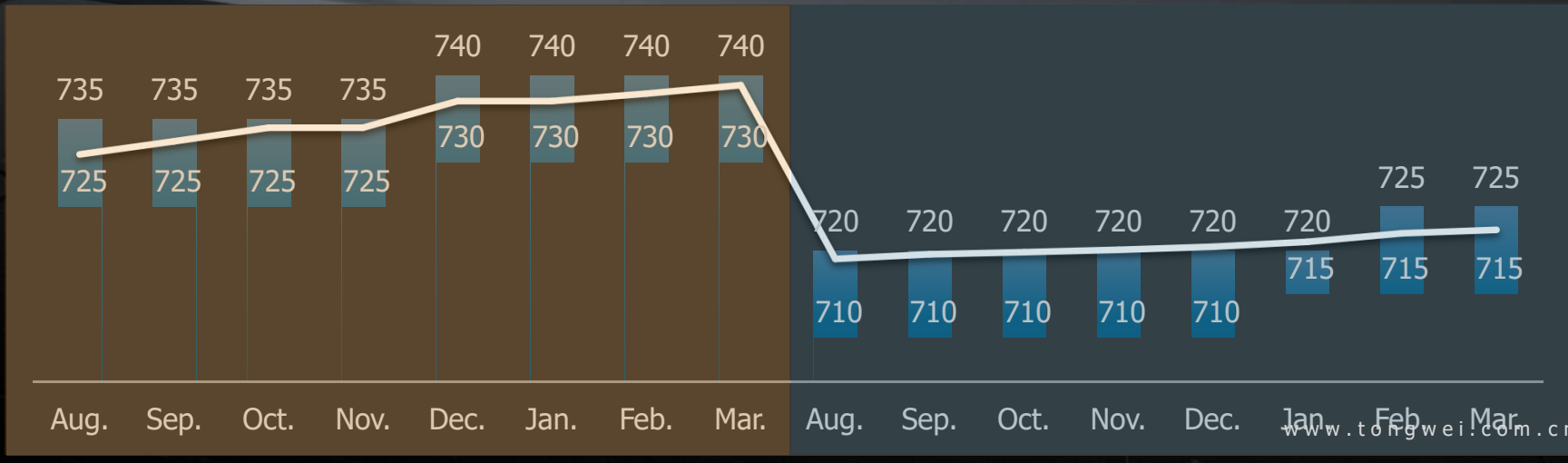
TNC 2.0

TNC 1.0

TWMNH-66HD
Bifacial-Dual Glass

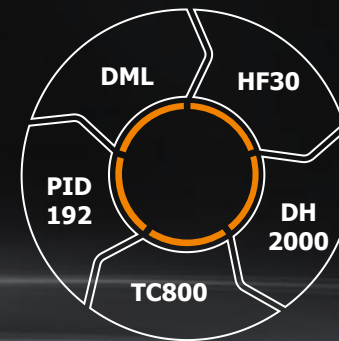
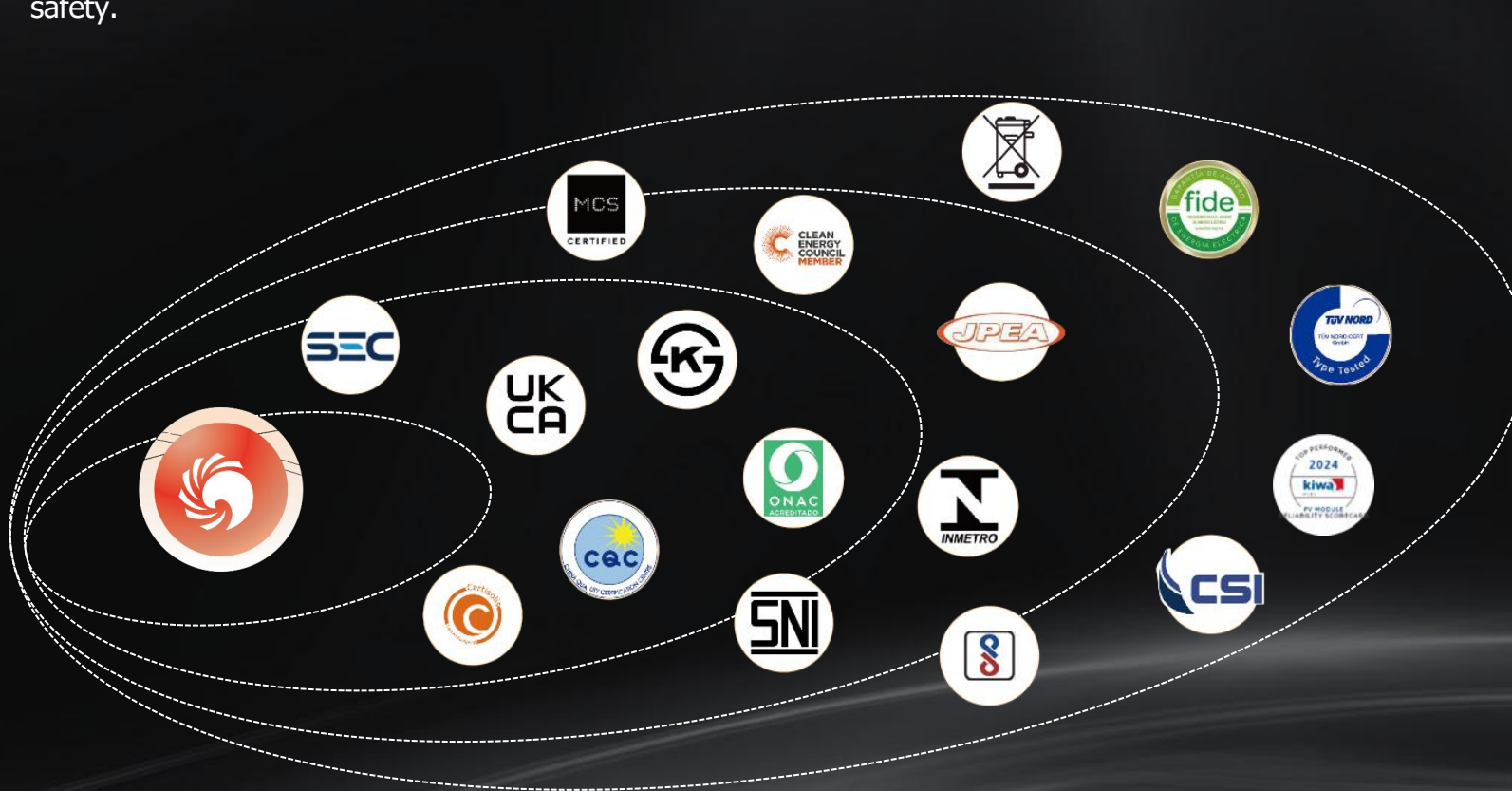


TWMNF-66HD
Bifacial-Dual Glass



CERTIFICATION AND EXTENDED TESTING

Tongwei modules meet international standards and have passed rigorous environmental and reliability tests, reflecting our dedication to quality and safety.



03

GLOBAL PROJECT REFERENCE





GLOBAL REFERENCE



Austria
Utility-scale
**25.14M
W**



**TWMNH-
66HD**

Saudi Arabia
Utility-scale
1.17GW



Romania
Utility-scale
60MW




Hungary
Utility-scale
25MW



Netherlands
Utility-scale
46MW



Austria
Utility-scale
**30.64M
W**



GLOBAL REFERENCE



Austria
Utility-scale
30.64MW



Netherland
C&I
67MW



Hungary
C&I
25MW



Netherlands
C&I
45MW



Spain
C&I
85MW



Germany
C&I
60MW

THANK YOU

