Advanced N-Type Solar Cell and Module for a Sustainable Future

PV CHANGES THE WORLD

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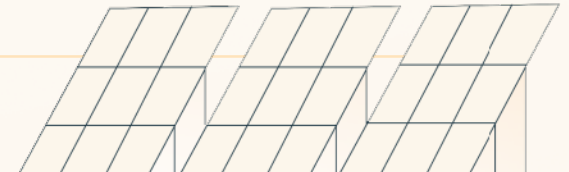
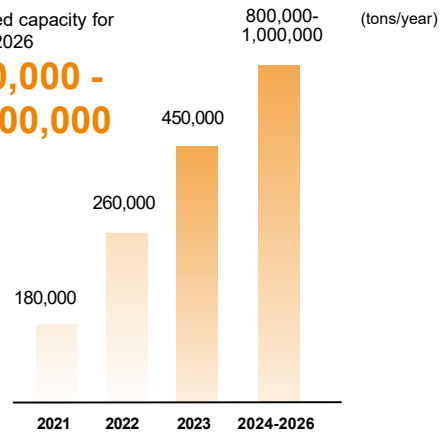


PV industry sector capacity roadmap

Polysilicon

Capacity in 2023
450,000

Planned capacity for 2024-2026
800,000 - 1,000,000

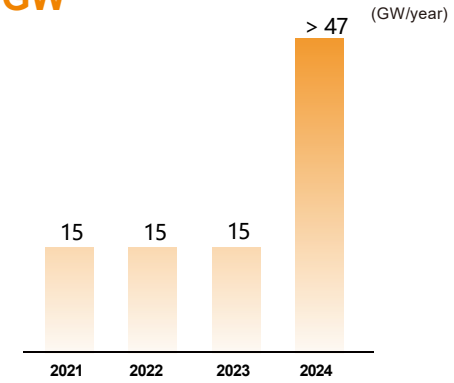


TOP1
Shipments

Mono-crystalline wafer

Capacity in 2023
15GW

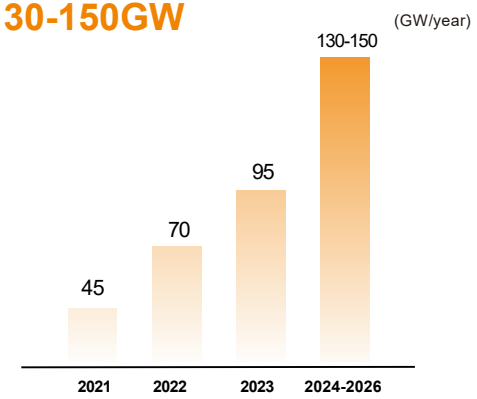
Planned capacity for 2024
47GW

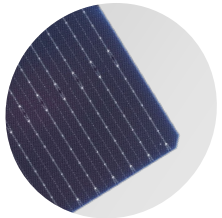


Solar cell

Capacity in 2023
95GW

Planned capacity for 2024-2026
130-150GW



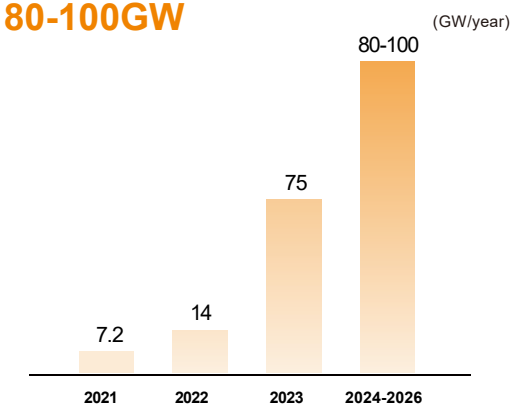


TOP1
Shipments for 7 consecutive years

PV module

Capacity in 2023
75GW

Planned capacity for 2024-2026
80-100GW



TOP5
Shipments

TIER1 Bloomberg

Tongwei Global Innovation R&D Center

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The park: 405,333m²

The R&D area: 270,000m²

Total area of the R&D workshop: 108,000m²

- Nov. 30, 2023

- Inaugurated Global Innovation R&D Center with a groundbreaking ceremony.

- April 26, 2024

- The first batch of process equipment of Tongwei Global Innovation R & D center entered the market.

- Previously

- T1, T2 & T3, and T4 facilities has been fully operational.

- June 2024

- T5 PV reliabilities center is officially commenced operations.

- June 6, 2024

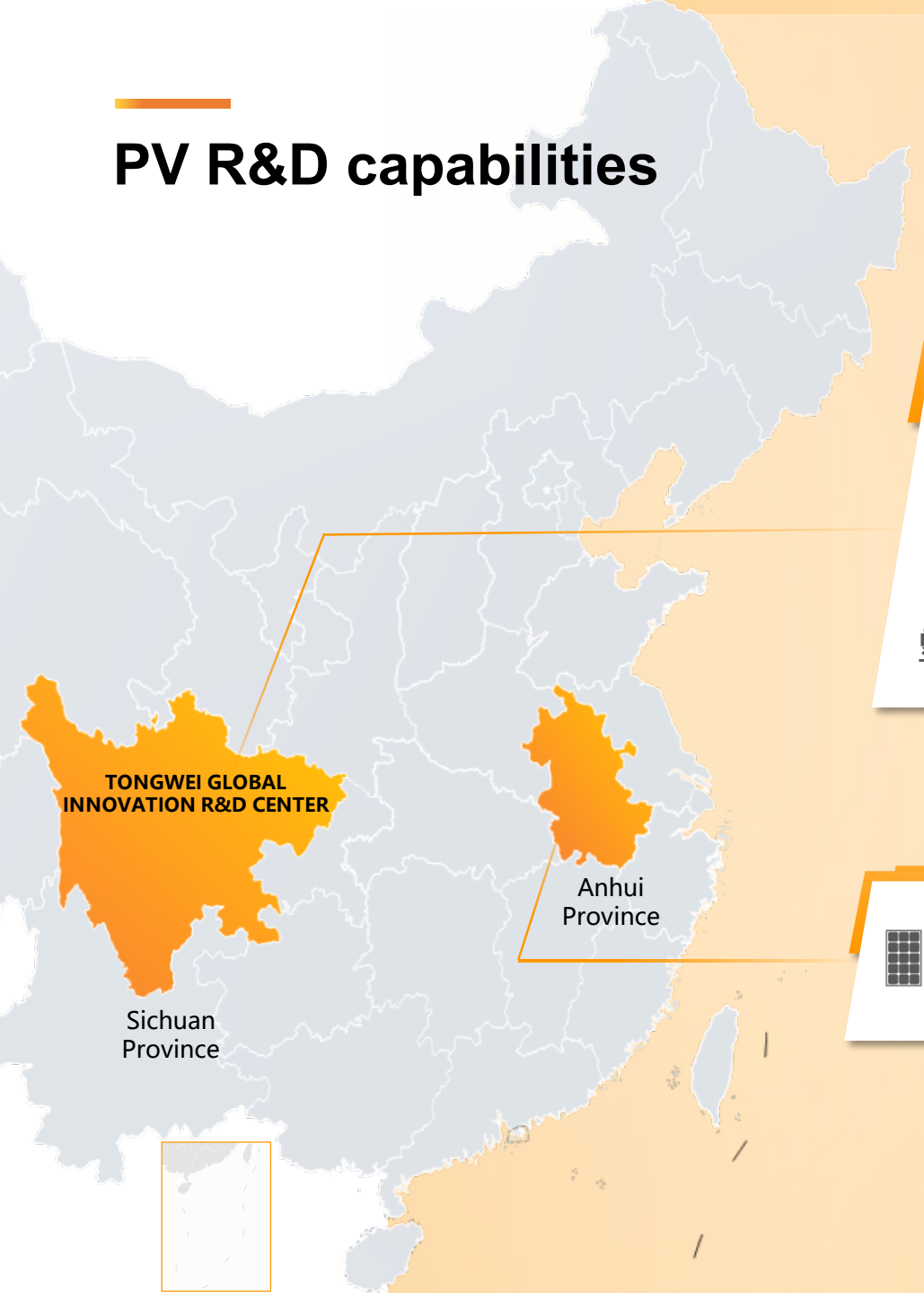
- The first T6 cell rolled off the line, signifying the official operational launch of Global innovation R&D center.

- July 30, 2024

- First wafer of half-cut wafer pilot line has been successfully produced.

Chengdu · Shuangliu

PV R&D capabilities



Polysilicon
- Polysilicon research center
- G12 crystal growth
- Half-cut wafer pilot line

Solar cell
- TNC development
- HJT/TBC pilot line
- Advanced metallization
- Perovskite/silicon tandem

PV module
- Half-cut module pilot line

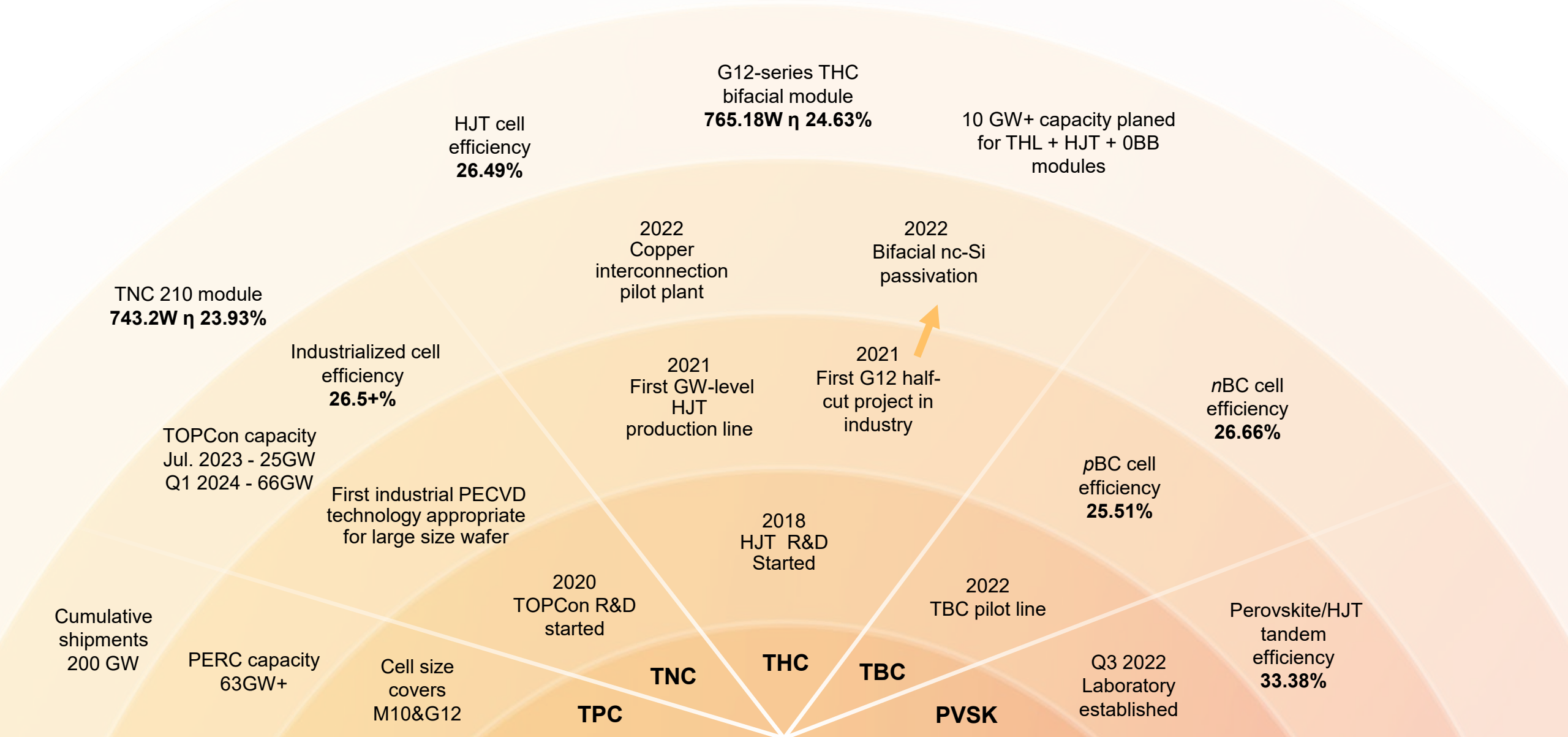
Lab
- Wafering advanced lab
- Cell characterization lab
- Module reliability lab

PV module
- HJT module pilot line
- Terrestrial module test sites

Over **1200** R&D researchers
Covering all PV technology fields

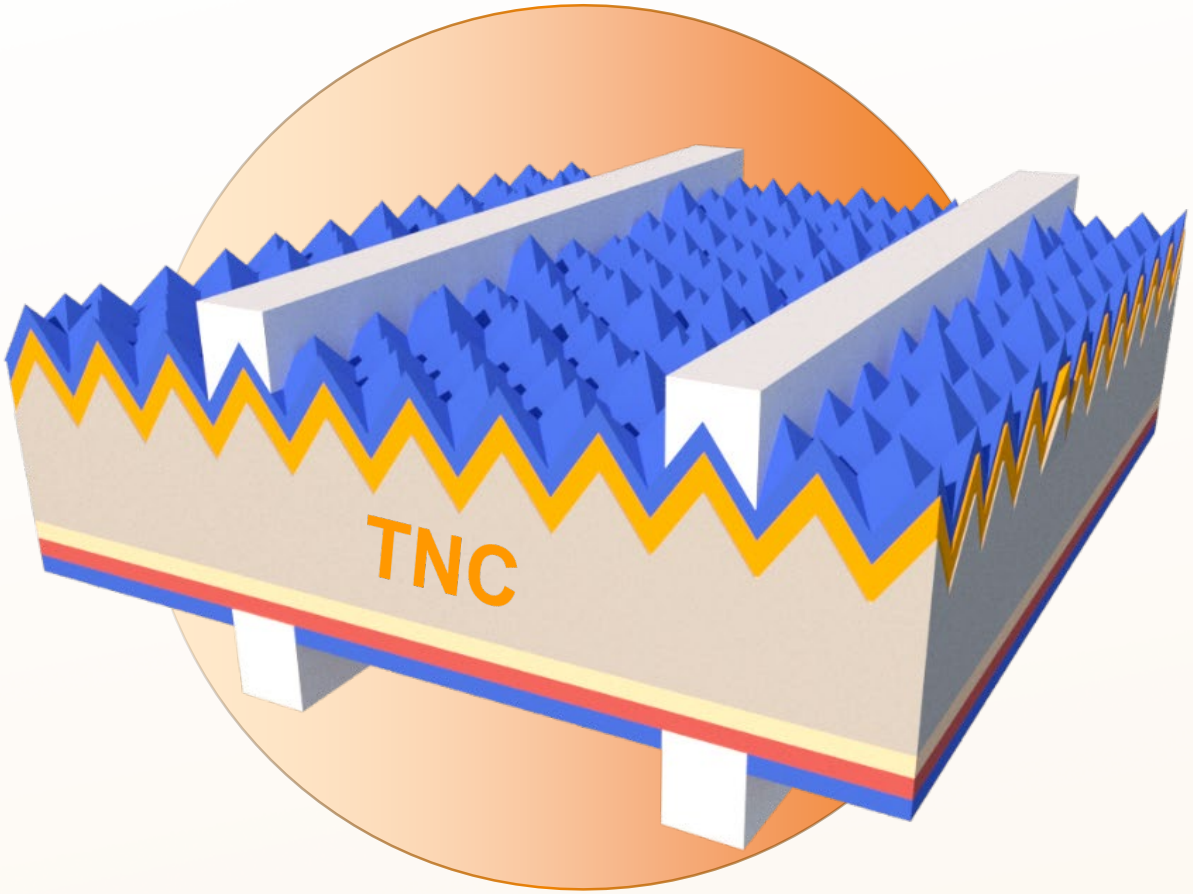
2,488 Patents
(By 09/30/2024)

PV R&D projects



Tongwei n-type TNC: The industry's first self-developed PECVD technology

- Tongwei initiated TNC cell research in 2020 and developed the industry's first large wafer size PECVD polysilicon technology route.
  By 2021, mass production conversion efficiency had reached 24.65%, with this further improving 25.3% in 2022 and 26.9+% in 2024.



High efficiency:

Mass production conversion efficiency now exceeds **26.9+%**

Module power = **600W+/700W+**

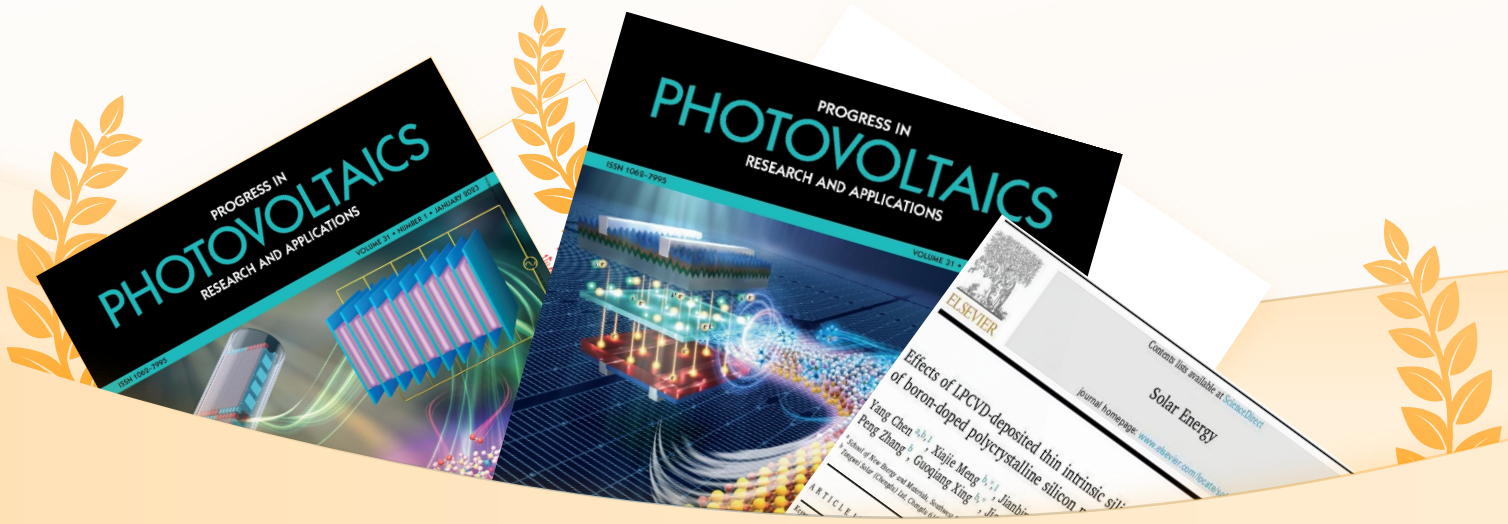
Technical issues mitigated under n-type-passivation contact mass production conditions.

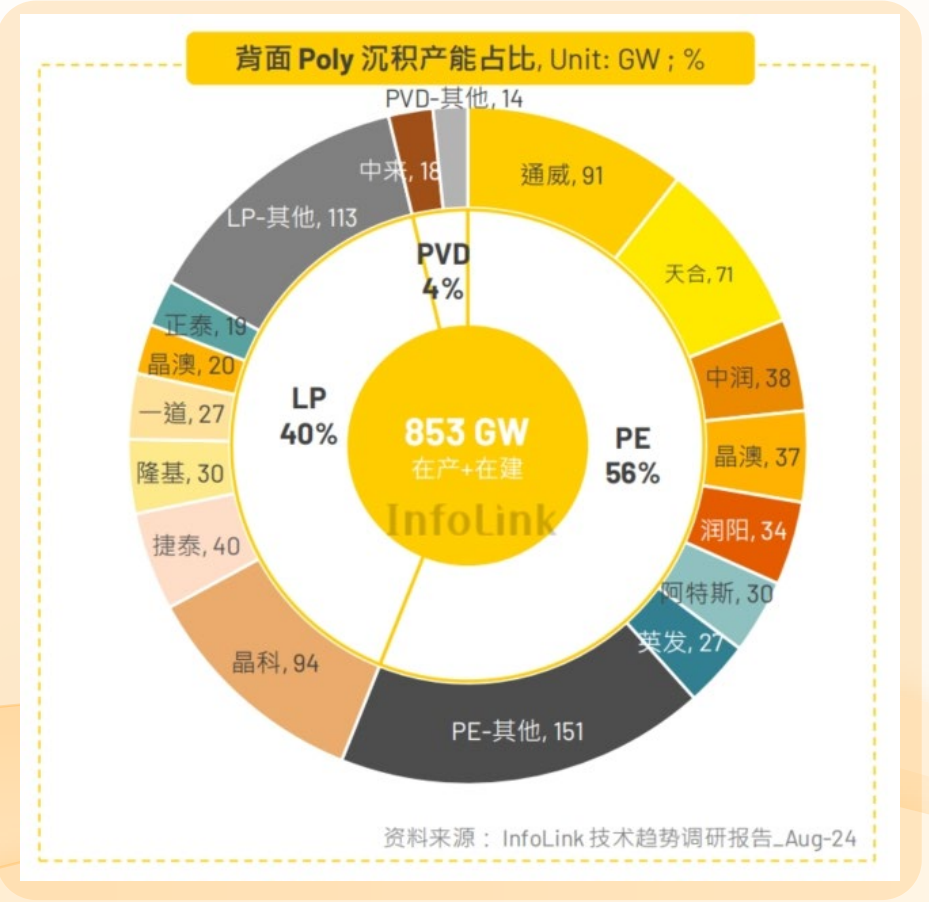
High reliability:

- Low temperature coefficient
- High bifaciality
- Excellent low irradiance performance
- High power generation per Wp
- Low LCoE

Domestic Tube-based PE-Tox & Poly TOPCon technology plays a key role in Tongwei's TNC cells

- Tube-based PECVD technology, developed by Nantong University/Leadmicro and Tongwei, has been twice featured in the annual and monthly cover articles of Progress in Photovoltaics (PIP).
- Tube-based PE-Tox & Poly became a significant tag of China’s technology, filling the industry gap.
- Cutting-edge development and industry-leading production process of TOPCon cells.





Flagship products

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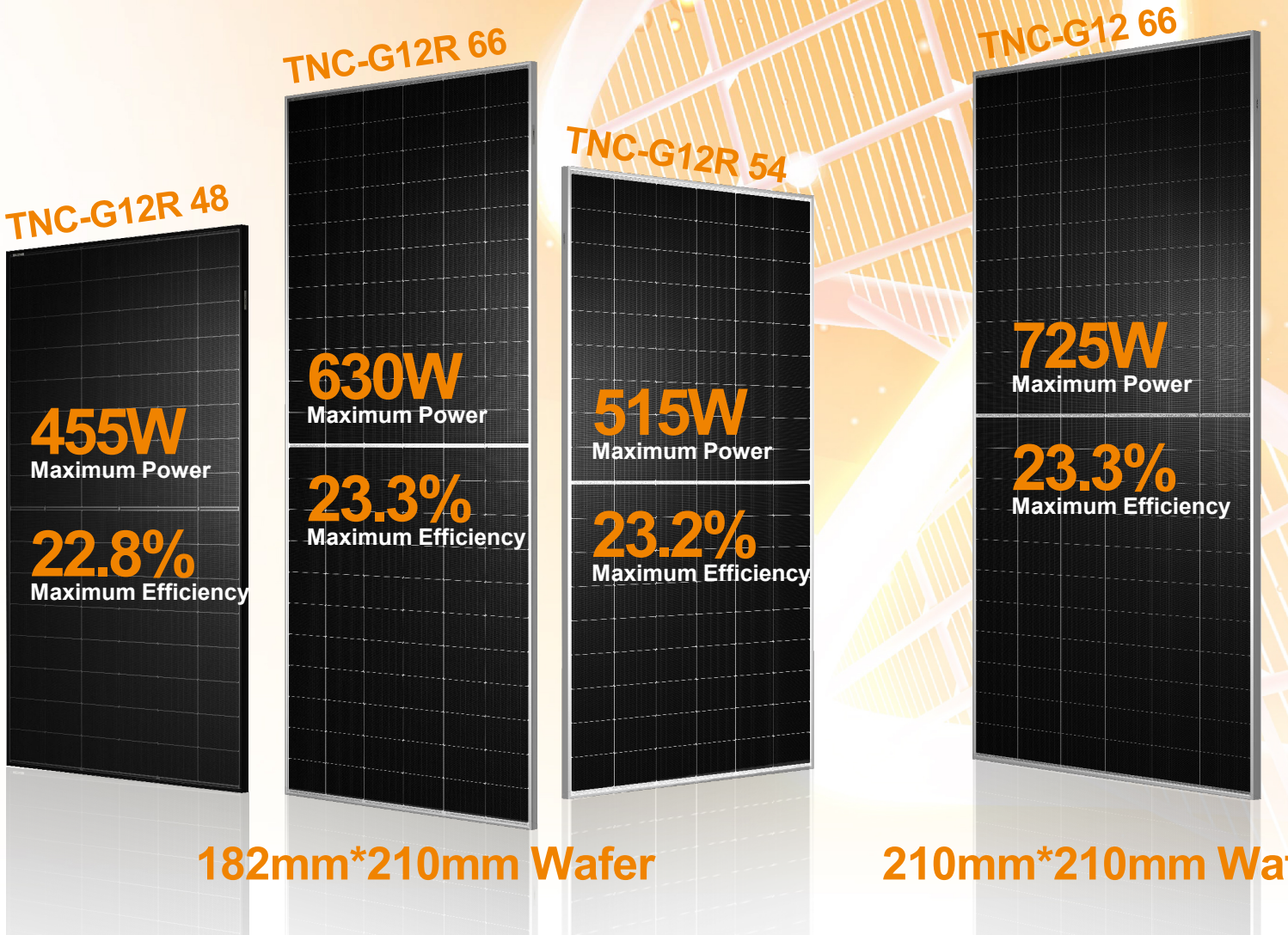
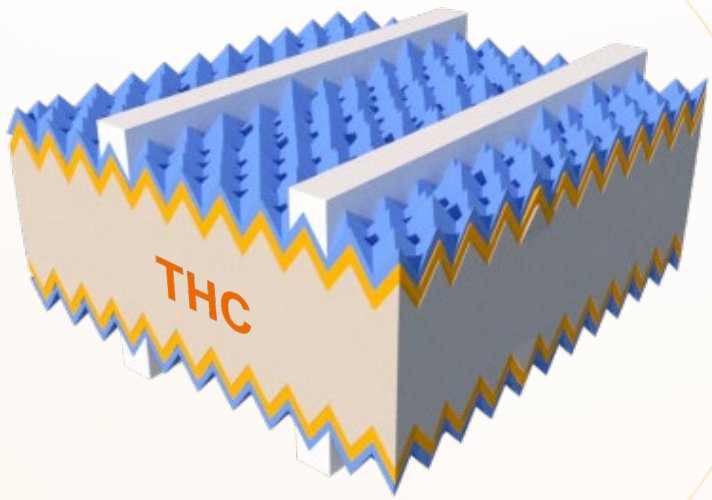
Tongwei Gene Repower



THC – Three core innovations



Bifacial nc-Si passivation

Replacing doped amorphous silicon with nc-Si passivation layers at both sides achieved an efficiency improvement of about 1% due to higher light transmittance, lower defects and higher conductivity.

Copper interconnection

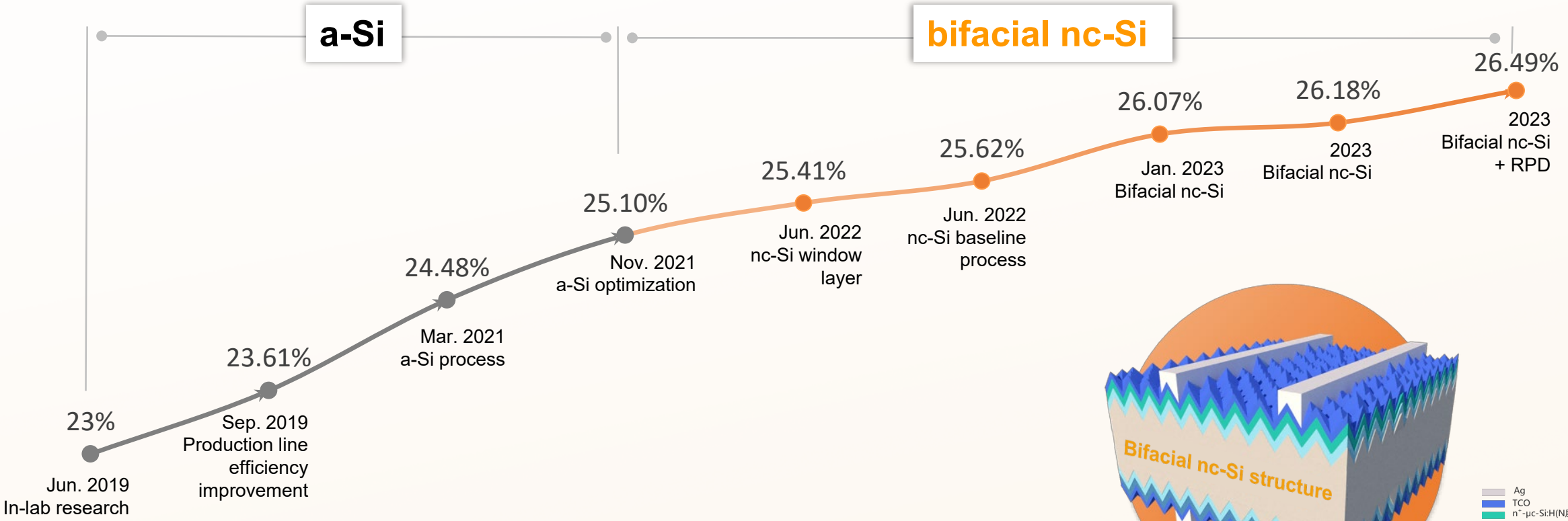
Lower costs and an efficiency enhancement of more than 0.2%, compared to screen printing.

0BB module

Reduced microcrack induced power loss.
Reduced internal cell consumption loss.
Improved aesthetics.

nc-Si window layer with superior transparency and carrier selectivity

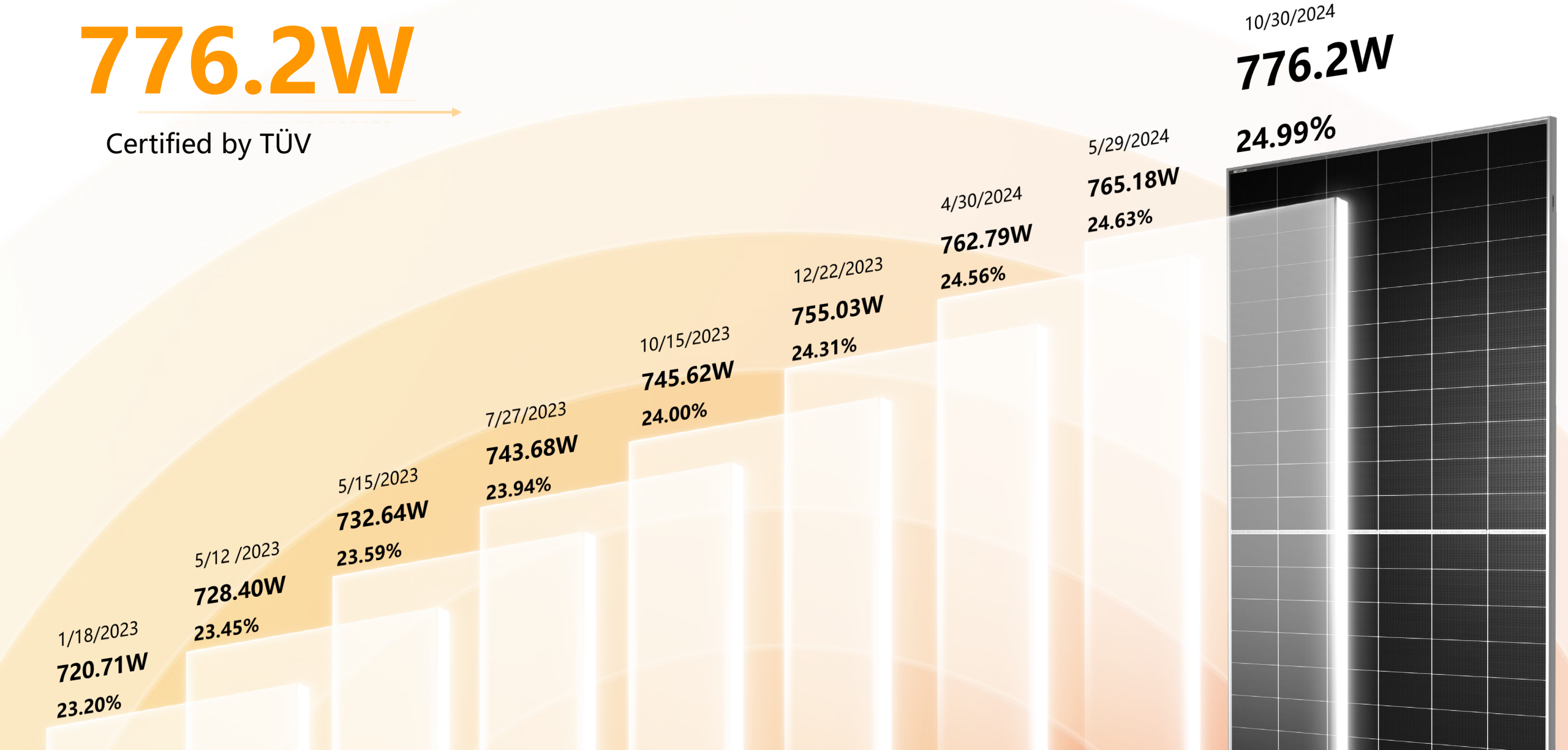
- Tongwei began develop HJT technology in 2018, building its first GW-level HJT production line in China in 2021.
- Tongwei pioneered the introduction of bifacial nc-Si into HJT.
- By Q1 2023, HJT champion efficiency reached **26.49%** (aperture area).



Tongwei THC - Power of Tongwei 210 THC bifacial module reaches

776.2W

Certified by TÜV



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光伏改变世界

Tongwei PV R&D Center