



LONGI

# Hi-MO X10

Peak of Crystalline Silicon  
First Choice for Value

HPBC  
2.0

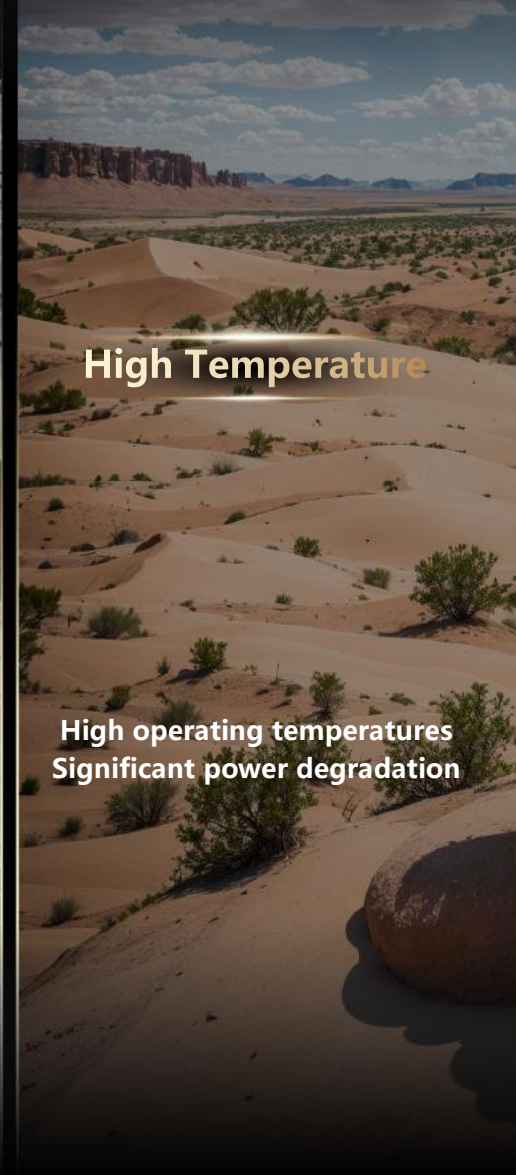
TaiRay

# Challenges in Harsh Environments Threatening Long-term **Stable Operation** of Power Stations



## Dust Accumulation

Dust accumulation on glass surfaces  
Sudden drop in power generation



## High Temperature

High operating temperatures  
Significant power degradation



## High UV

Damage to passivation layers  
Significant power loss



## High Temperature Difference

Aging of encapsulation materials  
Induced safety risks



## High Corrosion

Damage to glass backsheets  
Impaired power generation function

# Challenges throughout the product lifecycle

## Testing the Reliable Operation of Power Stations

### Factory-fresh



### During transit



### Rough unloading



### Trampled installation



### Long-term durability



# Shading and Hot Spots Threaten the Safe Operation of Power Stations

▲ Roof equipment shading

▲ Surrounding object shading

▲ Dust and scale shading

Shading causes localized overheating

87.0 °C

80.4 °C

90.8 °C

Module damage brings power loss

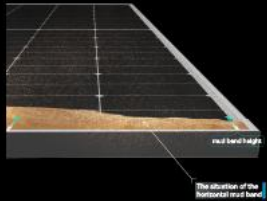
Module self-ignition brings threats to property and personal safety

# Hi-MO X10

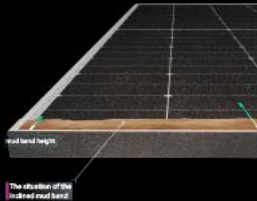
## Power Station for 30 Years of Safe, Reliable and Stable Operation

### Anti-Dust

Conventional Module



Anti-Dust Module

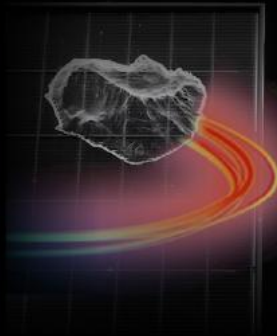


Dust accumulation causing power loss & cleaning costs

Anti-dust reducing power loss & cleaning costs

### Anti-Shading

TOPCon



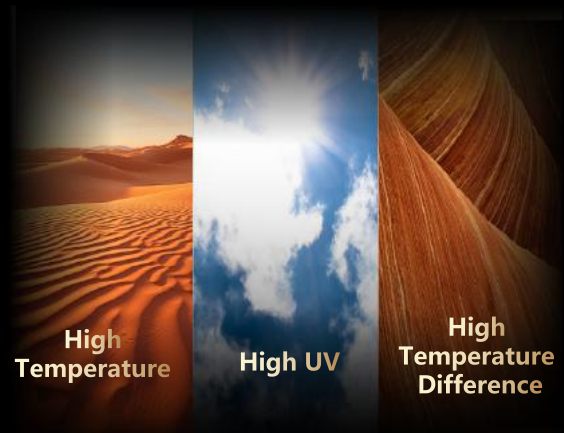
current struggles to pass through shaded areas, causing power loss and localized overheating

Hi-MO X10



current can effectively bypass shaded areas, reducing power loss and localized overheating

### Lower Degradation



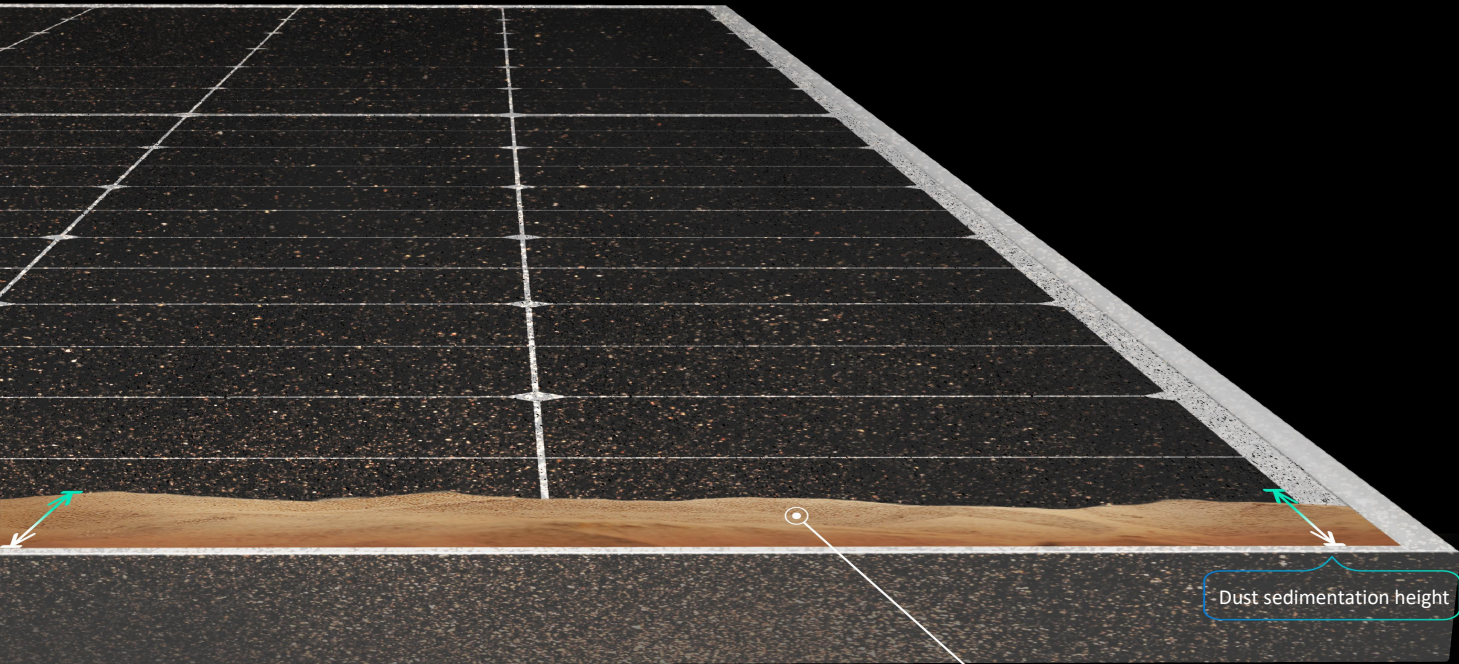
Better temperature coefficient  
Better UV, TC test results  
Lower degradation

### Impact Resistance



High thickness TaiRay wafer + One-line welding  
Better impact resistance than TOPCon

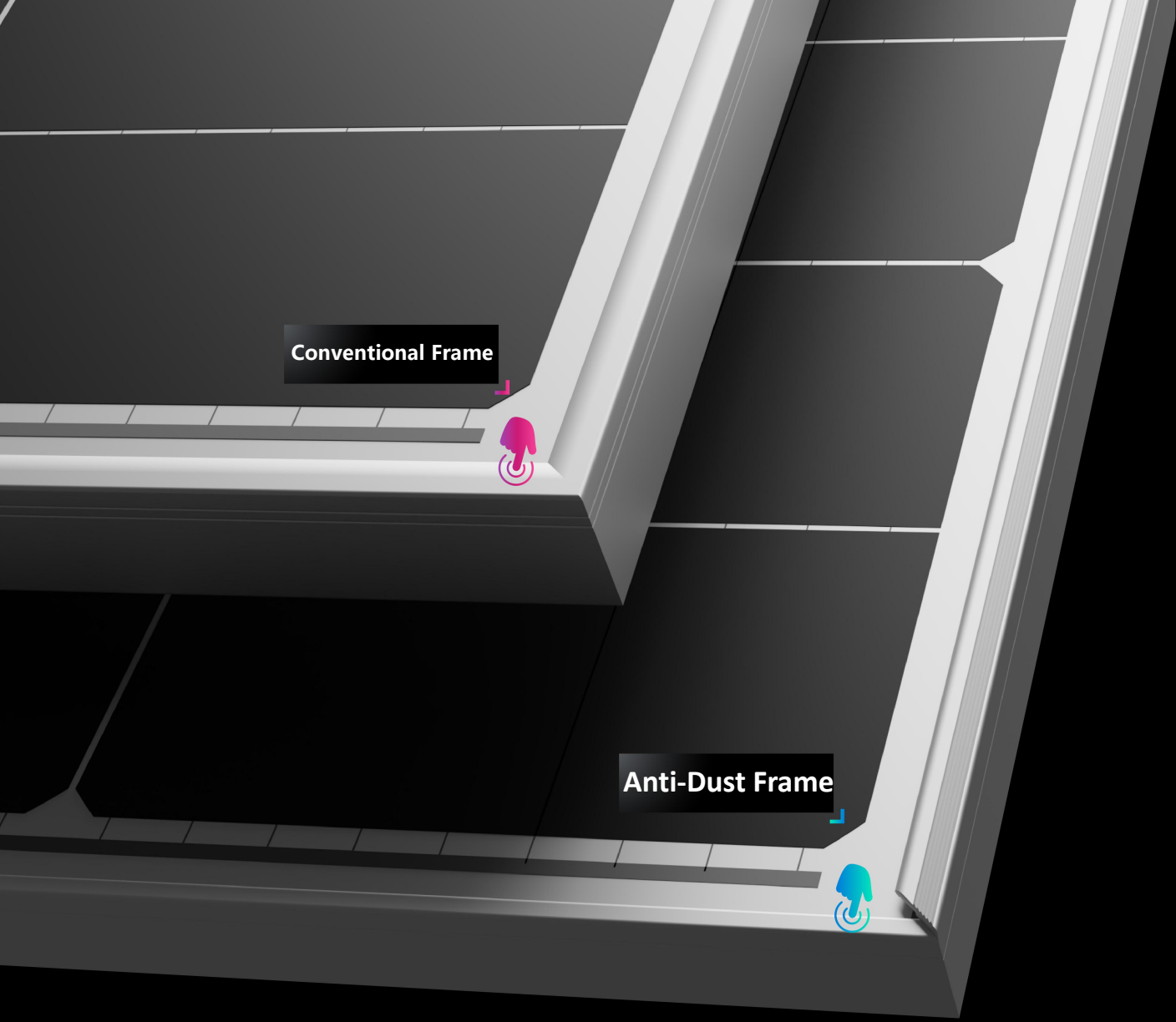
# Dust Accumulation Resulting in **24%** Energy Loss



Dust sedimentation height

Horizontal dust sedimentation situation

| 90 mm  | 70 mm  | 50 mm | 30 mm | 10 mm | Dust sedimentation height |
|--------|--------|-------|-------|-------|---------------------------|
| 23.39% | 16.63% | 8.38% | 3.90% | 0.55% | Power loss                |



Conventional Frame

Anti-Dust Frame

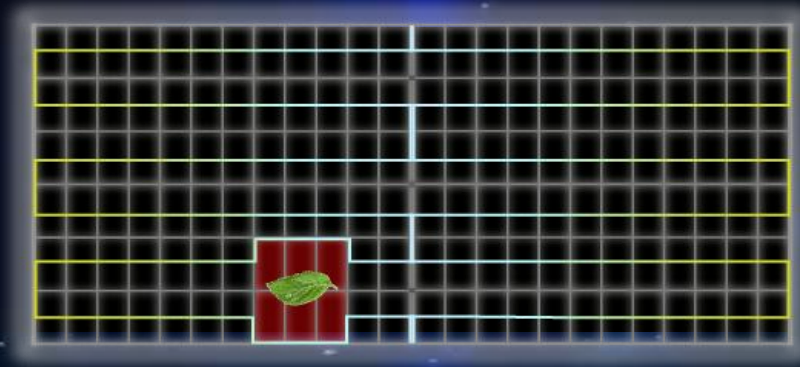
**Less** Energy Loss



# Anti-Shading

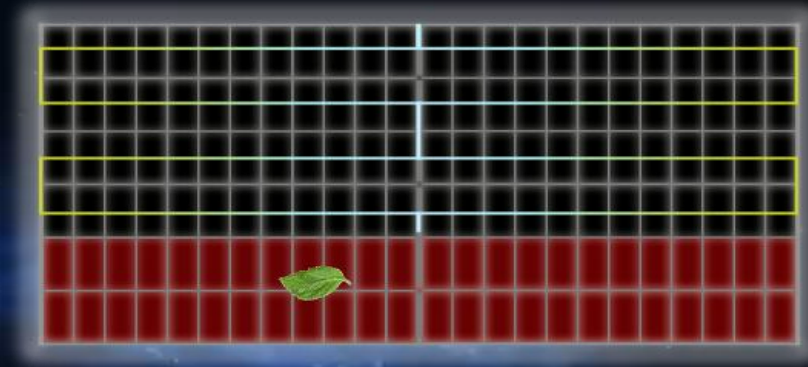
最小化遮挡损失 | 最大化利用屋顶

**Hi-MO X10**



8% energy loss

**Conventional Module**



35% energy loss

遮挡一块电池片情况下，功率损失比TOPCon组件少70%

Hi-MO X10 reduces power degradation by **70%+** compared to TOPCon under the same shaded conditions



TOPCon

35% reduction in module power generation efficiency after one pc cell shaded

35%

TOPCon Module



HPBC  
2.0

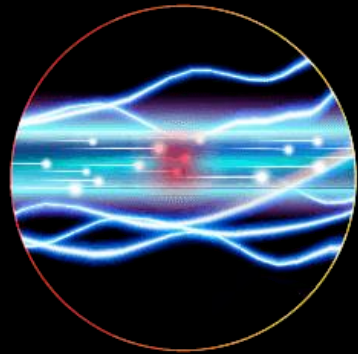
Using equivalent built-in bypass diode technology Only 8% reduction in module power generation efficiency after one pc cell shaded.

8%

Hi-MO X10 Module

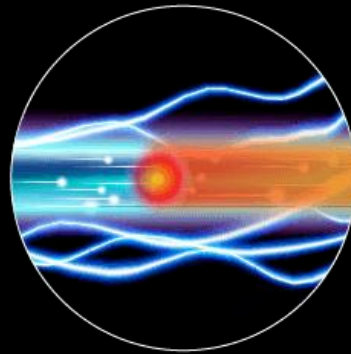
# Prevent Localized Overheating | Eliminate Fire Hazards

Innovative Soft Breakdown Design | Buy 'Fire Insurance' for Your Roof



**Hi-MO X10**

Soft breakdown design allows blocked current to bypass and prevent localized overheating



**TOPCon**

The current is blocked, and occurs localized heating, the temperature rises to form a 'hot spot'

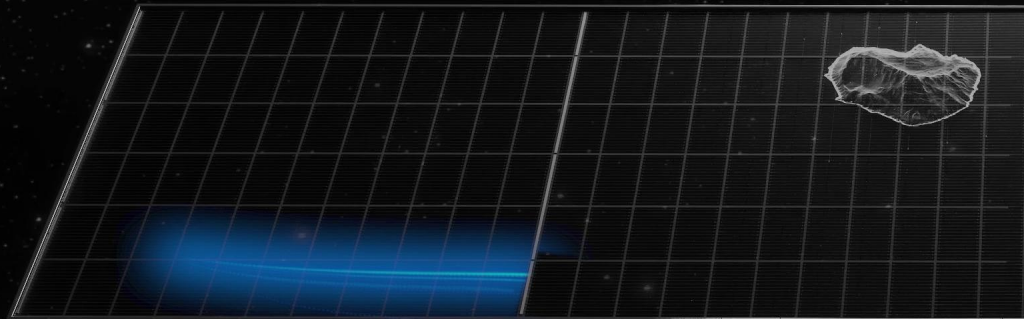
Localized temperature reduced  
**28%+** compare with regular cell

Even if the probability is one in ten thousand, once a fire occurs, the power station will suffer huge losses. The innovative soft breakdown function of Hi-MO X10 is equivalent to buying a 30-year fire insurance for the rooftop power station.

---

**TOPCon Module**

---



---

**Hi-MO X10 Module**

---



---

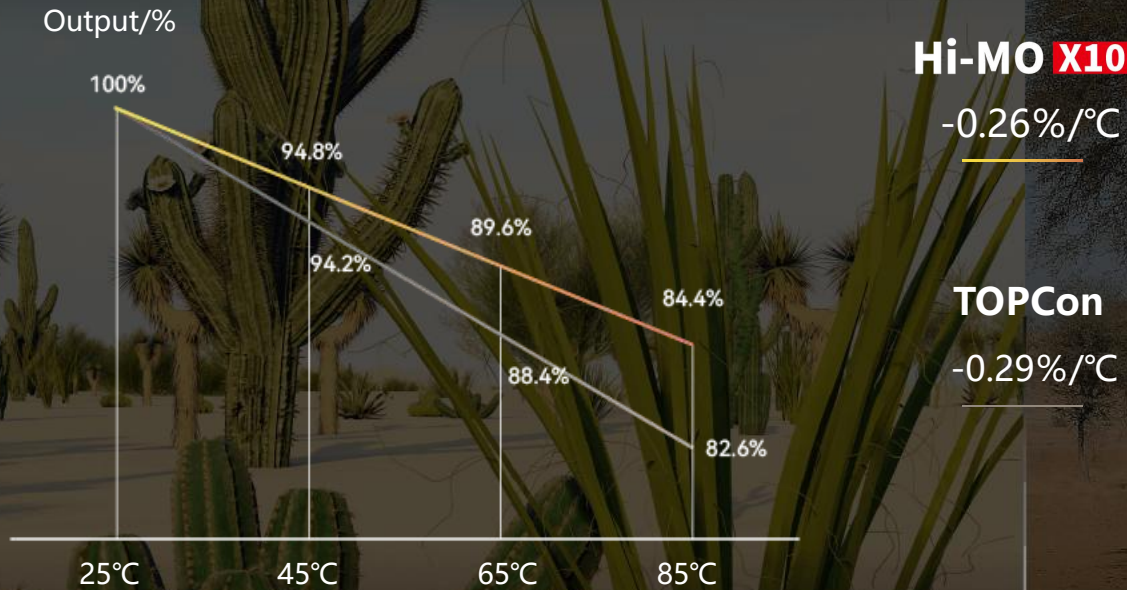
The current is like a river, **Hi-MO X10 Module** uses equivalent built-in bypass diode technology  
Make the current bypass and greatly reduce the heating problem caused by the shaded module

---

# Lower Degradation under High Temperature

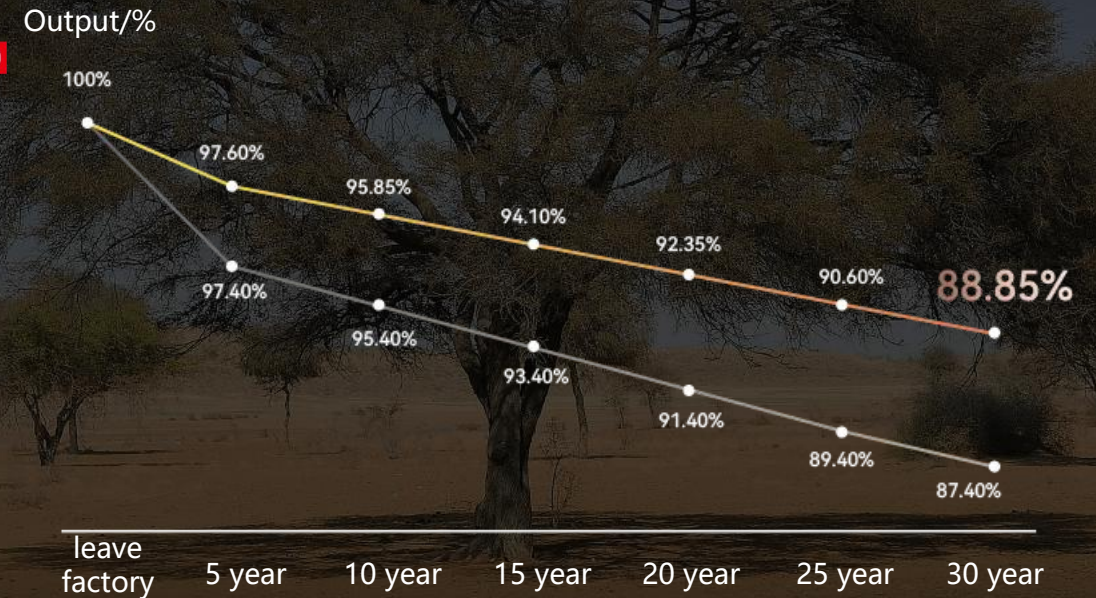
Better Power Generation Performance under High Temperature | More Long-term Power Generation Gain

## Better Temperature Coefficient



Power temperature coefficient: -0.26%/°C, up by 0.03%/°C compared with TOPCon.  
Better power generation performance at high temperatures.

## Lower Degradation

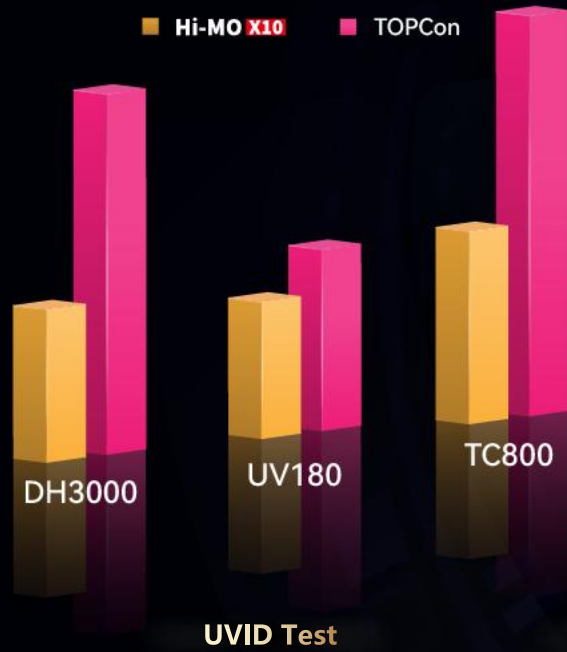


First year degradation: 1%. linear degradation: 0.35%.  
Long-lasting power generation throughout life cycle.  
Lower degradation rate, lower mismatch loss, reduction of mismatch risk by over 2.36%.

# Lower Degradation under Multiple Conditions

Rigorous Tests Show the Reliable Quality | Ultra-long Warranty Protects Customer Value

## Comparison of Module Degradation under Multiple Rigorous Tests



DH Test

At 85°C and 85% relative humidity, test for 1000 h/2000 h/3000 h.

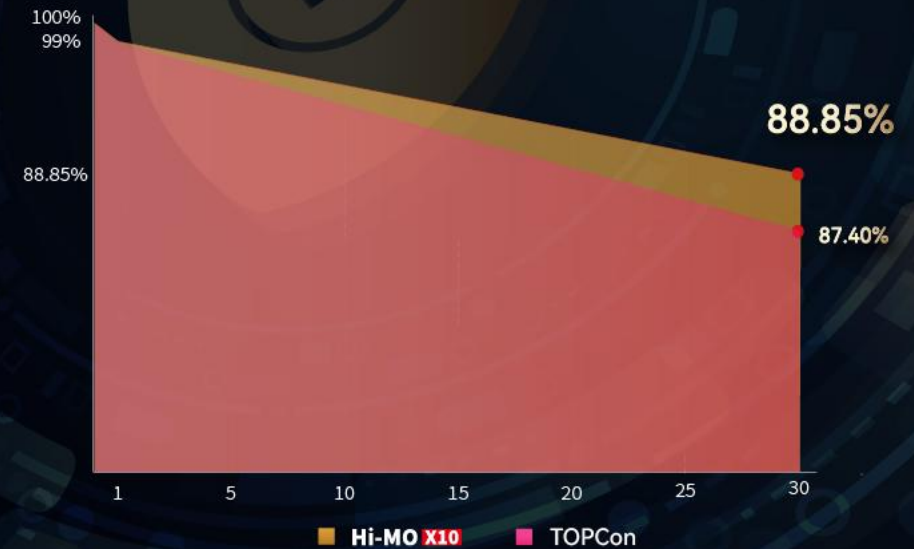
UVID Test

Irradiate for a certain period of time under a specific UV light intensity

TC Test

High and low temperature environment simulation 85°C to - 40°C 200 runs

Low degradation, Long warranty  
First year degradation 1%, linear degradation 0.35%  
life cycle power generation gain 1%+



15

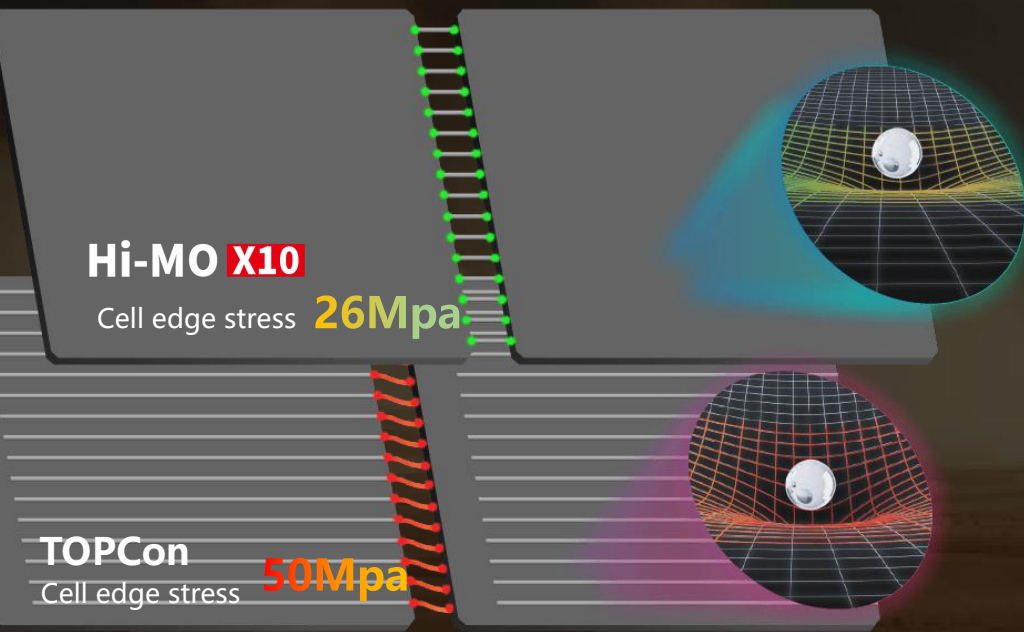
15 years product warranty

30

30 years power warranty guarantee 88.85% output power

# System-Level Resistance to Mechanical Stress

High Thickness TaiRay wafer | Full Back Contact One-line Welding Structure



**Hi-MO X10**

Cell edge stress **26Mpa**

**TOPCon**

Cell edge stress **50Mpa**

Under the same stress, the surface collapse of TaiRay wafer is smaller

## TaiRay Core

Ultra-high mechanical strength  
Maximum rupture strength increased by 16%.

## High Thickness TaiRay Wafer

Wafer thickness is 10 $\mu$ m thicker than mainstream  
Thicker wafer for stronger reliability

## Full Back Contact One-line Welding Structure

Reduce cell edge stress  
Improve anti-cracking performance

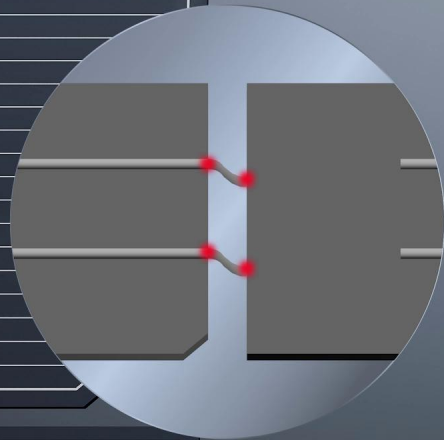
According to actual logistics and transport data, the risk of micro cracks can be significantly reduced by about 87.2%



Conventional  
Silicon Wafer

TaiRay

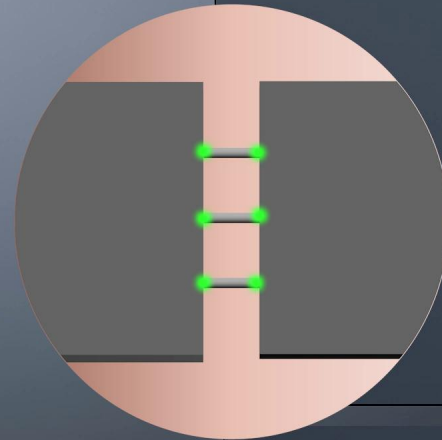
Place 50g standard weights on top of the silicon wafer in order



### TOPCon Module

"Z" type welding  
Cell Edge Stress

**50MPa**



### Hi-MO X10 Module

Full back "one-line" welding  
Cell Edge Stress

**26MPa**

LONGI

# Hi-MO X10

## Peak of Crystalline Silicon First Choice for Value Unleash the Future Without Limits

Powered by LONGi HPBC 2.0 Cell Technology,  
Redefining a New Era of Photovoltaic Value.

HPBC  
2.0

TaiRay



Extreme Security



Higher Value



Extreme Aesthetics

# First Choice for High-Value Modules in Global DG Market

Three Key Leaps | Four Overall Leadings

Maximum conversion efficiency

**24.8%**

Maximum module power

**670<sub>w</sub>**

## Four leadings



Performance leading



Reliability leading



Standard leading



Manufacturing leading

## Three Leaps



Silicon Substrate



Cell technology



BC Manufacturing

HPBC  
2.0

**54<sub>C</sub>**  
Monofacial

HPBC  
2.0

**72<sub>C</sub>**  
Monofacial

HPBC  
2.0

**72<sub>C</sub>**  
Anti-Dust

HPBC  
2.0

**72<sub>C</sub>**  
Bifacial

# HPBC 2.0 Breakthrough Upgrades

Mass production efficiency breaks through 26.6% | 1% absolute efficiency breakthrough of the last crystalline silicon cells

From wafers to cells to modules, core technologies create the pinnacle of the crystalline silicon era

## Back Contact

Leading Technology  
No gridlines in front, full absorption of light

No frontal gridline

## TaiRay Wafer

Premium **N-type** Wafer  
The greatest wafer innovation in the last decade

TaiRay Wafer

## Cell Tech

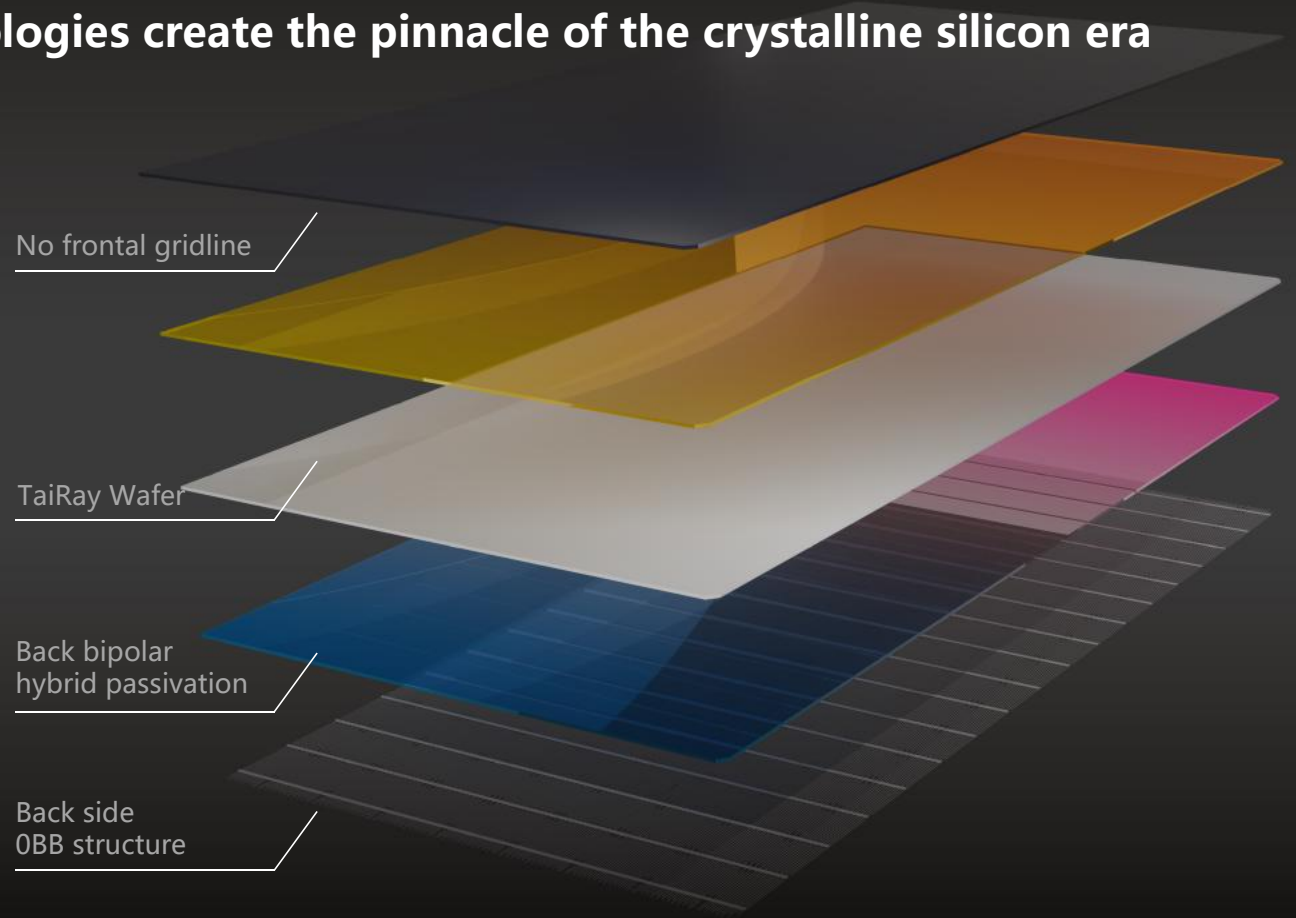
Ultimate Technology  
Reduce current loss, increase conversion efficiency

Back bipolar hybrid passivation

## Module Tech

NEW Technology  
Further improve power and bifacial performance

Back side OBB structure

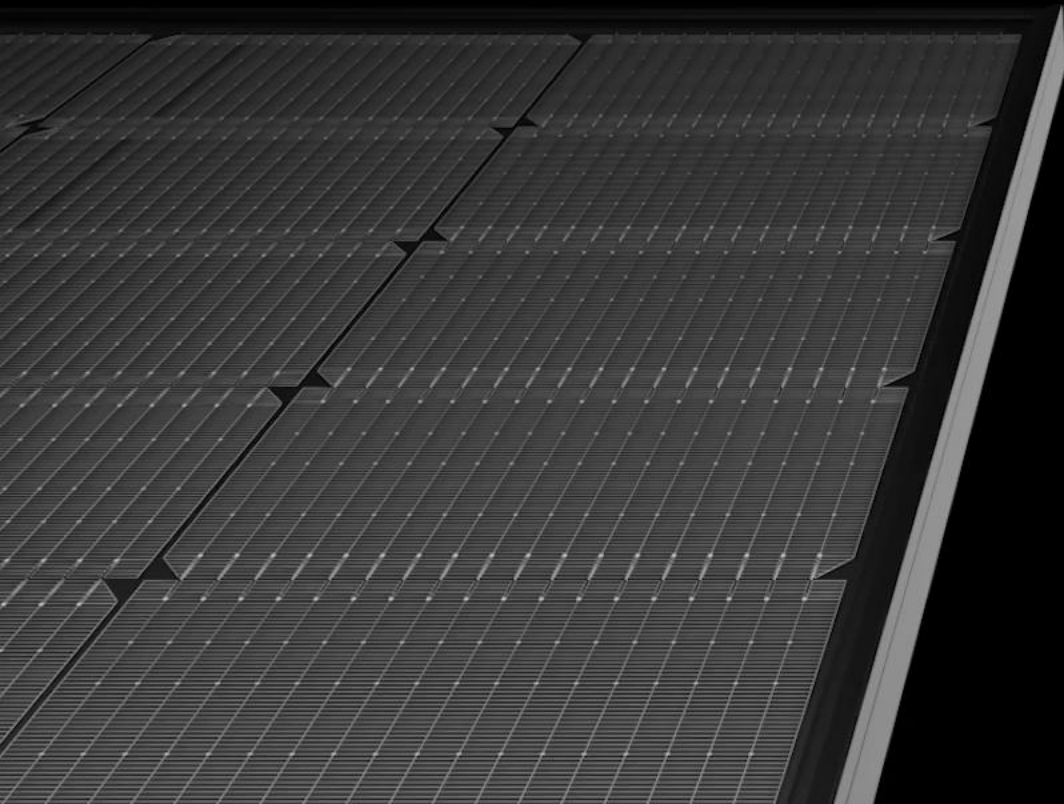


# BC - Back Contact Cell

No Gridlines in the Front

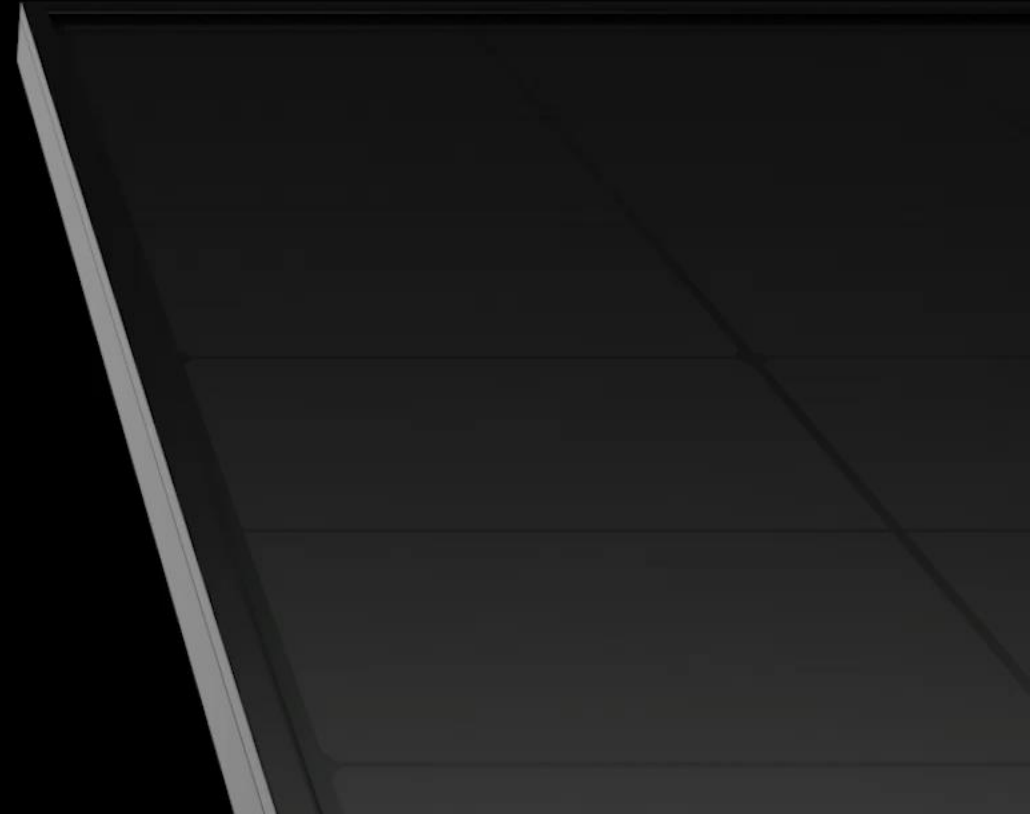
**Non-BC Cell**

Metal Gridlines



**Regular BC Cell**

No Frontal Gridlines



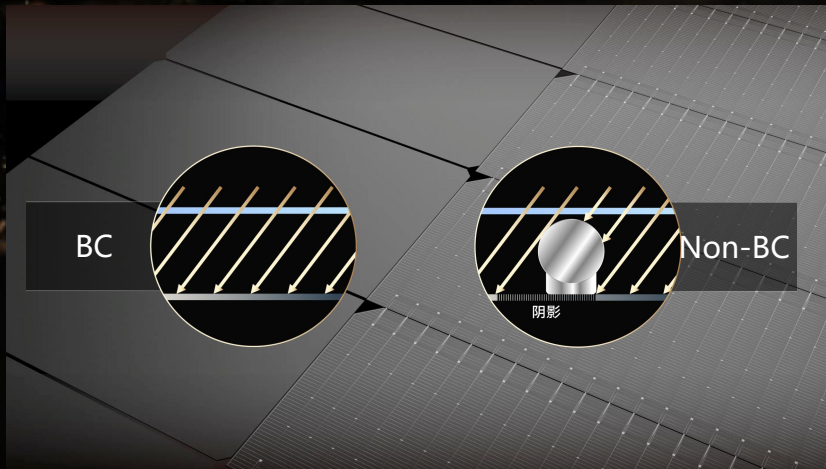
# BC: Peak of Silicon Cell Technology

Talent and Compatibility Coexist | Closest to Efficiency Limits

## Talent

No frontal gridline + Back contact electrodes  
Improved light absorption and enhanced reliability

No frontal gridline  
Improved light absorption



Back contact electrodes  
Enhanced reliability

## Compatibility

Platform technology  
compatible with other passivation processes

Tunneling oxide  
passivation contact

Heterojunction  
passivation

Passivated emitter  
and rear contact

## Peak Efficiency

BC closest to the crystalline  
silicon cell limit of 29.4 %

**29.1%**

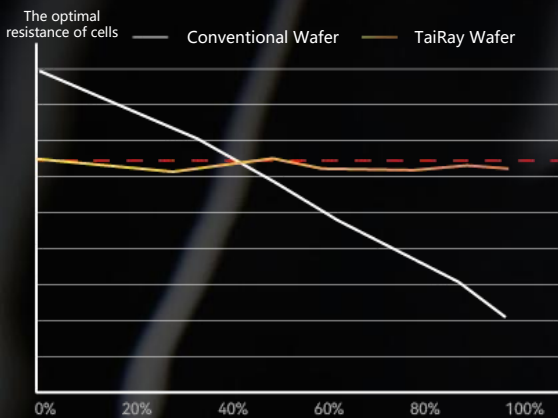
XBC theoretical  
efficiency

# TaiRay Wafer: Revolutionary Changes in the Silicon Wafer Industry in the Last 10 Years

Improve power generation performance and reliability

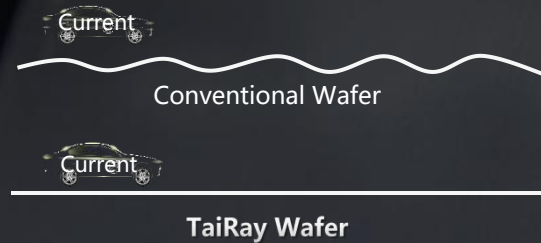
## Better Matching

Better matching of best cell resistance than conventional wafer



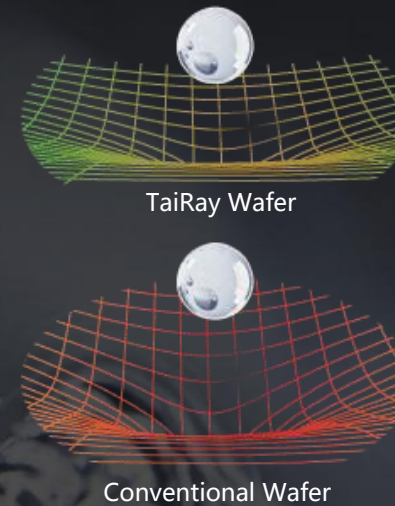
## Higher Concentration

The resistant distribution is more concentrated, higher efficiency in power generation



## More Impact-resistant

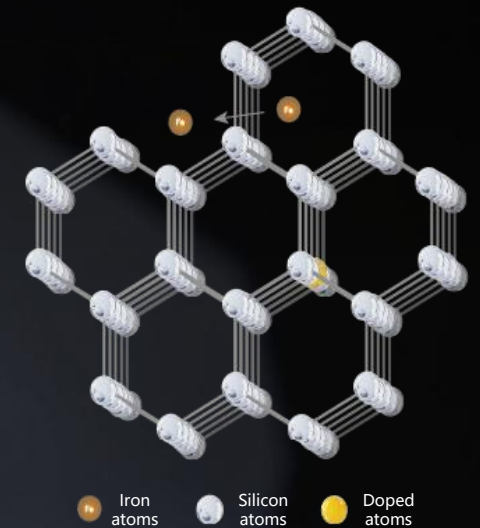
Mechanical strength increased by 16%, less prone to cause breakage and micro-cracks



TaiRay wafers deform less under the same stresses

## Fewer Impurities

Fewer wafer impurities, better performance



# HPBC 2.0 | The World's Most Efficient Mass-produced Cell

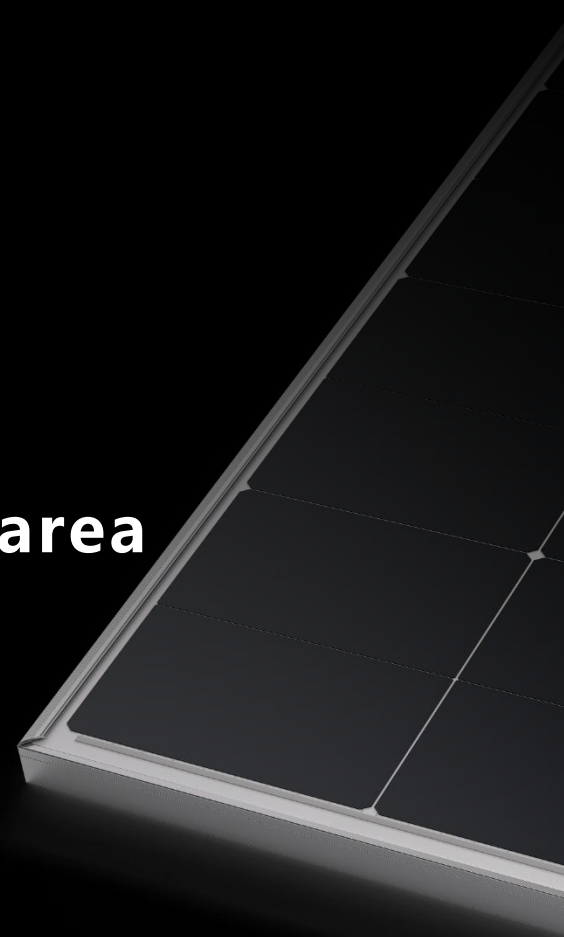
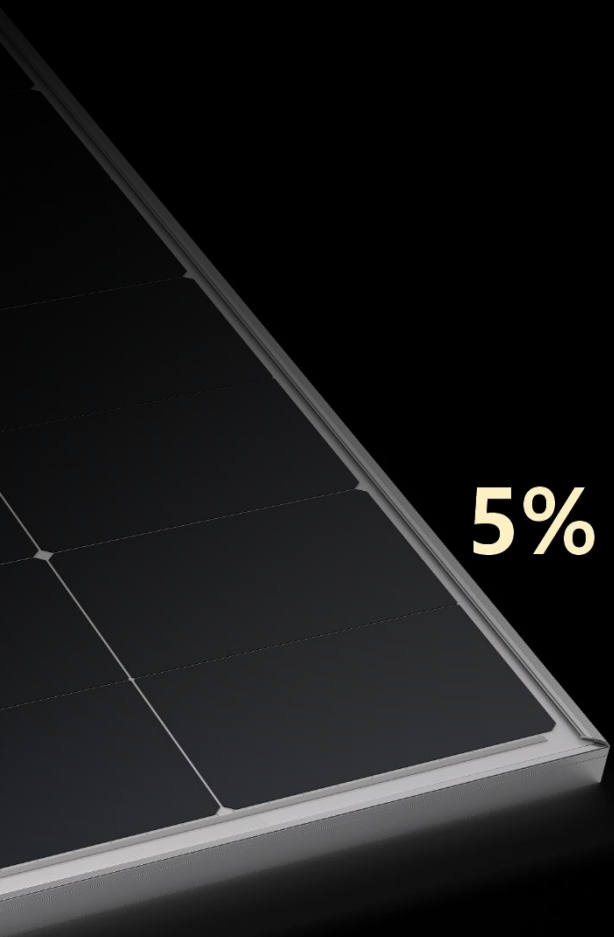
**26.6%**

Cell efficiency

**24.8%**

Module efficiency

**5% increase in installed capacity per unit area**

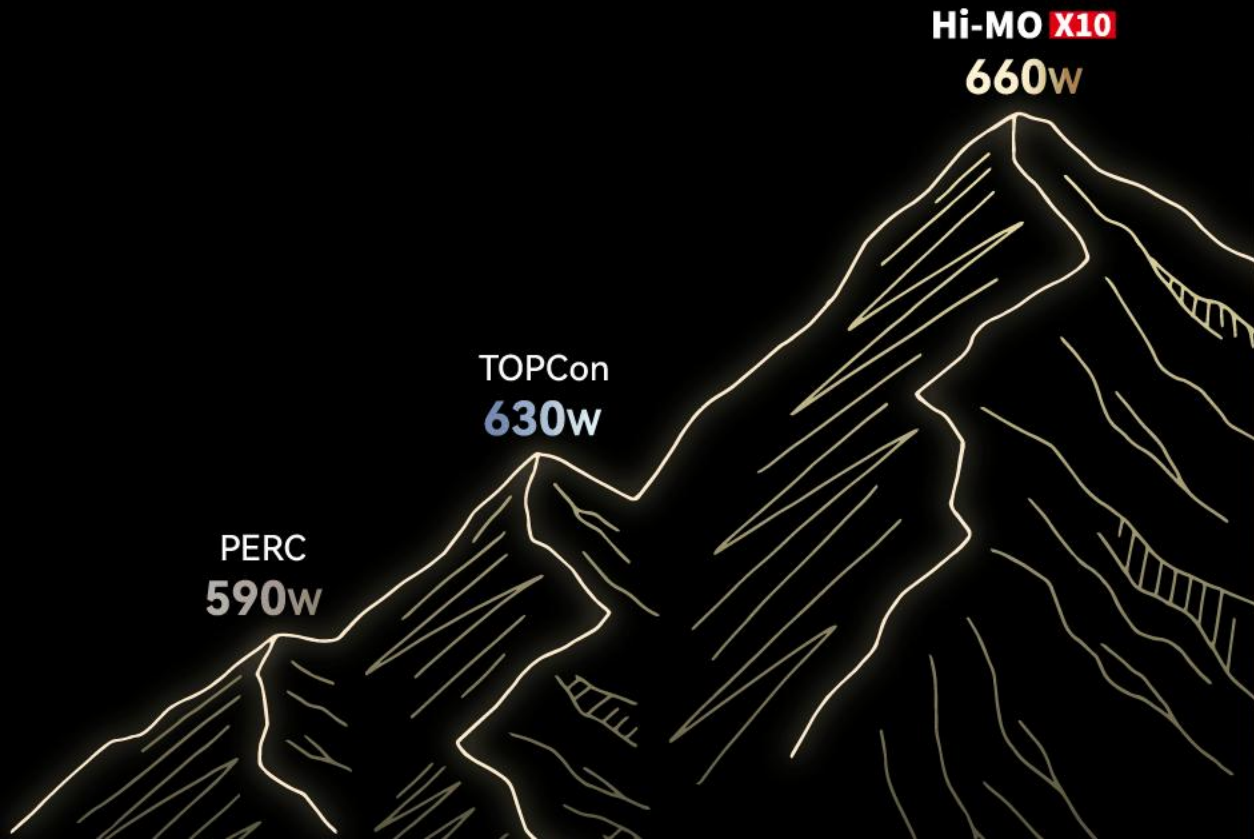


# Peak Efficiency | Power Leads TOPCon by 30W

About 5% Increase in Installed Capacity on the Same Roof

## Ultra-High Power

The mass production power leads competitors by 30W



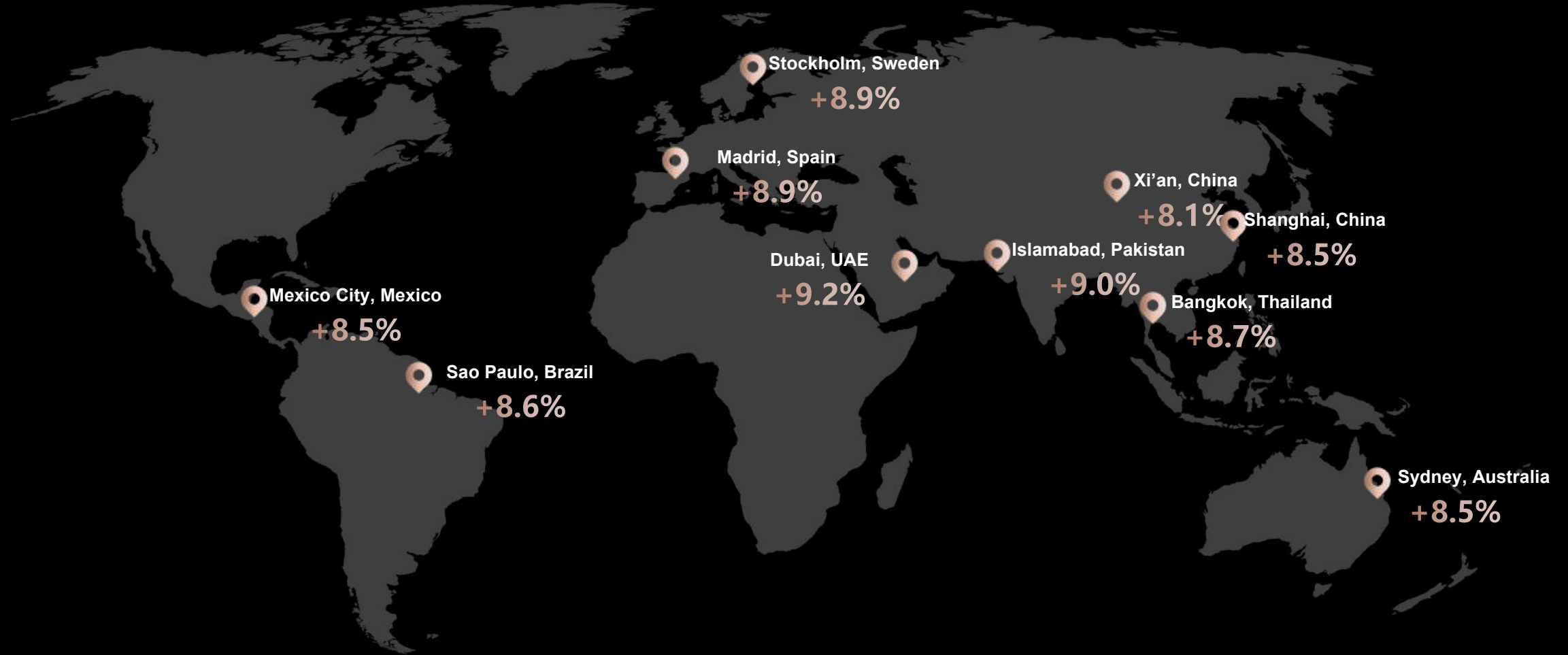
## Higher Installed Capacity

About 5% increase in installed capacity compared to TOPCon for same area



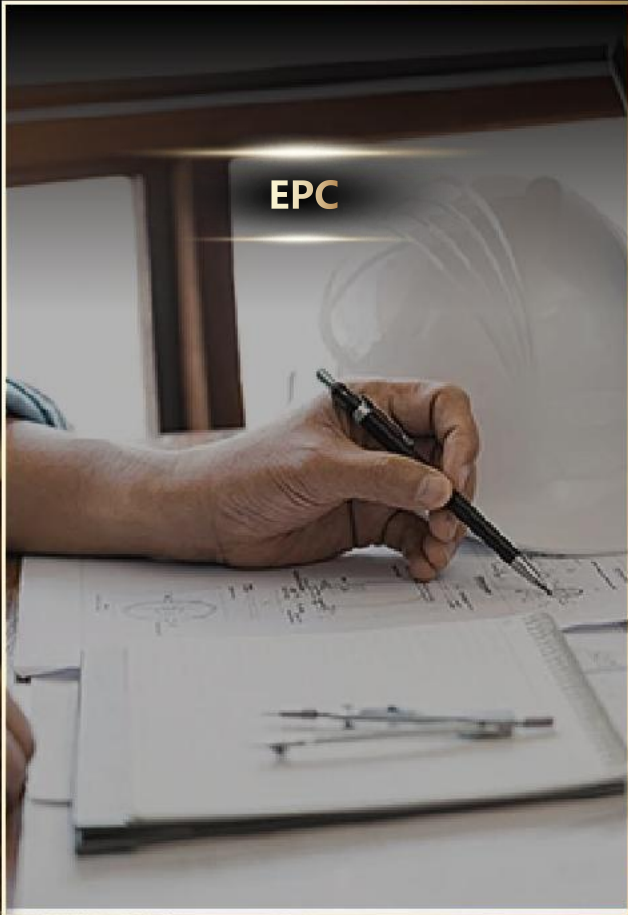
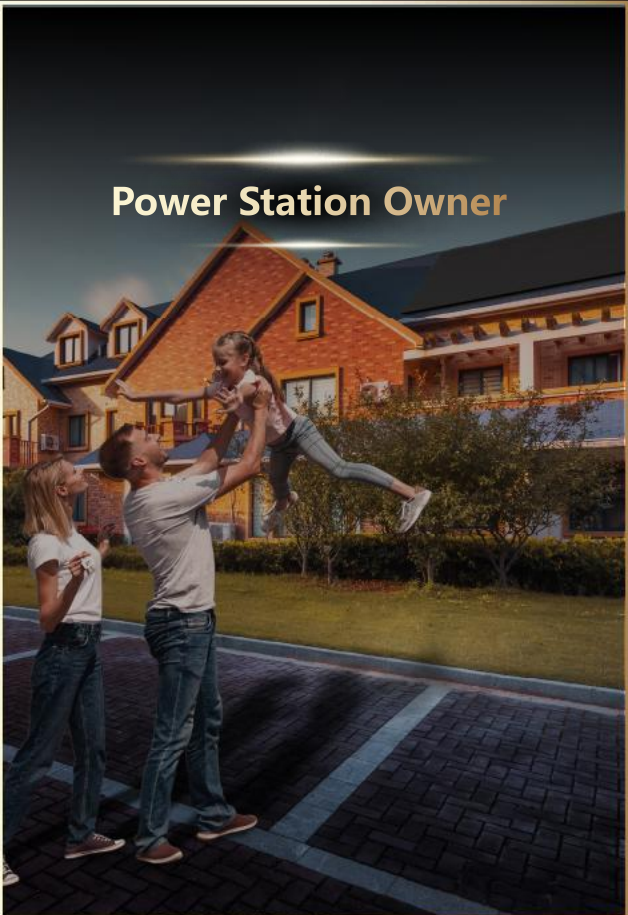
# Power Generation Exceeds TOPCon by 8.7%

Power Generation Simulation Average Data of Typical Regions Worldwide



# More Power Generation and Higher Returns, Eternal Pursuit of the Market

Market needs the module with higher efficiency and power generation



# Hi-MO X10 Overall Leading Performance | Ultra-high Returns for Customers

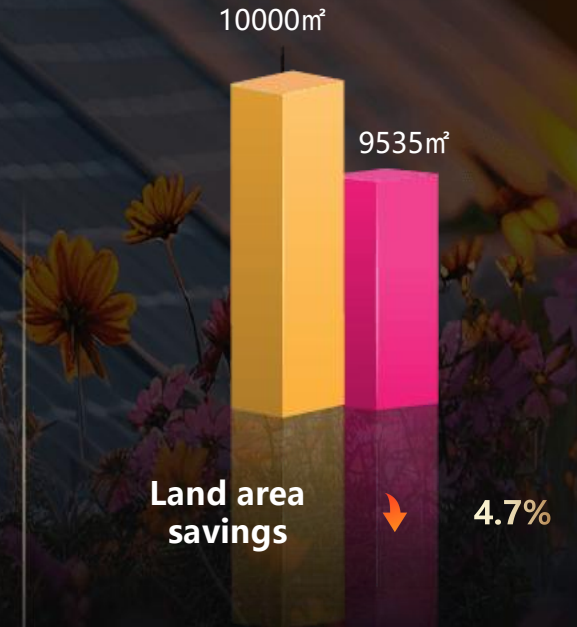
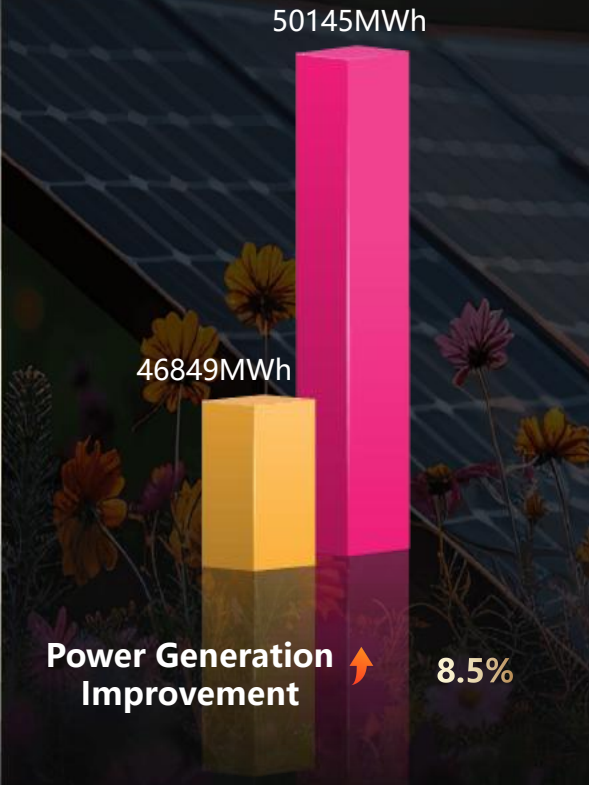
Multidimensional economic calculations

**Equal net profit**  
Saving initial cost of 6.9 cents/W

**Equal initial cost**  
8 cents/W more net profit

**Equal roof area**  
More power generation

**Equal installed capacity**  
Less area occupied



■ TOPCon ■ Hi-MO X10

South Africa 🏠 Roof area: 10000m²

# Hi-MO X10 Overall Leading Performance | Ultra-high Returns for Customers

**30 kWh** more per square meter per year, **80 kWh** more per module per year  
Each module generates an additional **\$12.7** per year, **\$382** more over 30 years  
Additional investment of **\$15.4**, with payback in less than **1.5** years

|                                       | TOPCon    | Hi-MO X10 |
|---------------------------------------|-----------|-----------|
| Power bin                             | 630W      | 660W      |
| Power per square meter                | 233W      | 245W      |
| Annual power generation hours         | 1600h     | 1648h     |
| Power generation/m <sup>2</sup> /year | 373 kW·h  | 403 kW·h  |
| Power generation/module/year          | 1008 kW·h | 1088 kW·h |
| Station construction cost/module      | \$296.1   | \$311.5   |
| Power gain/module/year                | \$161.3   | \$174.0   |
| Power gain/module/30 years            | \$4838    | \$5221    |

## HI-MO X10 GLOBAL TYPICAL REGIONAL GAIN | MIDDLE EAST, AFRICA AND CENTRAL ASIA

Hi-MO X10 30-year total gain **\$3671/pc**,  
additional gain of **\$269** compared to TOPCon

**Nigeria-Abuja**

C&I electricity price 0.1\$/kWh  
equivalent generation hours 1800kWh/kW/year

Hi-MO X10 30-year total gain **\$3671/pc**,  
additional gain of **\$269** compared to TOPCon

**Zambia-Lusaka**

C&I electricity price 0.1\$/kWh  
equivalent generation hours 1800kWh/kW/year

Hi-MO X10 30-year total gain **\$4262/pc**,  
additional gain of **\$312** compared to TOPCon

**South Africa - Cape Town**

C&I electricity price 0.11\$/kWh  
equivalent generation hours 1900kWh/kW/year

Hi-MO X10 30-year total gain **\$6934/pc**,  
additional gain of **\$508** compared to TOPCon

**Kenya-Nairobi**

C&I electricity price 0.2\$/kWh  
equivalent generation hours 1700kWh/kW/year

Hi-MO X10 30-year total gain **\$5221/pc**,  
additional gain of **\$382** compared to TOPCon

**Pakistan - Islamabad**

C&I electricity price 0.16\$/kWh  
equivalent generation hours 1600kWh/kW/year

Hi-MO X10 30-year total gain **\$2937/pc**,  
additional gain of **\$215** compared to TOPCon

**UAE-Dubai**

C&I electricity price 0.08\$/kWh  
equivalent generation hours 1800kWh/kW/year

# Investment Residential

## Higher Investment Returns

📍 Xi'an, China

🏠 Roof area: 260 m<sup>2</sup>

🕒 Roof angle: 25° tiled

🔌 Full Grid Connection, Feed-in tariff : \$0.05/kWh

- System design: 15 pcs /string, a total of 5 strings, 5 inverters of 8kW

### TOPCon

### Hi-MO X10

|        |                              |        |    |       |
|--------|------------------------------|--------|----|-------|
| 630    | Module rated power (W)       | 660    |    |       |
| 47.25  | Project capacity (kW)        | 49.50  | ⬆️ | 4.76% |
| 1485.2 | Total power generation (MWh) | 1602.1 | ⬆️ | 7.9%  |
| 11.56  | IRR (%)                      | 12.57  | ⬆️ | 8.75% |
| 8.19   | Payback period (year)        | 7.59   | ⬆️ | 7.34% |



# Value C&I

Lower LCOE

📍 Xi'an, China



Roof area: 14000 m<sup>2</sup>



Roof angle: Color steel tile roofing 3°



Self-consumption, C&I electricity price : \$0.11/kWh

- System design: 22 pcs /string, a total of 160 strings, 11 inverters of 175kW, system voltage 1500V

**TOPCon**

**Hi-MO X10**

|        |                              |        |    |       |
|--------|------------------------------|--------|----|-------|
| 630    | Module rated power (W)       | 660    |    |       |
| 2217.6 | Project capacity (kW)        | 2323.2 | ⬆️ | 4.76% |
| 66593  | Total power generation (MWh) | 71958  | ⬆️ | 8.1%  |
| 29.36  | IRR (%)                      | 31.33  | ⬆️ | 6.72% |
| 0.05   | LCOE (\$ /kWh)               | 0.047  | ⬆️ | 6.9%  |



# Residential

Lower LCOE

📍 Madrid, Spain

🏠 Roof area: 260 m<sup>2</sup>

📐 Roof angle: 35° tiled

🔌 Self-consumption, Residential electricity price : \$0.17/kWh

- System design: 13 pcs/string, a total of 6 strings, 6 inverters of 8kW

## TOPCon

## Hi-MO X10

|       |                              |       |   |       |
|-------|------------------------------|-------|---|-------|
| 630   | Module rated power (W)       | 660   |   |       |
| 49.14 | Project capacity (kW)        | 51.48 | ⤴ | 4.76% |
| 2396  | Total power generation (MWh) | 2610  | ⤴ | 9.0%  |
| 0.039 | LCOE (\$/kWh)                | 0.036 | ⤵ | 7.16% |



# Long Tail C&I

## Higher Investment Returns

📍 Madrid, Spain

🏠 Roof area: 10000 m<sup>2</sup>

📐 Roof angle: Color steel tile roofing 3°

🔌 Full Grid Connection, Feed-in tariff : \$0.043/kWh

- System design: 20 pcs/string, a total of 154 strings, 11 inverters of 175 kW, system voltage 1500V



### TOPCon

### Hi-MO X10

|       |                              |       |    |       |
|-------|------------------------------|-------|----|-------|
| 630   | Module rated power (W)       | 660   |    |       |
| 1940  | Project capacity (kW)        | 2033  | ⬆️ | 4.76% |
| 83647 | Total power generation (MWh) | 90933 | ⬆️ | 8.7%  |
| 9.07  | IRR (%)                      | 9.96  | ⬆️ | 9.88% |
| 10.06 | Payback period (year)        | 9.27  | ⬇️ | 7.89% |

LONGI

感谢聆听

Thanks all