

'22

PORTUGAL
RENEWABLE

ENERGY

SUMMIT



Assessing the Benefits of TOPCon Technology

Summary of Key Operating Figures

+100 GW

World's first module company to achieve shipment milestone of

(As of the first quarter of 2022)



- The leading supplier in the global PV market
- Significant R&D achievements and technical know-how
- Integrating industrial resources and promoting development of the industry
- Strong commitment on N-type technology
- Integrated production capacity and cost reduction optimization
- Listed on the Science and Technology Innovation Board

No.1 Shipment for 4 Consecutive Years

100G+

Delivered,
31st of March 2022

60GW

Module Capacity
by end of 2022

35-40GW

Expected annual total
shipments

>10GW

in 2022
of N-type shipments

19

World Records

14.3%

Market Share

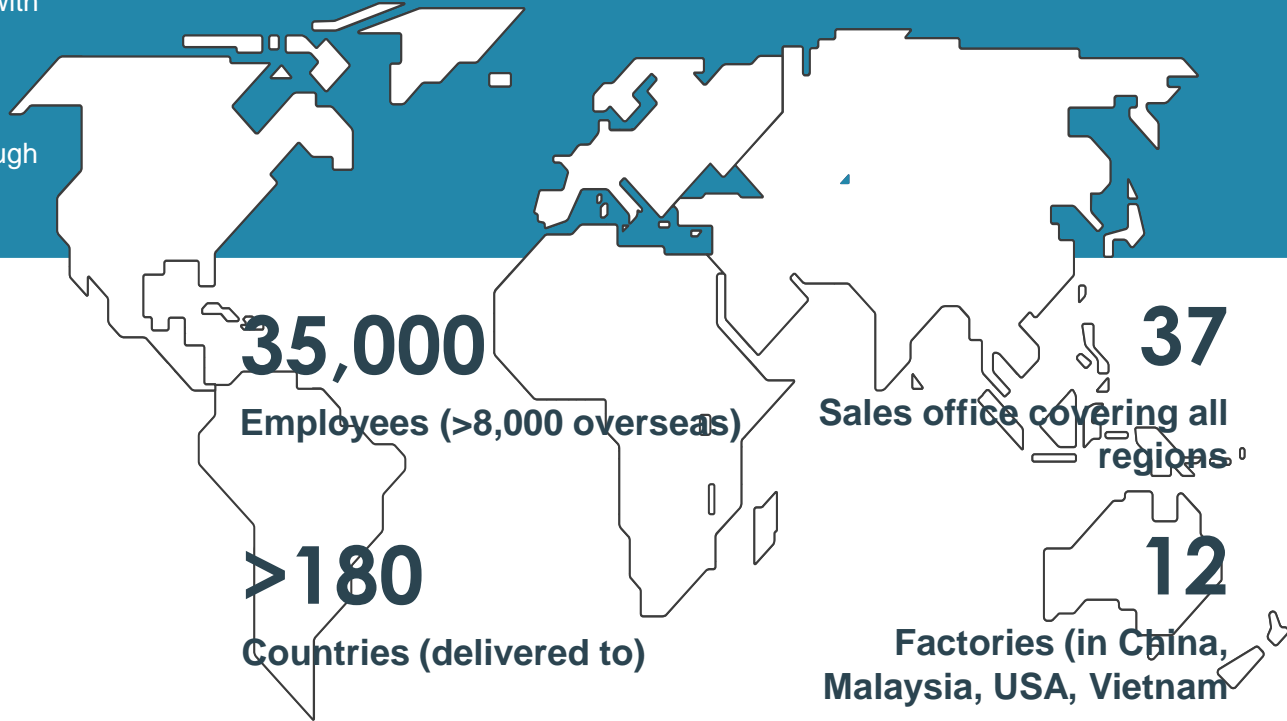
DG Shipments to reach

35%~40%

in 2022

Clear Company Concepts

- Sharpen our businesses focus in solar PV, and solar+ solutions
- Global presence to get closer to our customers and markets
- Grow our company value
- Foster an intimate and trusting partnership with our customers
- Unleash the full potential of our people
- Ignite pride and passion for Jinkosolar, through a new mindset and equity ownership





Applied for
1632 Patents



968 Authorized
Patents



R&D Team
900+ Engineers
and Scientists

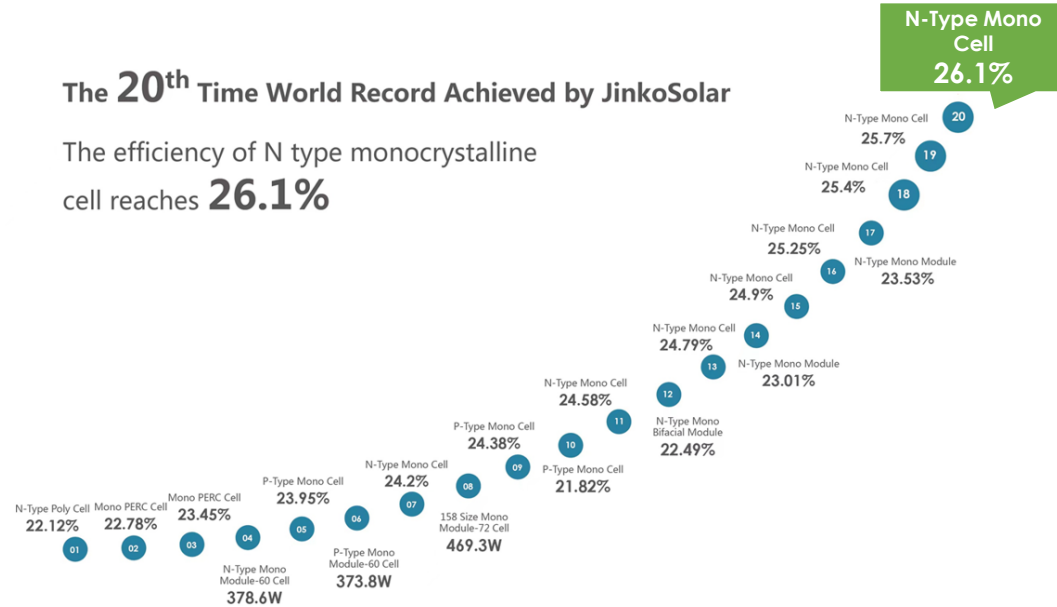


R&D Investments
1.274 Billion
(CNY)

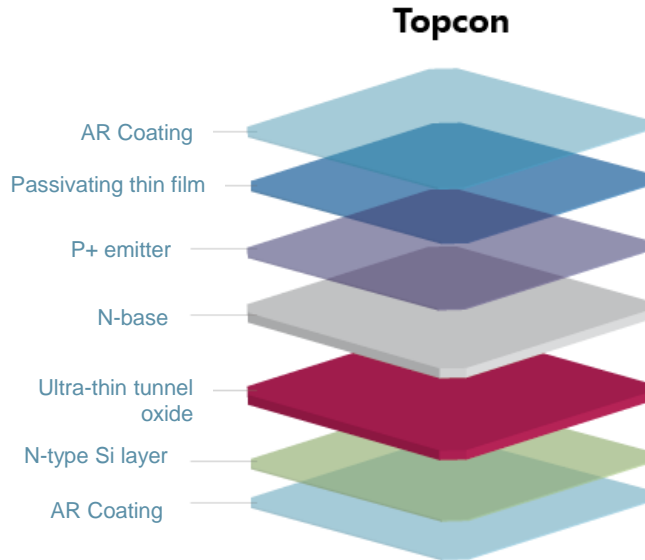
World Records

The **20th** Time World Record Achieved by JinkoSolar

The efficiency of N type monocrystalline cell reaches **26.1%**



N-type cell — JKS Technology innovation



TOPCon

HOT 2.0 Technology

Better activation rate

Less impurities

Better thickness uniformity

Better carrier conductivity

Product Advantage | Optimized Degradation

Advanced Power Warranty

N-type: 30 years vs. P-type module: 25 years.

The first year degradation is lower than 1% which means the power output could remain over 87.4% compare with the 1st year.



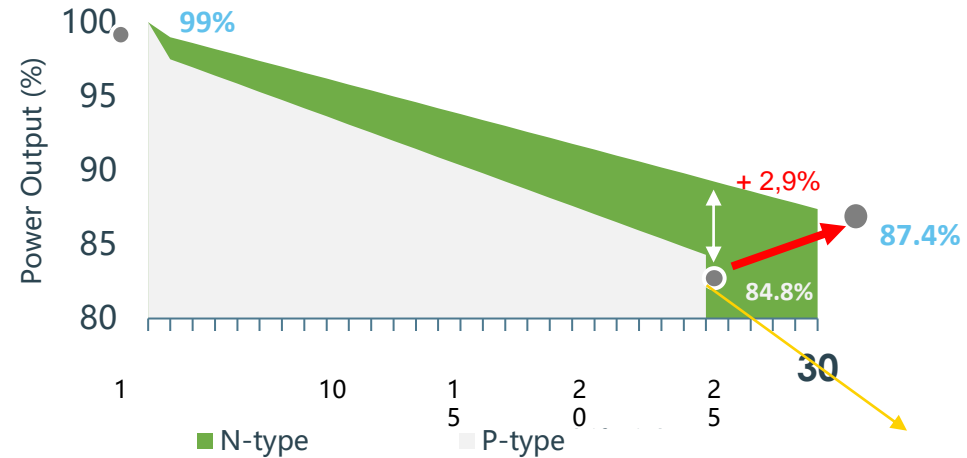
30 years Power Warranty

$\leq 1\%$

First year degradation

0.4%

Linear
degradation



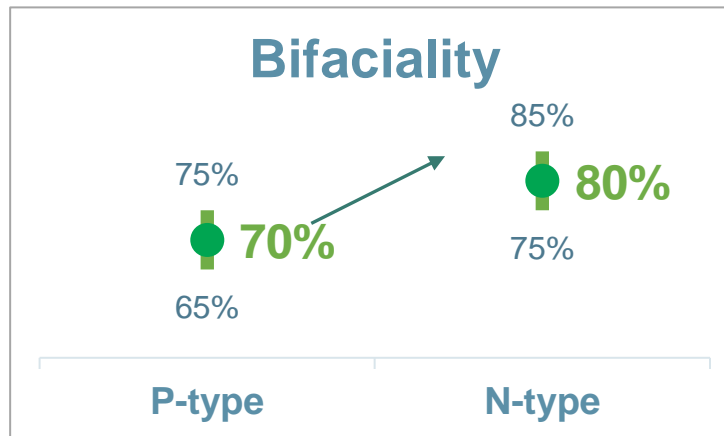
Product Advantage II

Bifaciality Factor

80%

N-type's higher bifaciality will
contribute to obtain a

Higher Bifacial gain



$$P_{\text{Integrated power}} = P_{\text{front}} * (1 + \text{BSI} * \text{Bifi})$$

*Bifi: Module bifacial factor
*BSI: Bifacial stress irradiance coefficient
(depend on real irradiance & ground reflectivity)

Power gain contrast

PERC	BSI*Bifi(70%) ≈ 9.45%
TOPCon	BSI*Bifi(80%) ≈ 10.80%
	BSI*Bifi(85%) ≈ 11.48%

Simulation results for location Haining

Product Advantage III Optimized Temperature Coefficients

-0.30%/ °C

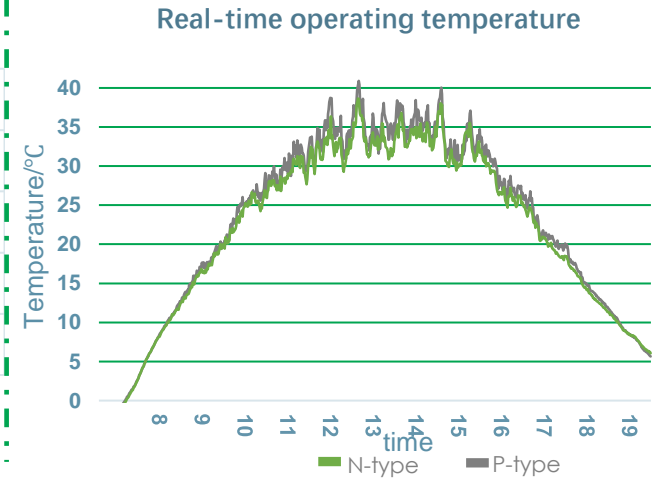
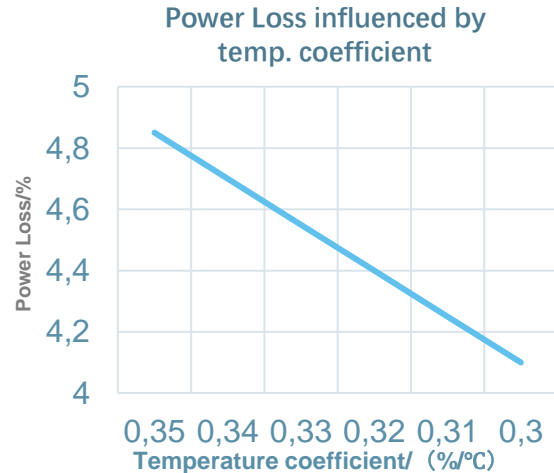


P-type -0.35%

N-type -0.30%



- Tiger Neo's power output will increase with the better **temperature coefficient** (**0.75%** higher compared with PERC)
- Under the same external environment, Tiger Neo's **operating temperature** (**1 °C lower** compared with the same specification P type)
- Under high temperature condition, the advantage will further expanded (**~2%** higher)



Location: Haining, Date: 4/12/2020

Product Advantage III Optimized Temperature Coefficients

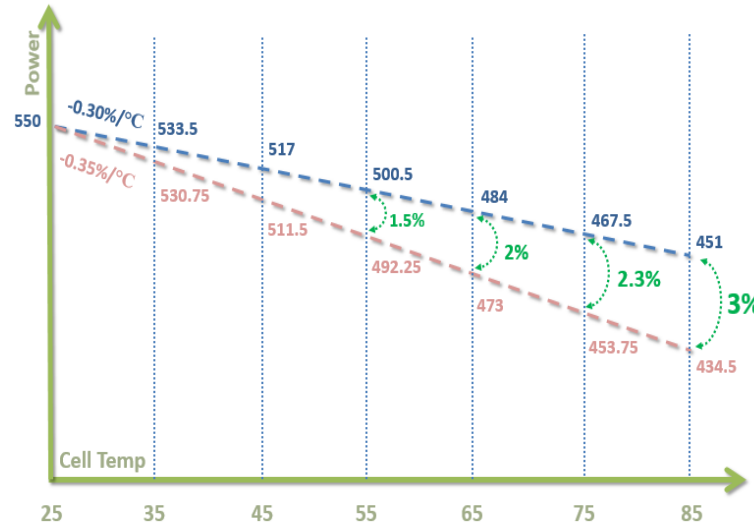
-0.30%/ °C



P-type -0.35%

N-type -0.30%

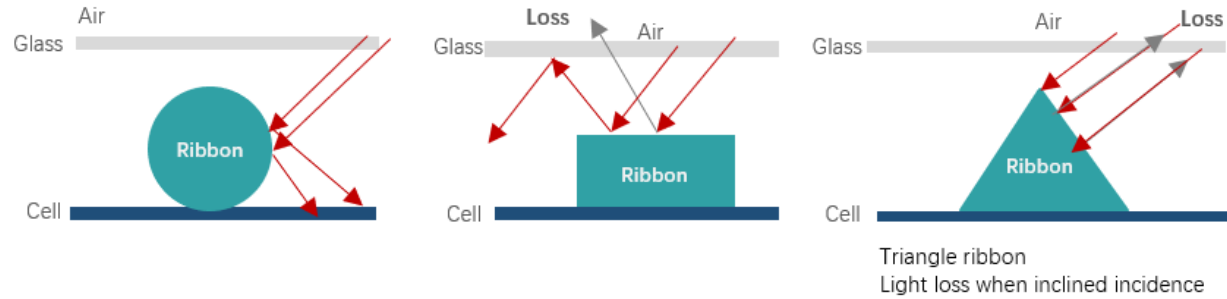
Power temp. Coefficient (%/°C)					
Poly	Mono	Mono PERC	Mono PERC HC	PERT	TOPCon
-0,40	-0,38	-0,37	-0,35	-0,32	-0,30



The power temperature coefficient has improved with every generation of PV technology, but the switch from PERC to TOPCon will further improve it by +15%.

Product Advantage VII

High-efficient use of light



Tilt irradiation	Circular ribbon	Triangular ribbon
Integrated light utilization	54.44%	43.33%

Rear Reflected light	Circular ribbon P-type	Circular ribbon N-type	Triangular ribbon
Bifaciality factor	70%	85%	67.8%

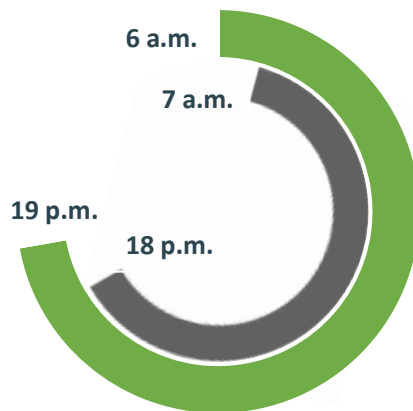
The use of circular ribbon effectively increases the total reflection of oblique light and the absorption of rear reflected light further improvement of bifacial factor

Product Advantage V

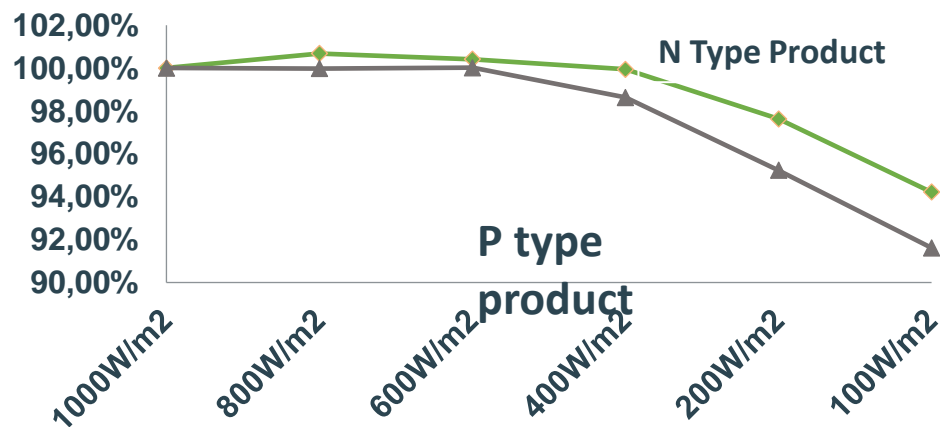
Better low light performance

N-type cell, higher internal resistance, longer minority carriers life, naturally better

low light response



- Compared with traditional PERC modules, N-type TOPCon modules have a better response to low light, extend the power generation period by about 1H in the morning and evening.
- At low light conditions, especially below $600\text{W}/\text{m}^2$, N-type show better performance than P-type.



Product Advantage

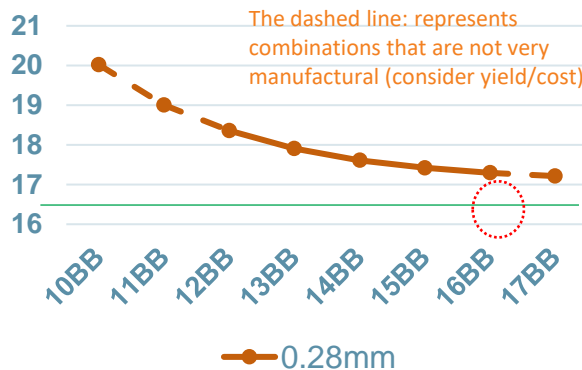
VI

Better Adaption of

Busbars

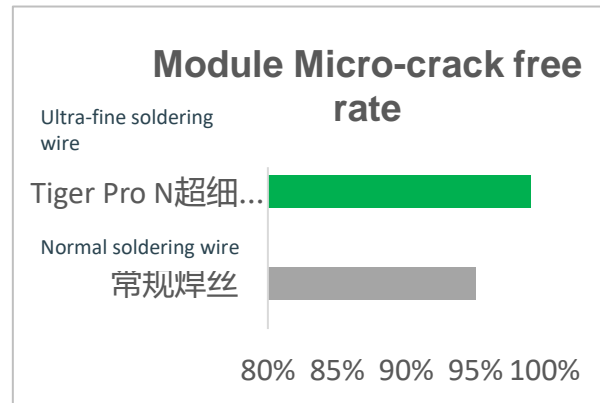


Power loss / Watt
Diameter of ribbon & Number of multi busbar & power loss



Electrical Analysis : Busbar increases by 1, internal resistance decreases by ~ 4%, corresponding power increases by 0.18%.

Optical Analysis : Busbar increases by 1, shading area increases by 0.18%, corresponding power loss ~0.11%



Ultra-fine soldering wire improves product quality, 0 hidden crack rate increases by 5%~10%.

Jinko's latest generation metallization technology, effectively improves power transport, reduces power losses and lowers the impact of micro cracks. This very effectively improves the power output of the modules

Product Advantage IV

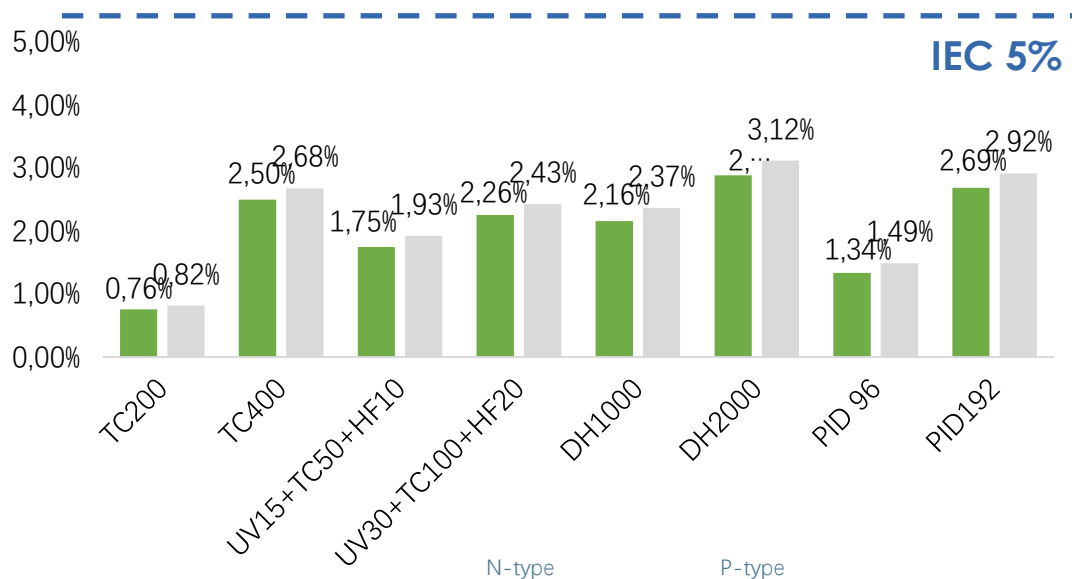
Enhanced Reliability



The N-type modules have better indicators than normal IEC standard and performs excellent during test process.



Tiger Neo Reliability Test



*Jinko R&D Data

Testing Sample: Jinko N-type mono-facial module, Jinko P-type mono-facial module

Improved Energy Generation

over 3%



1

Optimized Temperature Coefficients

The advanced N-type TOPCon technology brings better temperature coefficients from -0.35% (P-type) to -0.30% (N-type)

2

Higher Bifacial Gain

N-type modules have higher bifacial factor: 70% (P-type) up to 85% (N-type), significantly optimizing power generation capacity.

3

Lower LID / LETID

Low B content in N-type c-Si doped with P (significantly lower LETID from 0.9~1.2% (P-type) to 0.4% (N-type) and negligible LID < 0.5%)

Improved Long-term Performance & Reliability



4

Advance Power Warranty

N-type TOPCon offers 30 yrs. warranty compared to 25 yrs. of p-type. Besides of a 1st year degradation of only 1% and annual 0.4% only.

5

Enhanced Reliability

N-type modules have better reliability indicators than the requirement of the IEC standards and show improved results than p-type.

Tiger Neo Series — Different Scenarios



Utility

Tiger Neo 78P

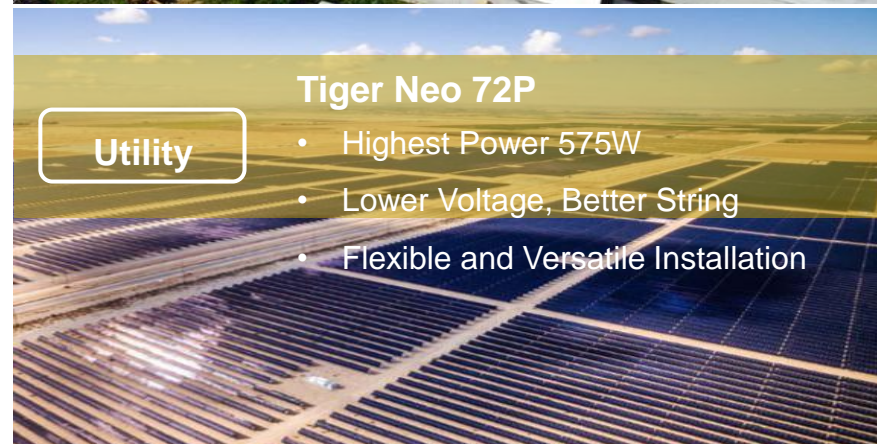
- Highest Power 620W
- Lowest LCOE



Tiger Neo 60P/54P

Distributed Grid

- Highest Power 475W/425W
- Smaller size is best for commercial & industrial rooftop



Utility

Tiger Neo 72P

- Highest Power 575W
- Lower Voltage, Better String
- Flexible and Versatile Installation



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Thank you!

