

LONGi Solar Product Roadmap

LONGi, the worlds leading supplier of solar products and solutions.

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LONGi

SH601012

The company was founded in 2000. Over the years, LONGi has led the photovoltaic industry to new heights in product innovation and LCOE optimization with its breakthrough monocrystalline technology. LONGi is recognized as the most valuable solar company in the industry and currently has the largest market value globally. Innovation and sustainable development are the two core concepts of LONGi's business philosophy.







Life-Cycle Reliability

The long-term management philosophy, leading financial health, and product quality are the guarantees for LONGi to continue providing high-quality solutions and services

Revenue
$20.2B 2022

Net profit
$2.32B 2022

Best ESG in the industry
Forbes China ESG 50

Solar for Solar
Baoshan zero-carbon factory

2016~2022
TÜV Rheinland AQM

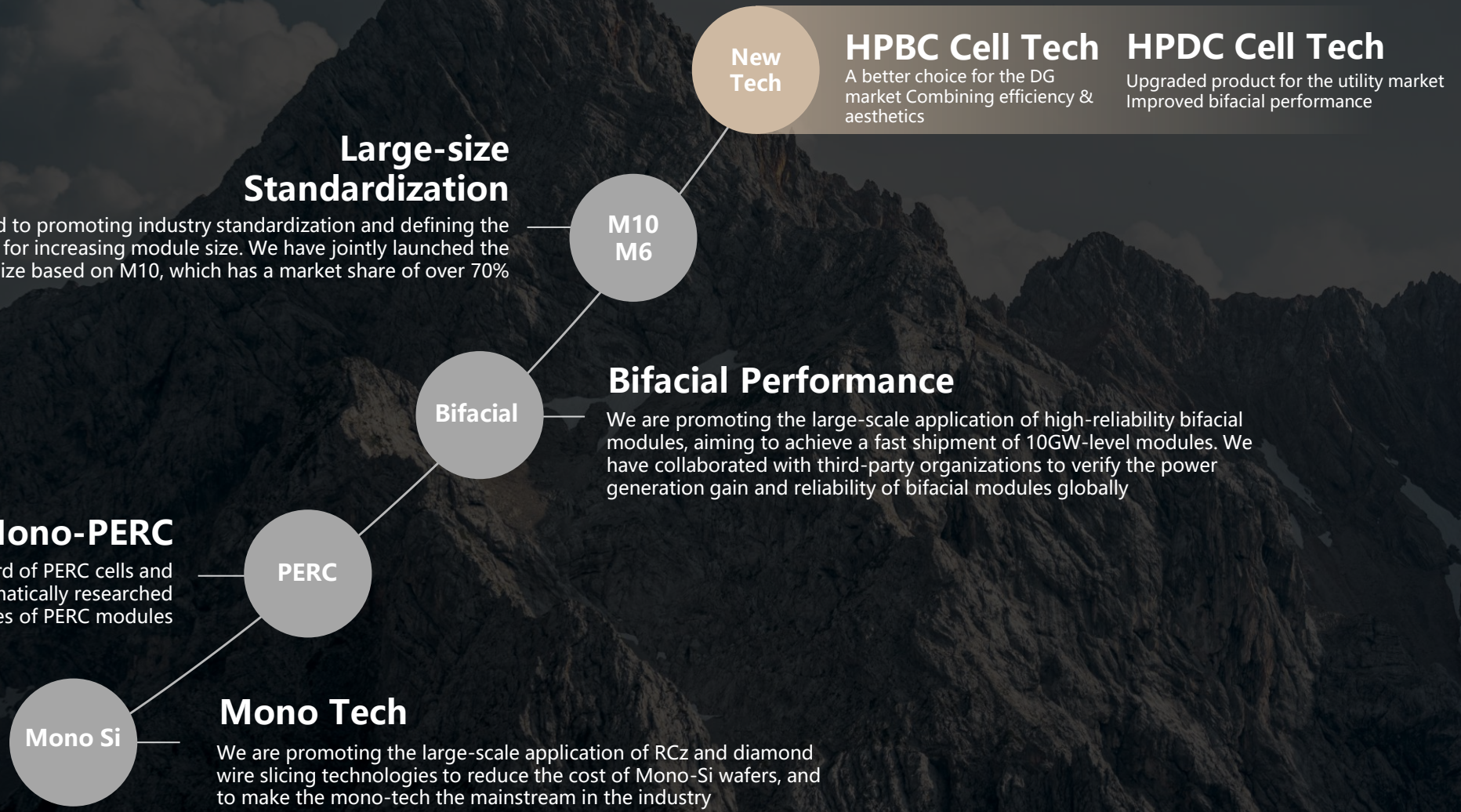
RETC Report 2019-2022
Highest Achievement Award

PV module tech
AAA-grade Bankability

BloombergNEF
100% Bankability

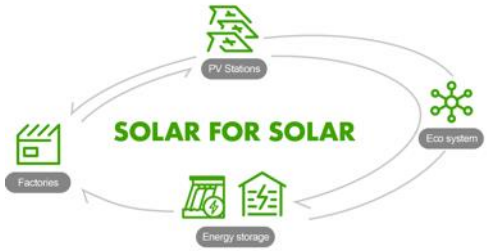
Leading Technology

Every innovation of LONGi has realized industrial value, become a benchmark in the industry, and accelerated the optimization of the industry’ s LCOE



SINCE 2018, WE HAVE RESPONDED FULLY TO ESG GOALS

With Solar for Solar, LONGi announced our commitment IN COP25



Our ESG metrics meet all key disclosures standards



The 40 Chinese companies that are included in the FORTUNE China ESG Impact List have all made outstanding efforts in improving environment, protection employees and supporting communities. They all have been exploring a growth path that is sustainable and inclusive," FORTUNE China.



LONGi pushes forward the integration of the UN 2030 Sustainable Development Goals (SDGs) with the business value chain, identifies the importance and significance of the relevant SDGs for the Company, and strives to include sustainability concepts and actions into corporate strategy and operations.



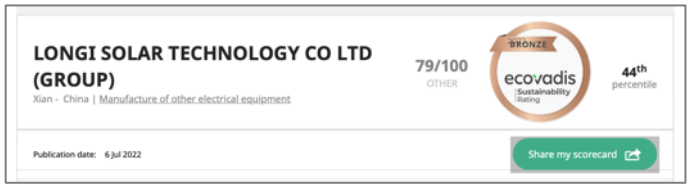
2022 Bloomberg
Green ESG Pioneers Enterprises

Fortune 2022
China ESG Impact List

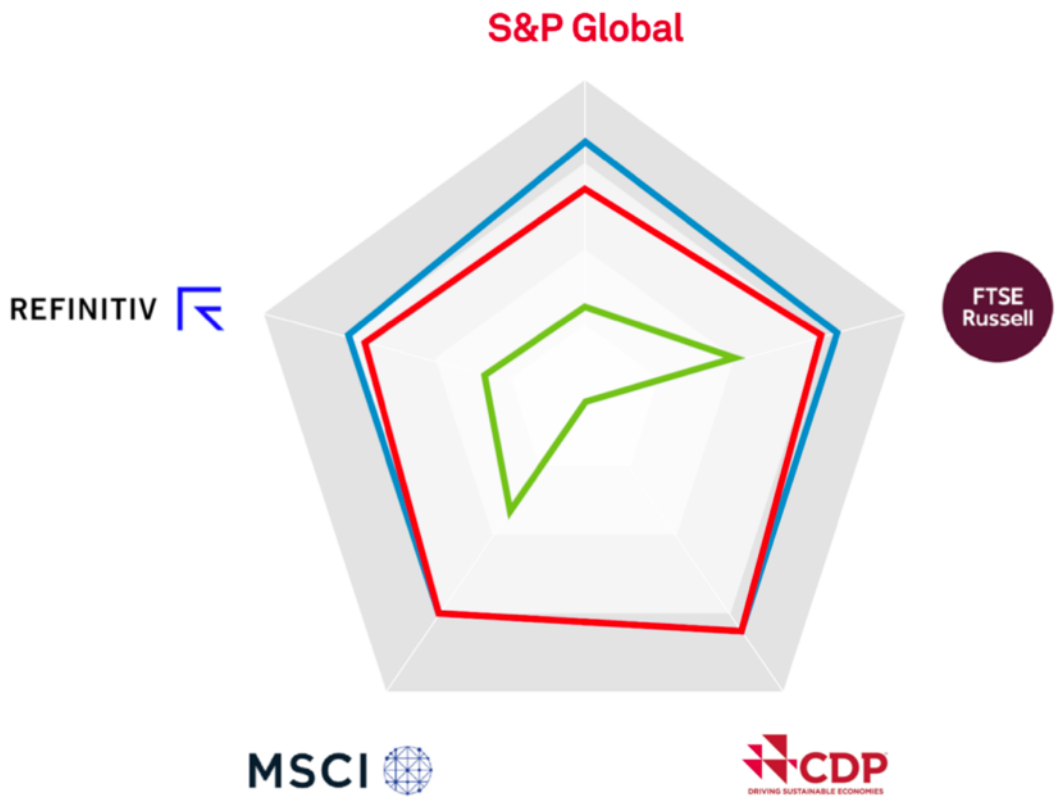
Forbes 2022
ESG 50

SETTING INDUSTRY STANDARDS IN ESG

BENCHMARKING TO BEST-IN-CLASS COMPANIES



		LONGi	INDUSTRY PEERS AVERAGE
MSCI	BBB	BBB	B-BB
REFINITIV	80	78	49-55
FTSE Russell	3.8	3.0	2.1-2.5
S&P Global	37	23	19
CDP	A-	B	-



LONGi's Zero-carbon Plant in Baoshan, Yunnan

Announced in Oct-2021 – Yunnan Baoshan to be the first zero-carbon plan by 2023, with 3 targets:

1. **100% Green Electricity for production and operations, to lower Scope 2 emissions**
2. **Investment in technology for natural gas recovery to significantly reduce Scope 1 emissions**
3. **Build green plants, deploy digital green management systems, promote energy conservation, enhance energy utilization efficiency**

Certification by BIS planned in Q4/2023



99.09%
green electricity used reached in 2022

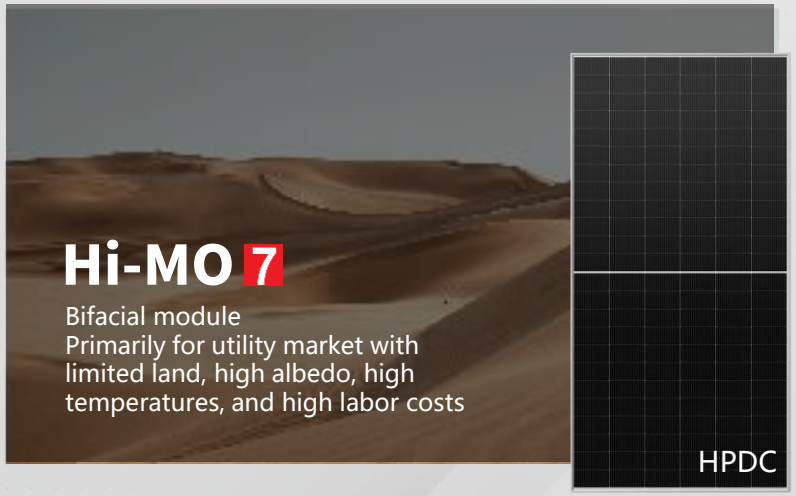


Carbon emissions of the plant are expected to fall from about 32,000 tonnes per year to 3,200 tonnes by **90%.**

LONGi Product Portfolio

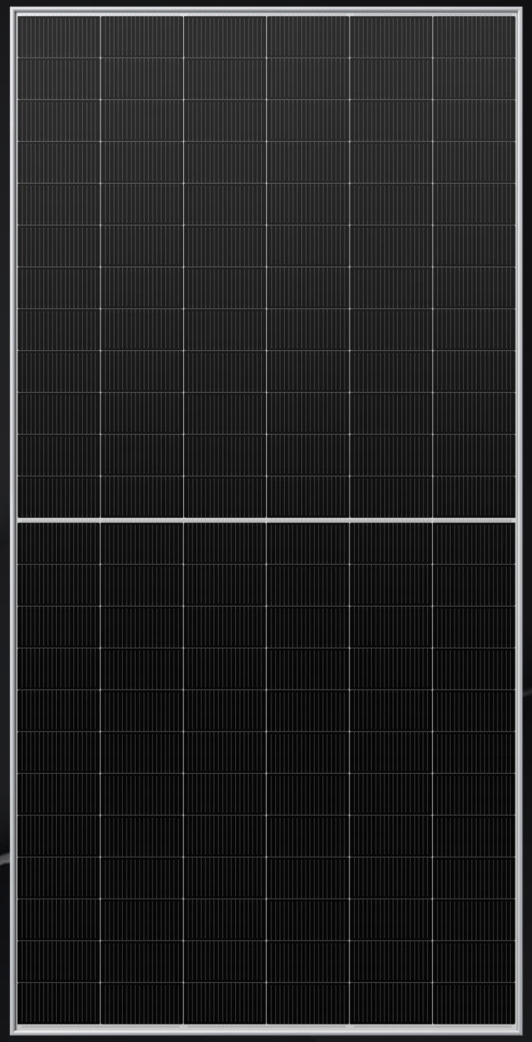






Hi-MO 7

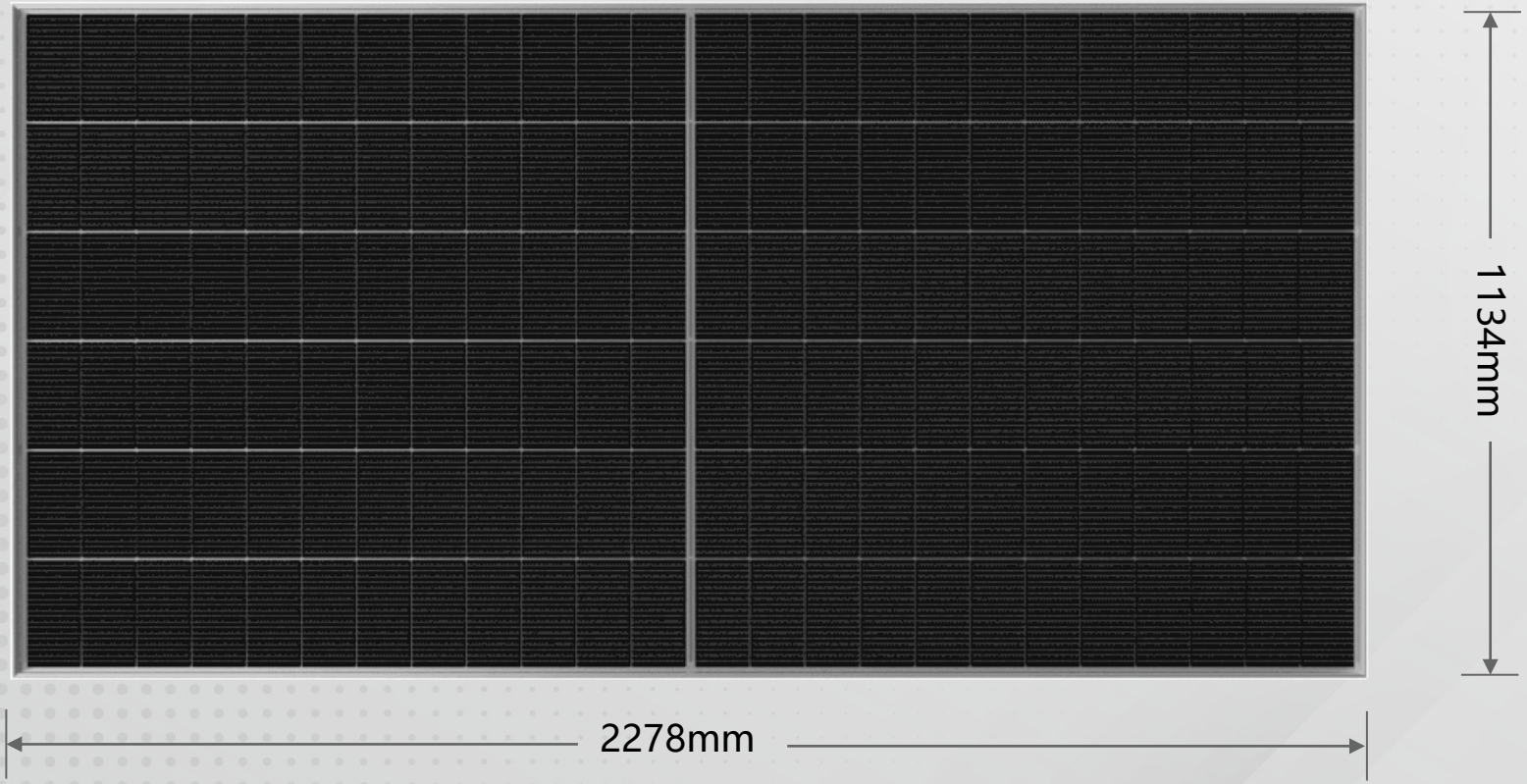
Upgraded Technologies
Reliable Choices



M10 Module with Power of 580W & Efficiency of 22.5%

Type：LR5-72HGD-580M Voc：51.4V Isc：14.2A Power temperature coefficient：-0.28% / °C Bifaciality：80±5%

31.8kg

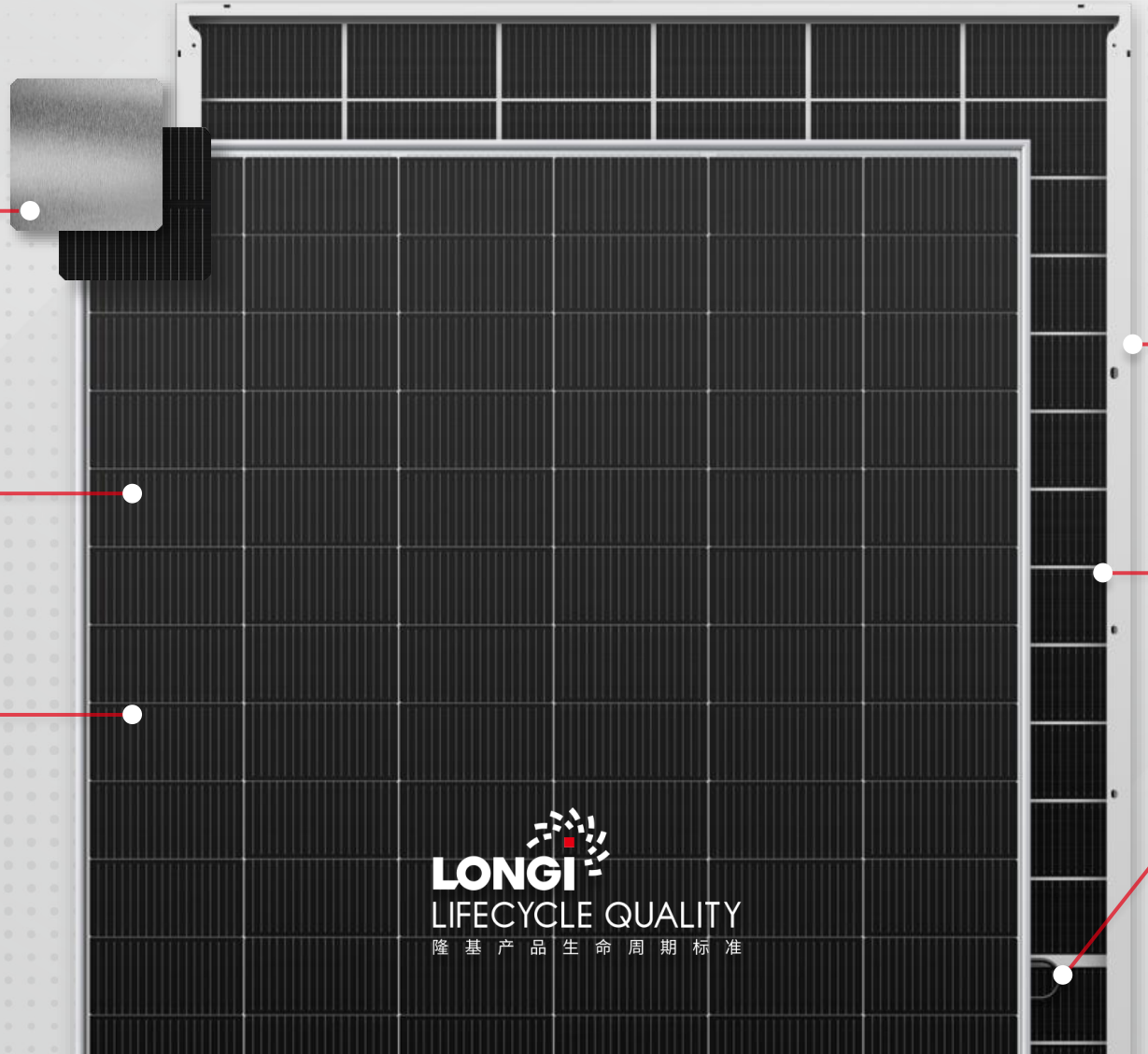


Advanced Technology Integration

High quality M10 n-type wafer

HPDC bifacial cell with high performance

High-precision SMBB interconnection technology



High-strength and weather-resistant aluminum frames Frames without C-side on the short edge

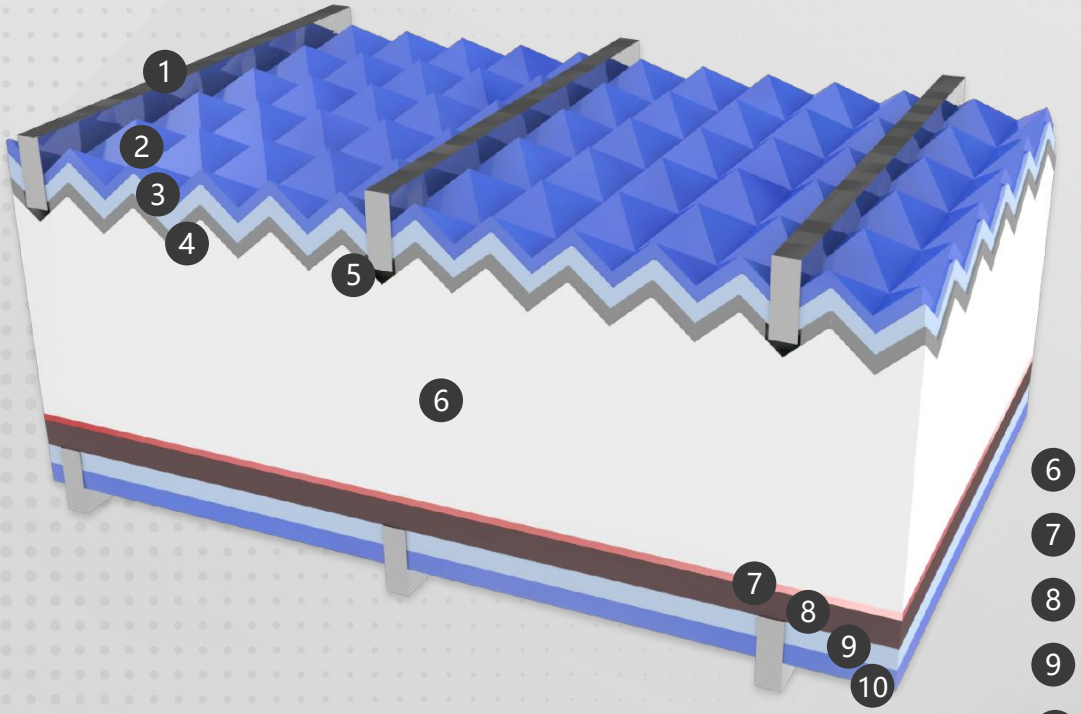
High reliability 2+2mm Dual-glass structure

High standard 25A J-Box

HPDC Cell Technology

- The acronym HPDC stands for High Performance and Hybrid Passivated Dual-Junction Cell, which is another improved iteration of the HPC cell technology.
- The backside of the cell features high and low junctions, optimized film design, and advanced deposition techniques to achieve remarkable full-area passivation with minimal parasitic absorption. On the front side, the cell is applied with a local low-resistance contact layer that enhances cell efficiency. Additionally, both the front and back sides incorporate upgraded antireflection and low-recombination films, as well as metallization solutions, for superior performance.
- In general, the upgraded HPDC cell has better conversion efficiency, power temperature coefficient, and higher reliability

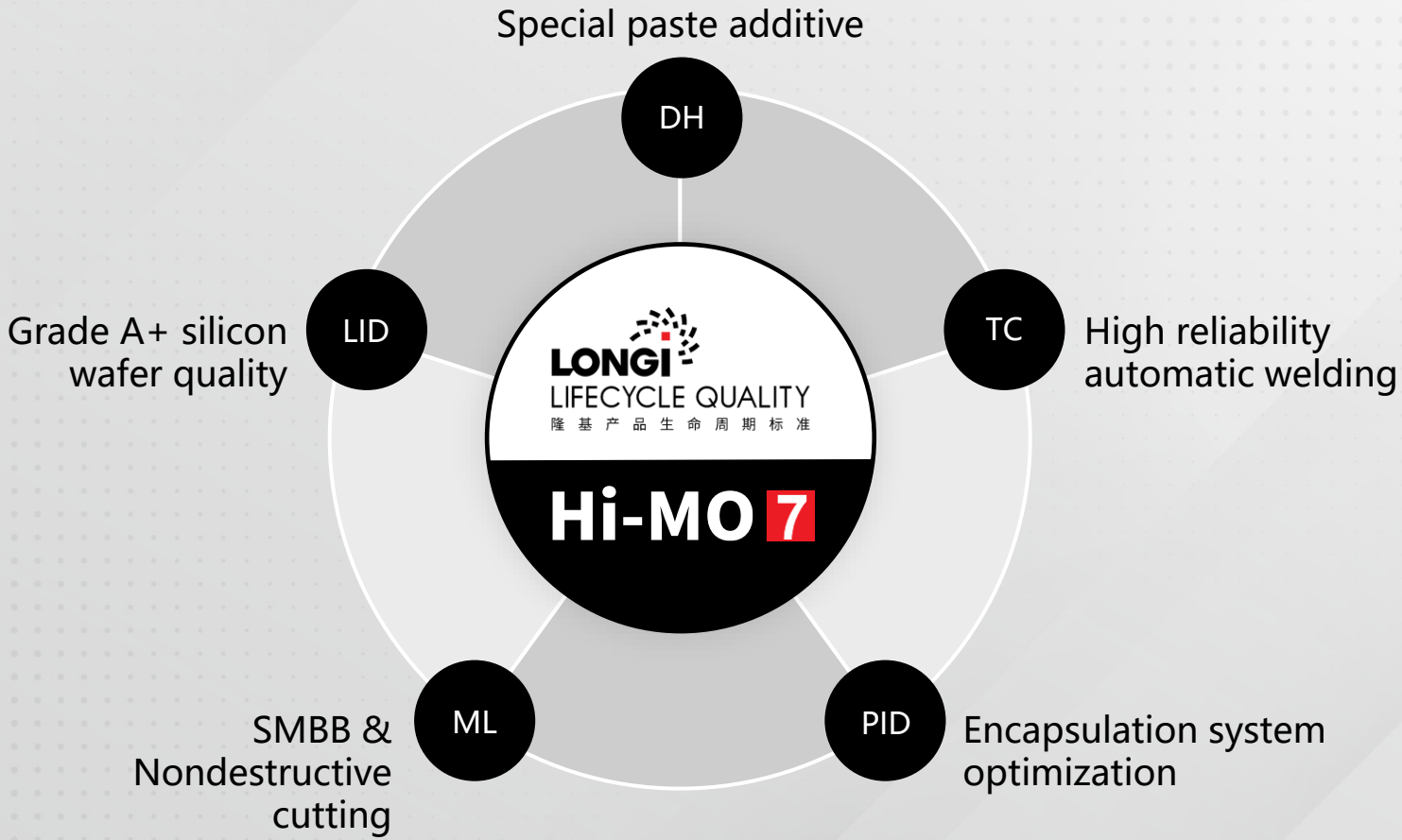
1. Low-recombination metallization solutions
2. Anti-reflection multi-layer
3. Low-recombination multi-layer
4. High resistance emitter layer
5. Low resistance contact layer



6. N-type substrate
7. Ultra-thin low combination passivation layer
8. Ultra-low recombination heterogeneous back field (n+)
9. Low-recombination multi-layer
10. Anti-reflection multi-layer

LONGi Lifecycle Quality Guarantees Long Term Reliability of Products

LONGi lifecycle quality has a deep insight into the lifecycle attributes of products and systems. Based on robustness and reliability, it aims to ensure the long-term value of customers, and implements the high reliability standard throughout the product life cycle from the dimensions of design, materials, manufacturing, demonstration, service and value-added, so as to provide customers with more robust value and benefits than expected. Hi-MO 7 ensures excellent performance of products through five-dimensional design.



Hi-MO 7 Module Reliability Enhancement– Wafer

A+ grade monocrystalline silicon wafer



- By adopting advanced wafer slicing technology to continuously reduce the damage to the wafer surface. Then it will improve the mechanical load performance



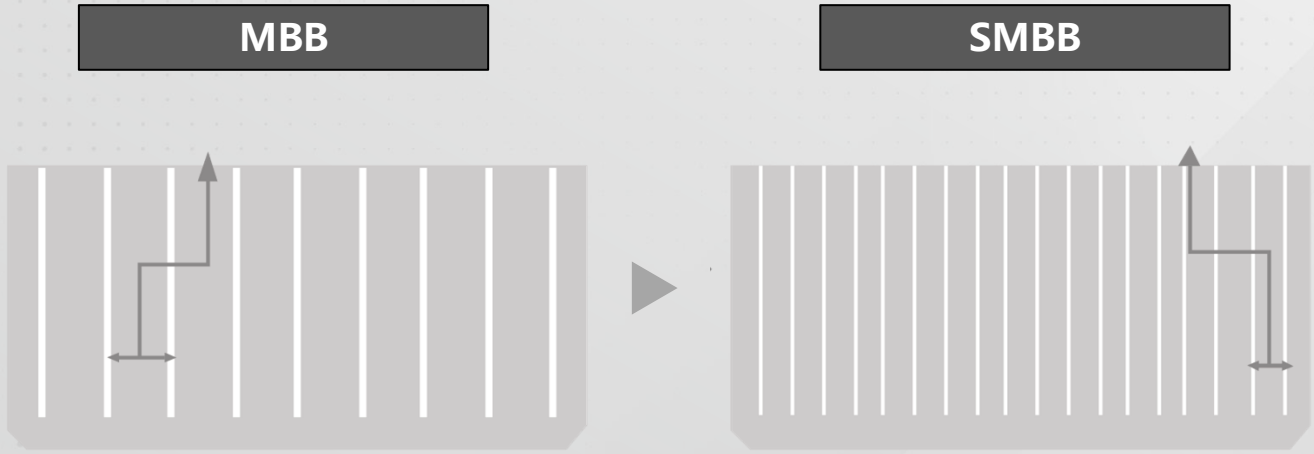
- Stable thermal field design of full crucible reduces oxygen content resulting in low LID performance

Hi-MO 7 Module Reliability Enhancement– Cell

SMBB technology improves ML/TC200 performance

SMBB technology, multi zone design, reducing the sensitivity of cell crack

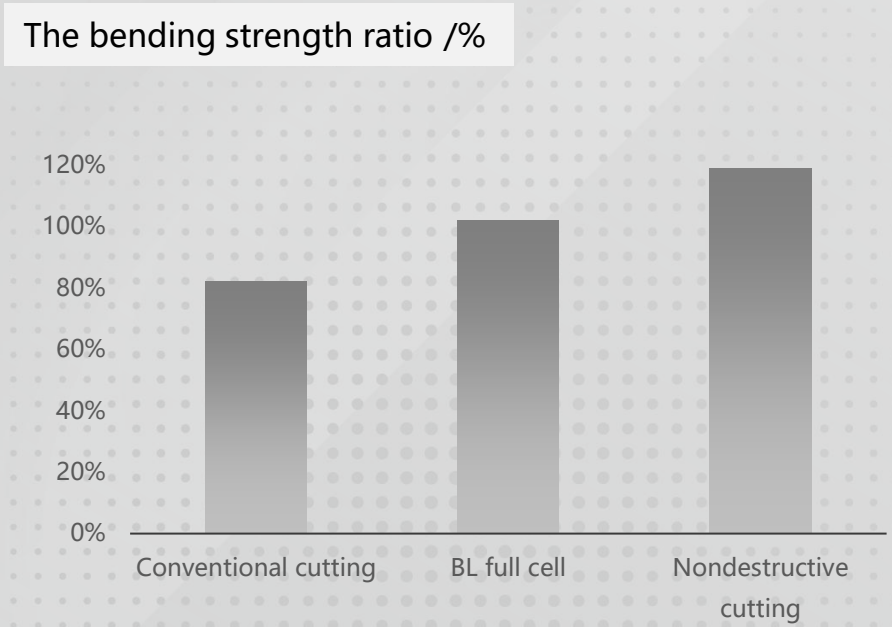
18BB grid line, 19 zones, cracked sensitivity decreased by 5.3% compared with 9BB, so as to improve the reliability of the module ML/TC200



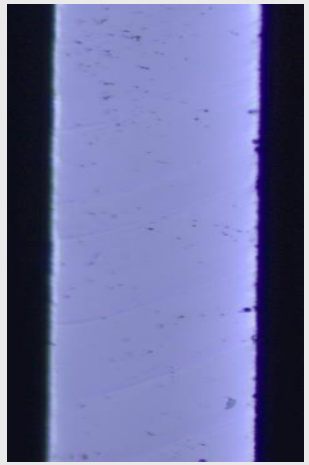
Hi-MO 7 Module Reliability Enhancement – Cell

Nondestructive cutting technology to improve ML performance

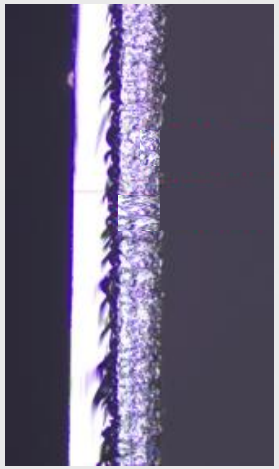
Groove depth is less than 35% of the thickness, and the bending strength ratio increases by 20%



The section is smooth, which significantly reduces micro cracks and risk



Nondestructive cutting section



Conventional cutting section

Hi-MO 7 Module Reliability Enhancement– Encapsulation

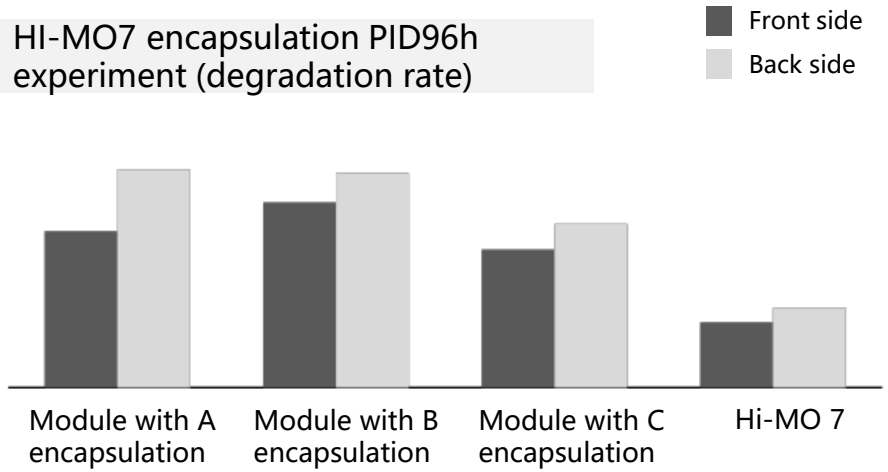
Optimization of encapsulation system to improve anti-PID performance

High gram weight encapsulation film design improves the sealing performance

- The gram weight of adhesive film increased by 5%, the UV aging resistance increased by 5%, and the PID resistance increased by 8%
- High precision vacuum lamination design reduces lamination defects

High volume resistivity encapsulation optimize the anti-PID performance

HI-MO7 encapsulation PID96h experiment (degradation rate)

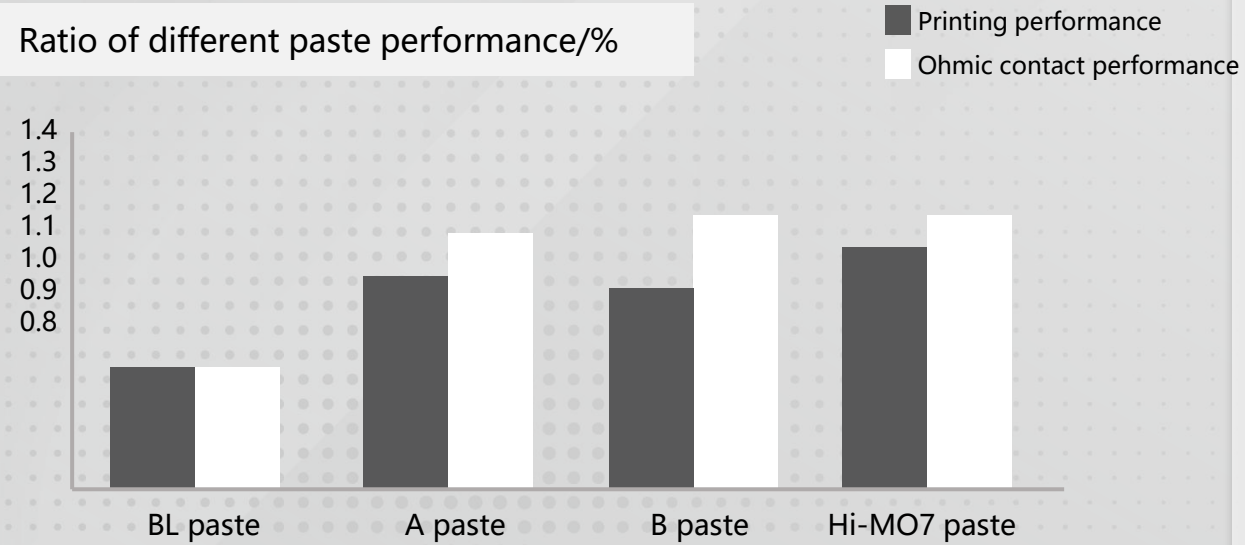


- The volume resistivity of Hi-MO 7 film increases by 20%
- DOE experimental design verification, synchronous development of four groups of parallel formulas, optimal anti PID performance formula, excellent PID96 performance

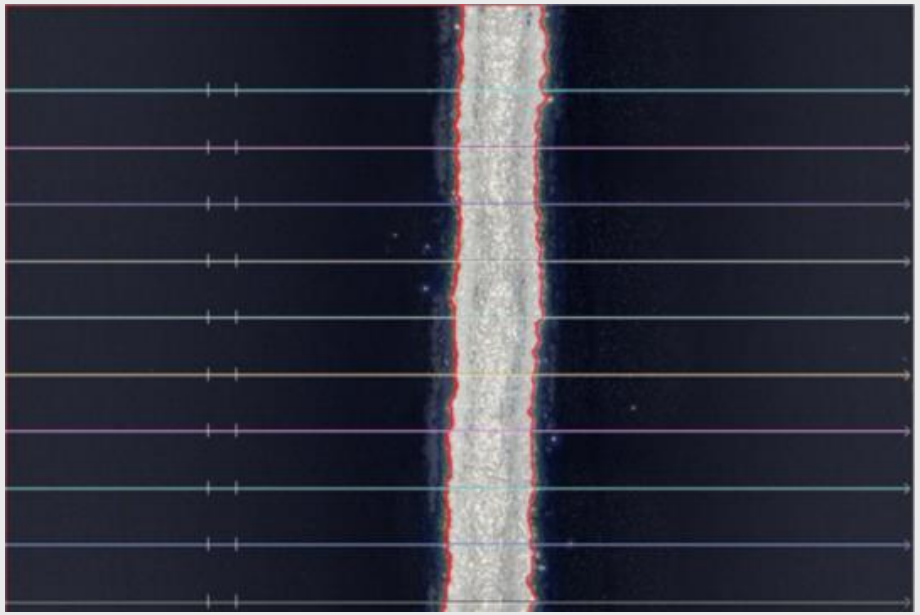
Hi-MO 7 Module Reliability Enhancement –Paste

Optimization of paste improve DH1000/ML performance of module

Improve the printing performance and ohmic contact ability of the paste



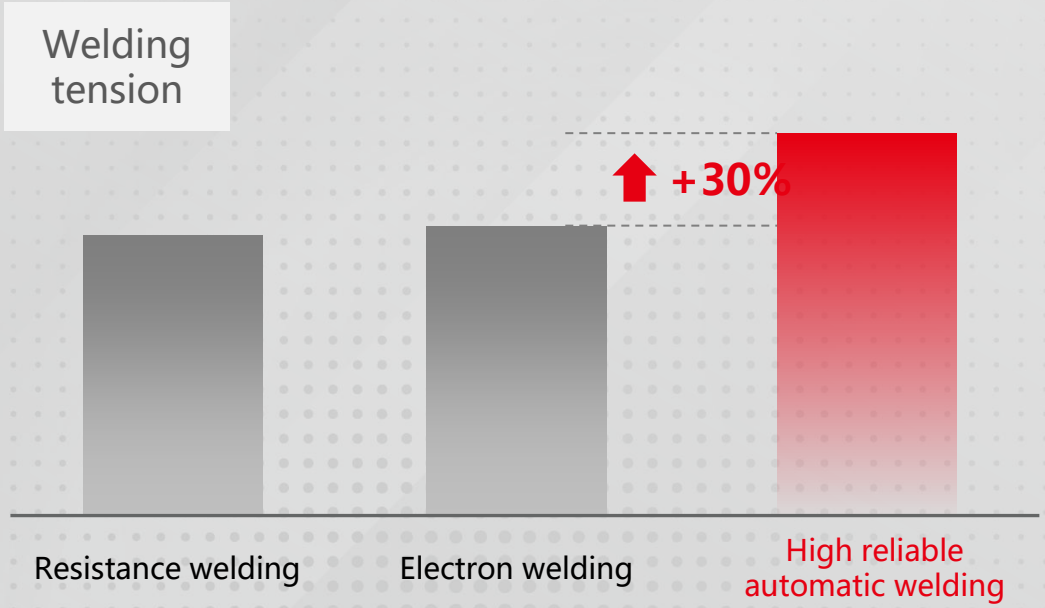
- The printing performance of Hi-MO7 paste is improved by 20%, and the ohmic contact performance is improved by 25%
- Improve DH1000 performance of module

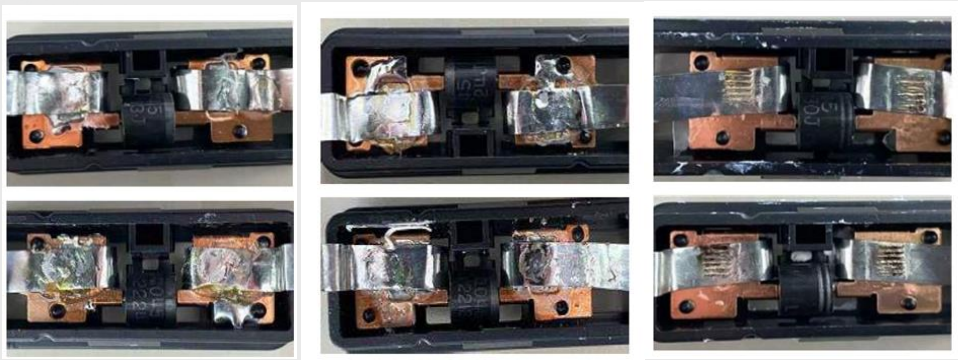


- Viscoelasticity is enhanced, paste layer is uniform, and ML performance is improved

Hi-MO 7 Module Reliability Enhancement– Welding Tech

High reliability welding technology to improve the safety performance of power plant





- Compared with conventional resistance welding and electromagnetic welding, the welding tension increases by more than 30%
- Highly reliable automatic welding full AI visual quality inspection ensures that the welding is robust. After PCT48 × 3, TC200 × 3, the welding line is clear

Hi-MO 7 Module Reliability Enhancement –DQM

Besides the MES lean manufacturing system, LONGi has also pioneered **“Digital Quality Management"** platform in PV industry.

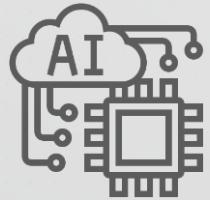
LONGi is constantly improving its digital quality management level. With the overall control of the MES lean manufacturing management system, Hi-MO 7 is equipped with a "digital quality management" platform, which realizes an upgrade in "quality" manufacturing.





AI-Inspection system (Artificial Intelligence)

LONGi has creatively applied the Artificial Intelligence technology for the quality Inspection, including almost 200 quality items will be precisely inspected by AI system. This will increase the productivity more than 25%, and highly decreased the inspection mistakes made by traditional manual operation. Besides, the AI forecasting function will early warn of the quality risk through analysis of timely collected data, and the self-learning function will keep improving the inspection accuracy and efficiency.



Precise AI-Inspection

Lay-up	Visual/EL inspection Pre-Lamination	Visual inspection after Lamination	EL inspection after Lamination	Visual inspection of J-box soldering	Final inspection Visual/EL

Hi-MO 7

Excellent Performance
Lasting Value

Hi-MO 7 Product Value



01

The power generation performance of bifacial module is significantly improved

02

The installed capacity is increased by more than 4.5%, which helps reduce the BOS and operation and maintenance costs of the power plant

03

Reliability is been improved to provide better power warranty

Higher Bifaciality

Due to the higher bifaciality of Hi-MO 7 (80%), power generation in high albedo scenarios can be increased by more than 1%.



Mainstream product

Bifaciality：~70%
Typical bifacial gain：9%

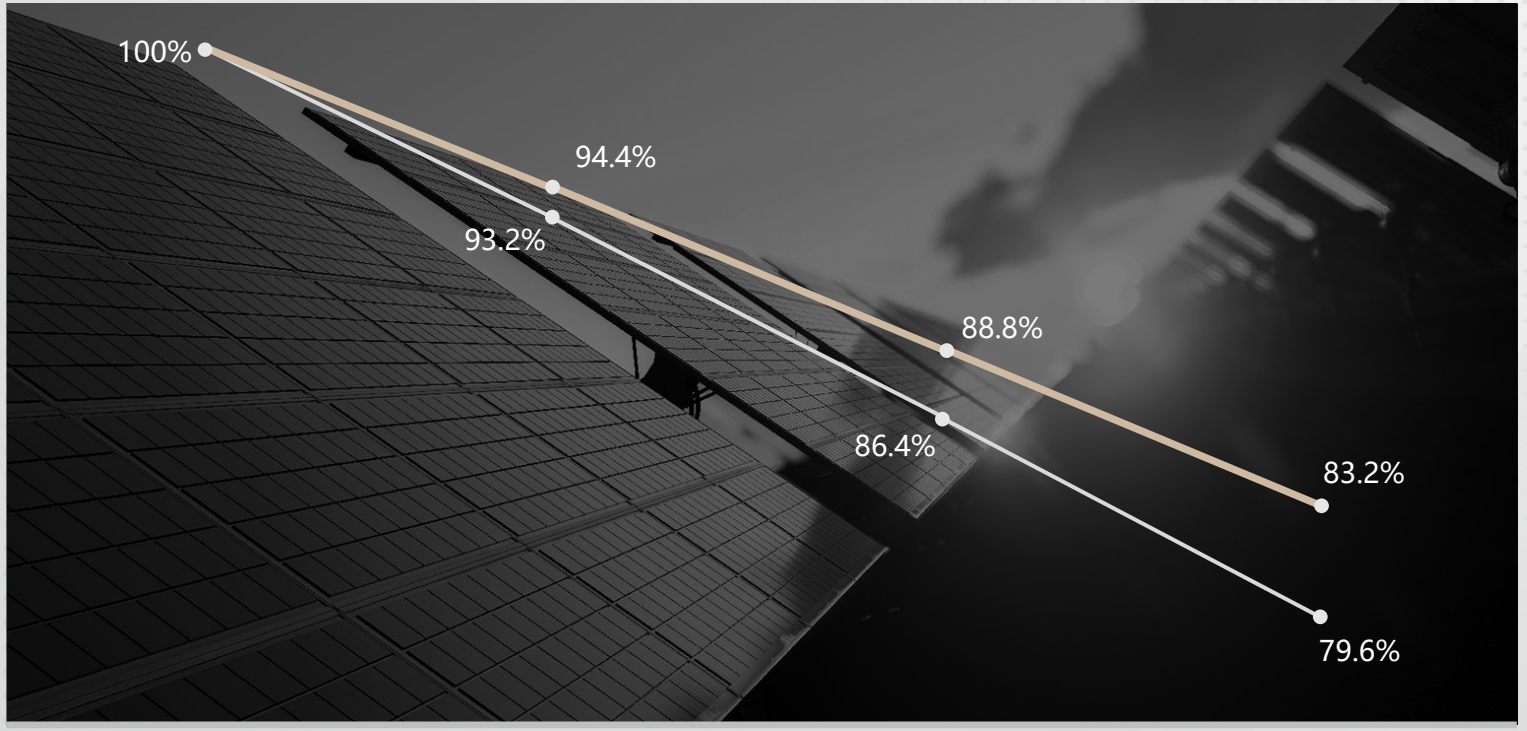
Hi-MO 7

Bifaciality：~80%
Typical bifacial gain：10%+

Better Temperature Coefficient

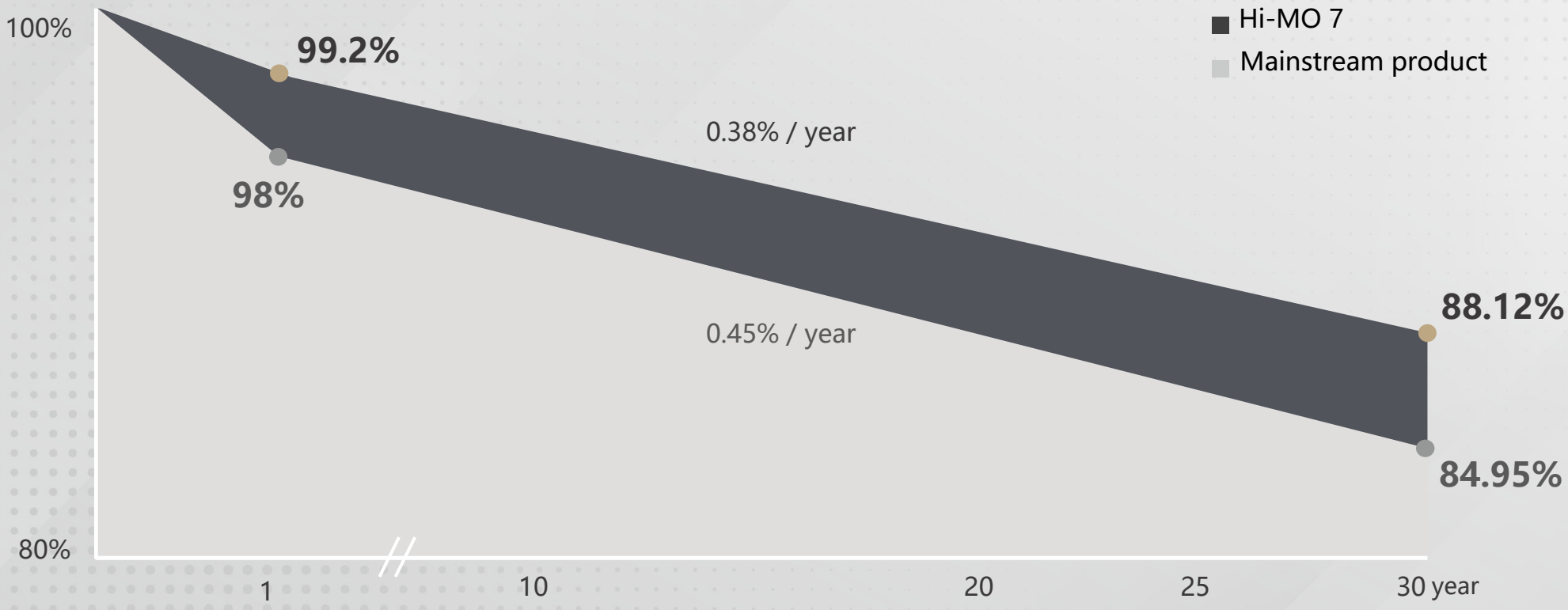
Better temperature coefficient benefits from Hi-MO 7's better passivation performance and higher Voc. It can increase power generation by more than 1% in high-temperature environments.

Mainstream product	Hi-MO 7
-0.34%/℃	-0.28%/℃



Leading Product Warranty

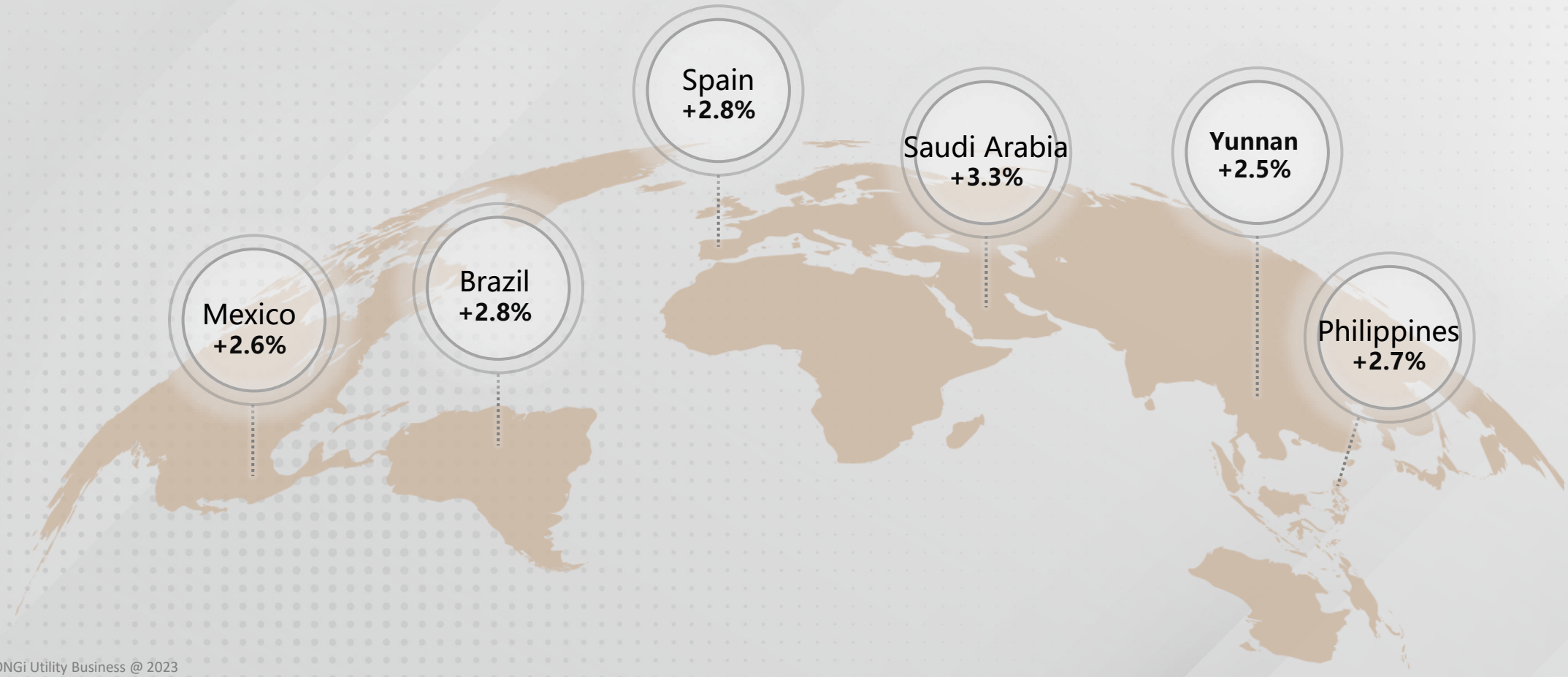
First year degradation≤ 0.8%，Linear degradation≤ 0.38%



Note: For market n-type product 1st degradation · 1%，linear degradation · 0.4%

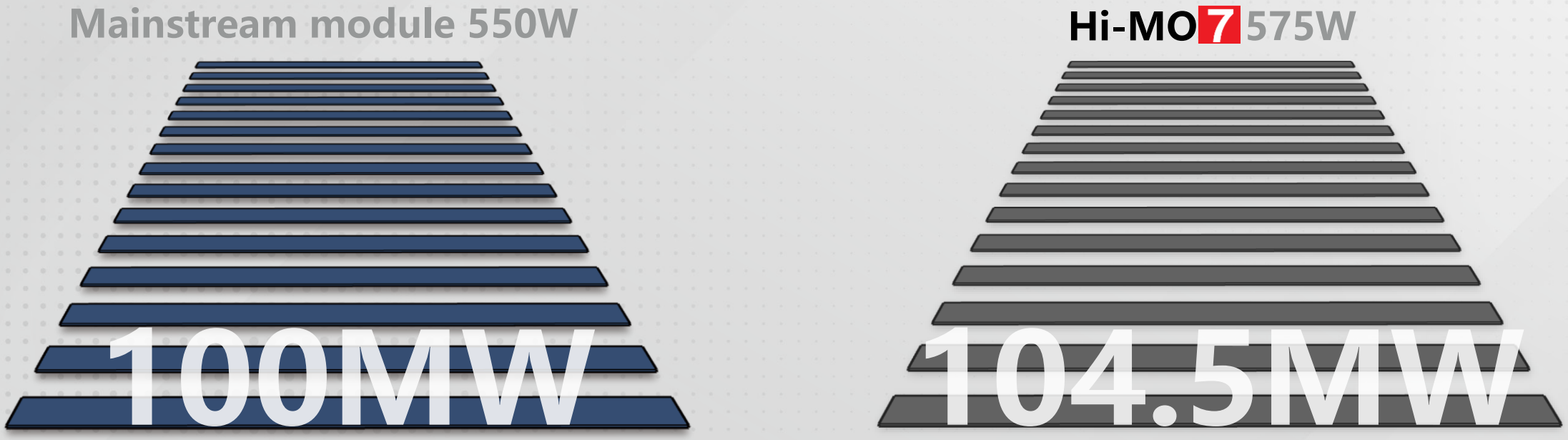
Better Power Generation-PVSYST Simulation

Simulations in typical regions worldwide (high albedo scenarios) show that **Hi-MO 7** has an average power generation gain of about 2% compared to mainstream products.



BOS Cost Saving

Compared to mainstream products, Hi-MO7 has a power increase of about 4.5%, which can increase the corresponding installation capacity and bring comprehensive savings for the rack, inverter, cable, land, and AC equipment per watt



O&M Cost Saving

The improvement in efficiency of Hi-MO 7 modules also brings savings in the operational and maintenance costs throughout the lifespan of the power station, including lower costs for module cleaning, land lease, equipment replacement, and maintenance.

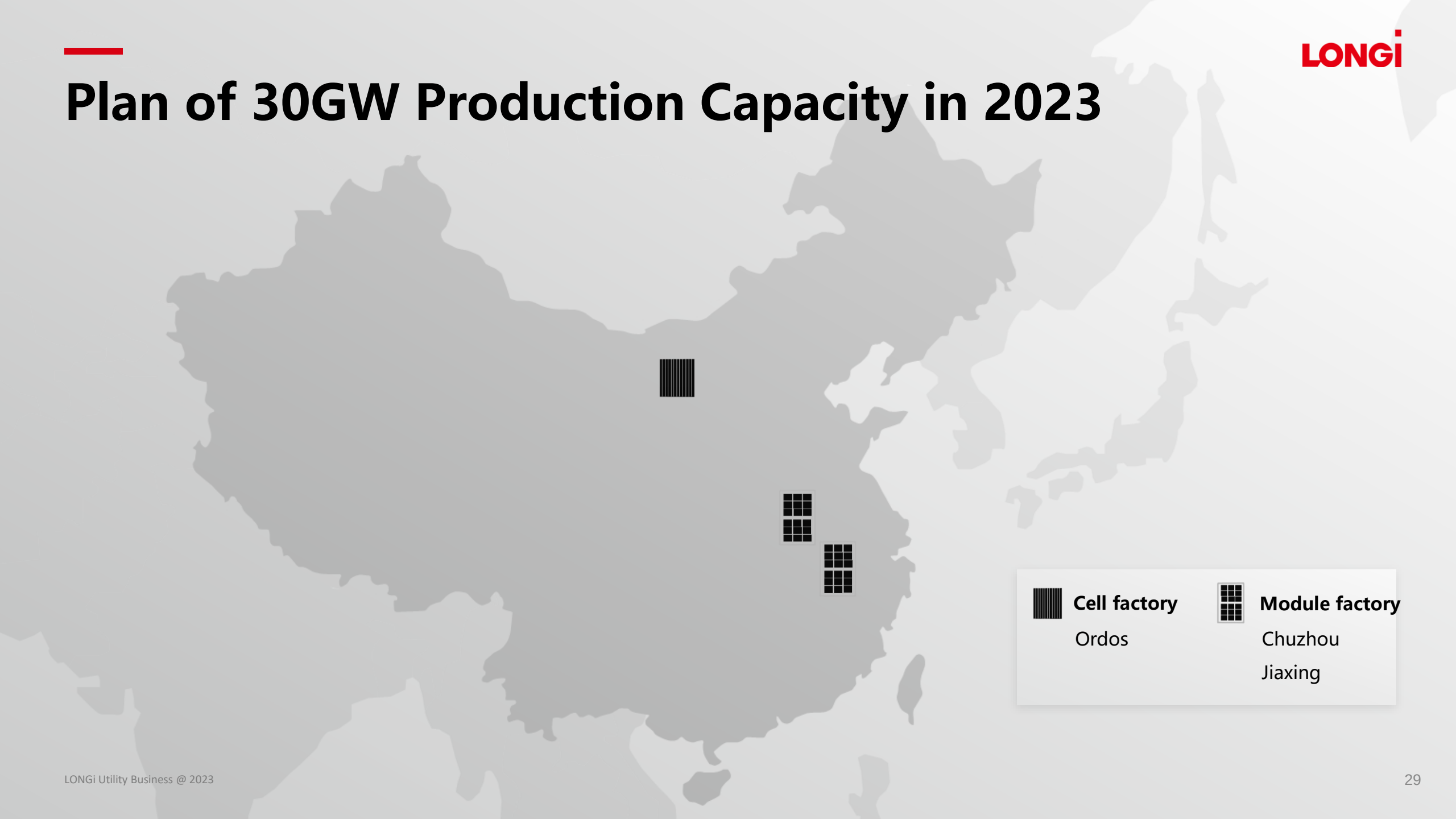


Module cleaning

Land lease

Equipment maintenance

Plan of 30GW Production Capacity in 2023



2023 Business outlook



Year-end Production Capacity (GW)

Shipments (GW)

Revenue (RMB Billion)

Based on advanced manufacturing, the company will strengthen its competitiveness by industry-leading technology and quality, and will improve the service further to provide global customers with the most reliable products and solutions.

www.longi.com

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LONGi Utility Business @ 2023