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TERRA 



THREE R R >

# TONGWEI GROUP



Tongwei group was founded in 1982 (listed in 2004, stock code 600438), is a large multinational conglomerate that focuses on green agriculture and green energy. Adhering to the vision of "For better life" and the mission of "striving for excellence and contributing to society", Tongwei has created unique competitiveness from the Aquaculture-Photovoltaic Integration mode. For the future, it focuses on food safety and energy transition, two themes relating to the future of mankind, with the aim of becoming a world-class safe good supplier and a world-class clean energy operator.

Over **€40 billion**  
The highest stock  
market value in 2022

About **€20 billion**  
Brand value

Top **500**  
Ranking of  
Chinese enterprises

Nearly **50,000**  
Employees  
worldwide

Over **300**  
Branches or  
subsidiaries

## Financial data for 2022

Operating Revenue

**€18.67 billion**

▲ YoY  
growth of **119.69%**

Net Profit

**€3.37 billion**

▲ YoY  
growth of **217.25%**

Total Asset

**€19.04 billion**

▲ YoY  
growth of **65.25%**

### Yongxiang Co., Ltd.

#### High-purity Crystalline Silicon Manufacturer

The production line that has large unit scale, low energy consumption, new technological integration, and superior quality on a global level.

#### 3 Major Production Bases

Leshan, Sichuan,  
Baotou, Inner Mongolia  
Baoshan, Yunnan

### TW Solar

#### PV Solar Cell and Panel Manufacturer

As the most critical link, TW Solar has deeply engaged in the R&D, manufacturing, and promotion of core solar power generation products. It has the most advanced technology, production equipment, and the highest level of automation and intelligence in the PV industry.

#### 6 Major Production Bases

Hefei, Anhui  
Shuangliu, Sichuan  
Meishan, Sichuan  
Jintang, Sichuan  
Yancheng, Jiangsu  
Nantong, Jiangsu

### Tongwei New Energy

#### Green Agriculture and Green Energy Suppliers

Integrating PV power generation with modern fisheries, pioneered the world's first "PV+fishery" development model.

Over **380,000 TONS**

Annual production capacity in 2023

**NO.1**

in the world

**80~100 GW**

Cell production capacity in 2023

**NO.1**

in the world

**80 GW**

Module production capacity in 2023

**52**

"PV + fishery" power plants

**3.4 GW**

Cumulative installed capacity



Tongwei entered the market of photovoltaics (PV) in 2006, and after more than 10 years of rapid development, it has become an integrated PV enterprise with high-purity polysilicon production in upstream, high-efficiency solar cell and PV module production in midstream, as well as experience in PV power plant construction and operation in downstream. It has formed a complete PV new energy industry chain with independent intellectual property rights and leading scale, technology, cost, and quality advantages, building up the vertically integrated layout of the whole PV industry chain.

Tongwei continues to strengthen and enlarge its advantages, focusing on the layout of high-purity crystalline silicon, high-efficiency cells, and module products on the manufacturing side and on building a "Fishery & PV Integration" innovative development model on the application side. Tongwei has become an important participant and significant driving force for the development of China and even the global photovoltaic new energy industry.

# TERRA

Terra, guarding the green world in the name of Mother Earth.  
Terrace, stacking like solar cells in search of green land.  
TeraWatt, TW Solar, powering green energy towards a TeraWatts era.

Terra, on the rooftops of countless homes, feels the rhythm and breath of the sun every moment, outlining the contours of the entire universe with its mysterious blackness, always carrying a reverence for nature, and extending endless possibilities.

**430~440w**  
**21.8kg**

**Intensive and Durable**

**Covering residential, commercial and industrial applications**

Aiming for the higher power output while ensuring efficient, stable, and safe operation of power system and equipment.

# TIER 1

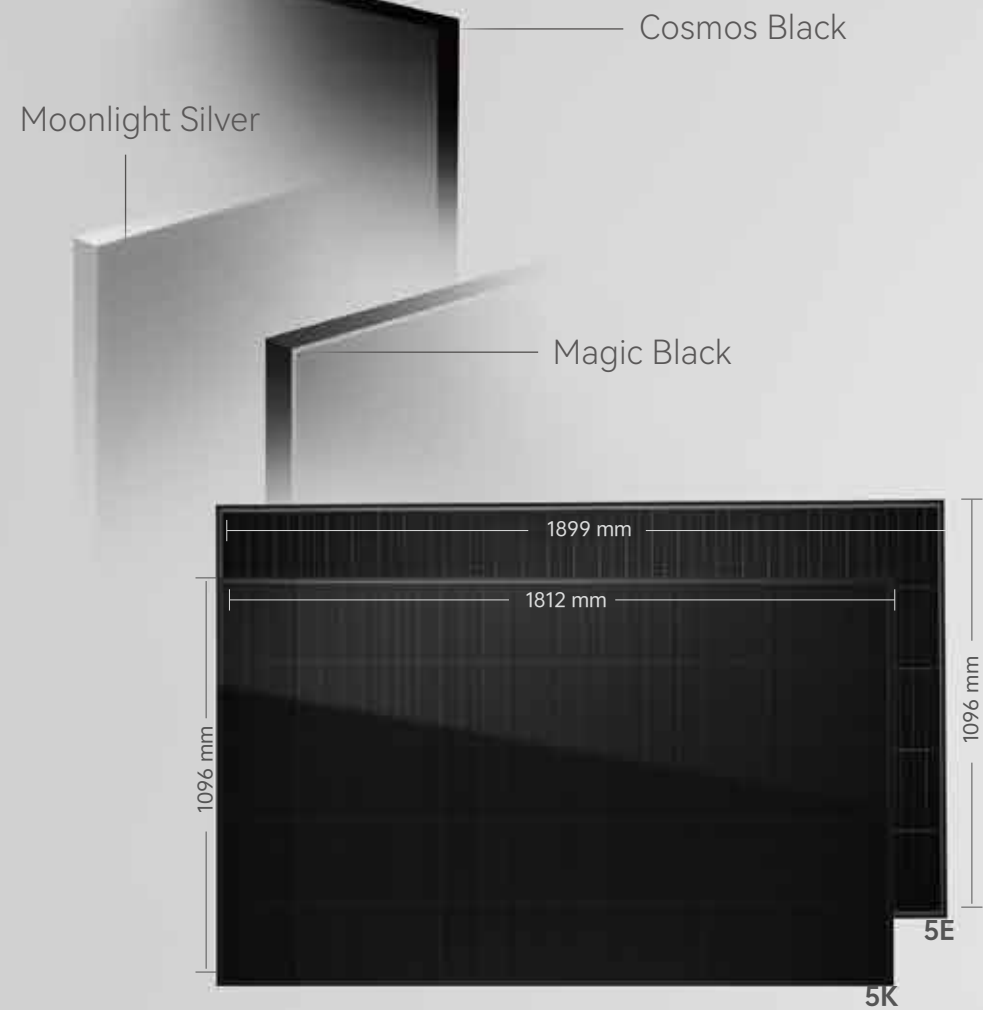
**415~425w**  
**20.8±0.3kg**

**Exquisite and Flexible**

**Focusing on the residential market**

A compact design of less than 2m<sup>2</sup> that can be flexibly utilized in various rooftop spaces.

Easy to transport and reduces rooftop load.



# COSMOS BLACK

Multi-step screening for uniform, dark-colored solar cells.

Coupled with double-sided, deep enamel-coated glass, black frames and busbars.

The immaculate design of dots, lines, and surfaces, exuding a classic and pure texture with exceptional quality.



**Double-Glass:**  
 Liner power output **30** year  
 Annual degradation  $\leq$  **0.45%**

**Single-Glass:**  
 Liner power output **25** year  
 Annual degradation  $\leq$  **0.55%**

# TERRA FEATURES



Flexible for residential, commercial and industrial



Eco-friendly design concept



Low hot-spot risk



Enhanced shading tolerance



Trusted reliability



Optimized power output and efficiency



Pure black appearance, elegant and futuristic design



Emulating shingled configuration, maximizing space utilization

## 01

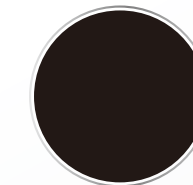
### Eco-friendly Design

#### Take a step towards a more sustainable lifestyle

*Getting rid of metal ribbon, using non-toxic and eco-friendly adhesives to achieve negative spacing interconnection for cell strips.*



Traditional panel  
Metal ribbon



Terra shingled panel  
Ribbon-free

Low lead content, reduced by over 60%.

0 fluoride back sheet.

Mitigating harm to humans and the environment.

Minimizing the future process costs related to lead and fluoride contamination treatment.

Achieving efficient panel recycling.

02

## Aesthetic Appearance

Trends are impermanent, but elegance is forever

*Free from solder ribbons and solder joints, Terra consists of multi-step screening of uniform, dark-colored solar cells, equipped with double-sided, deep enamel-coated glass, black frames and black busbars.*



Terra' s Cosmos Black.....

is an everlasting classic, naturally endowed with pureness and luxury.

is a silent language, collides with its surroundings, sometimes calm and introverted, sometimes expressive and bold.

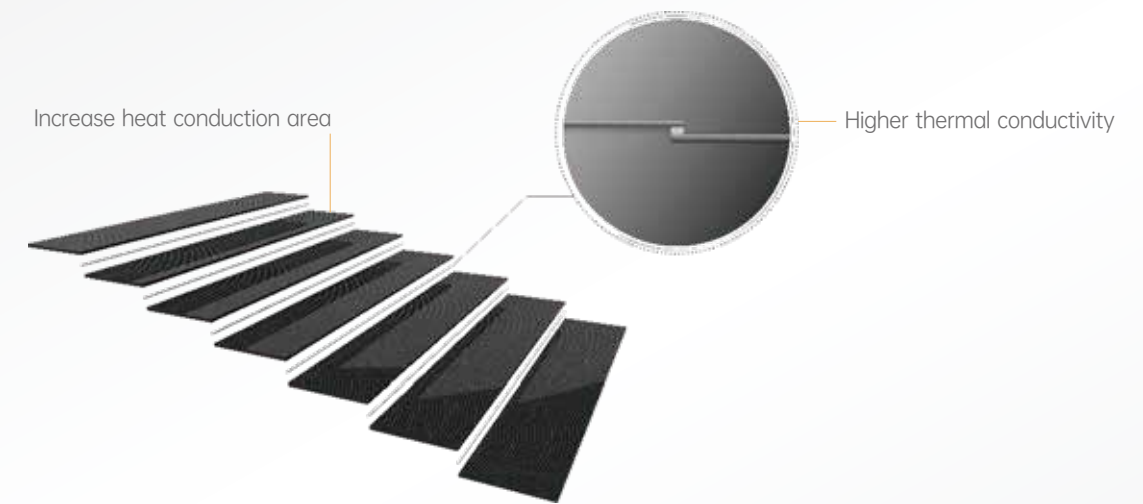
is a magnificent magic, like a dark mirror reflecting the cosmos, exploring the infinite potential of clean energy.

03

## Stable and Durable Quality

An absolutely reassuring sunbathing experience

*Overlapping cell strips with conductive adhesive as the medium allows for more rapid and extensive conduction of concentrated high temperatures, resulting in a reduction of hot spot temperature by approximately 40°C compared to traditional panels.*



Operating temperature is stable, guarding the safety of your roof.

Day and night, Terra captures solar energy for your power demands around the clock.

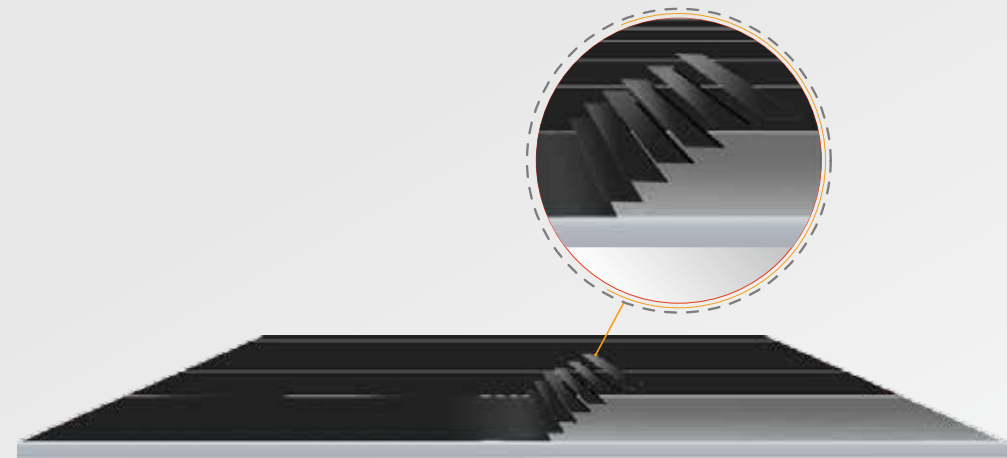
Terra undergoes rigorous production standards and testing, ensuring a 25-year warranty.



# 04

## Excellent Power Output and Efficiency Unleash the sun energy freely and abundantly

The shingled structure removes the distance between cells, achieving high-density encapsulating and a "active area ratio" of 95.2%. Terra contain more solar cells per unit area, resulting in increased power and efficiency.

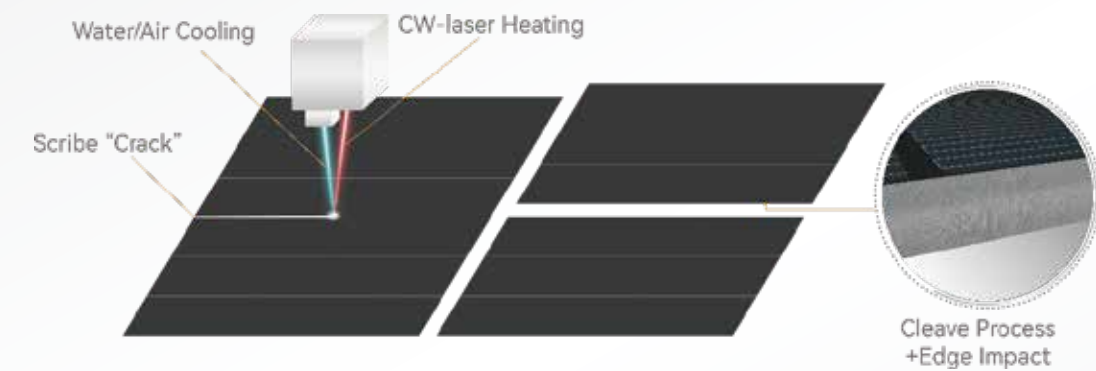


- Recharge your low-carbon lifestyle with ease by swiftly acquiring ample supplies of green energy.
- Realize your required project capacity with lower installation expenses.
- Utilize your roof as a valuable employee that generates sustained returns for you.

# 05

## Advanced Technology Meticulous attention to every manufacturing detail

Optimized Thermal Laser Separation (TLS) technology for precise cutting of cells, avoiding thermal damage caused by conventional cutting and improving the cell mechanical strength by 37MPa.

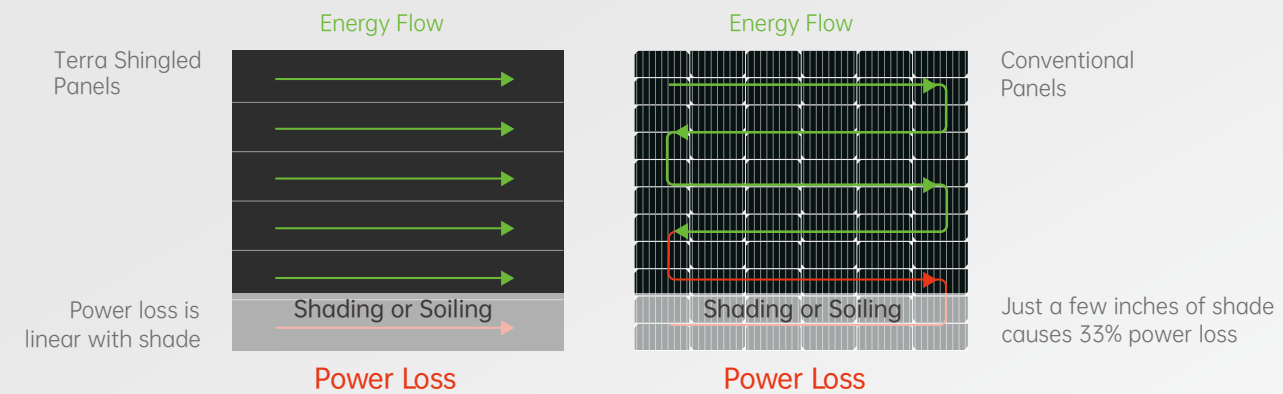


- The 8100Pa limit load test indicated that Terra could support a weight equivalent to approximately 11 adult men, without any visible micro-cracks.
- Able to withstand collisions or accidents during transportation and handling.
- Maximizing the reduction of power attenuation.

# 06

## Comprehensive Parallel Circuit Design Shading won't stop Terra from producing reliable energy

The design of a multi-parallel circuit increases the current path and enables stable output power even when panels are obstructed.



When obstructed by tree branches, buildings, or surface dirt, with Terra, the surrounding light resources can be utilized to their fullest potential.

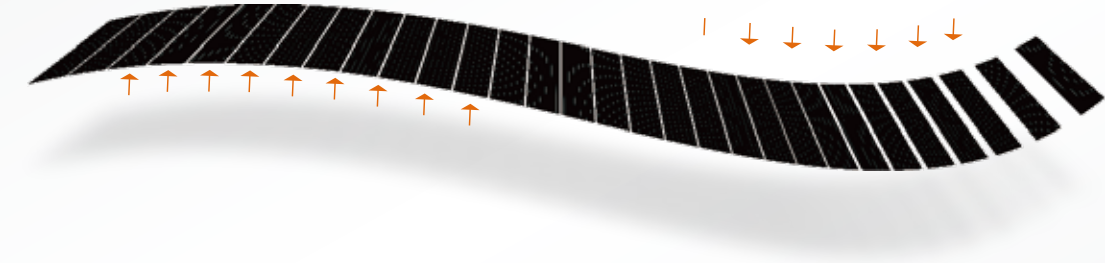
Terra ensures the stability and dependability of the power generation system, minimizing the need for frequent maintenance, which significantly lowers operating costs.

Suitable for high-latitude areas and land-intensive areas with high obstruction.

# 07

## Superb Load-carrying Ability Flexible interconnection, embracing the ever-changing world

Shingled interconnection technique operates at temperatures lower than 180°C, while traditional soldering methods exceed this by more than 40°C, which may cause material expansion or contraction, thus weakening the product's pressure resistance.



Enhanced toughness and longevity. Resilient adhesives can effectively absorb external mechanical stress through flexible deformation when under compression.

Even in the frigid nights or winter, Terra's adhesive remains adhesion and elasticity under low temperatures.

Unafraid of howling winds, relentless rain, pounding hail, and blinding snow, its robust endurance makes your house a haven overflowing with green energy and comforting warmth within your home.

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SMART MODULE  
BY  
TONGWEI

# SMART TONGWEI



Tongwei Jintang  
5G Application Base



The IGV Smart Car is Running Efficiently

Tongwei Solar has built the first 5G application base in the global PV industry. Tongwei Jintang base, which is a "super factory" of "5G + Industrial Manufacturing", has realized the comprehensive interconnection of material supply management, production monitoring and equipment management, which makes full 5G advantages of high bandwidth, low delay and anti-interference.

In the dust-free workshops, the fully automatic intelligent manufacturing production line runs efficiently, and the 5G unmanned car shuttling back and forth completely replaces the manual to complete the main work such as material handling. It is estimated that the 5G production line will reduce labor use by about 62%, reduce energy consumption by about 30%, and improve production efficiency by about 161%.

In the past 20 years, through continuous technology R&D and innovation, Tongwei has been committed to addressing safety and environmental protection issues at the source, and has formed a complete "chemical + new energy" circular economy industrial chain and material energy self-recycling system, achieving quality improvement, consumption reduction, and low-carbon development.



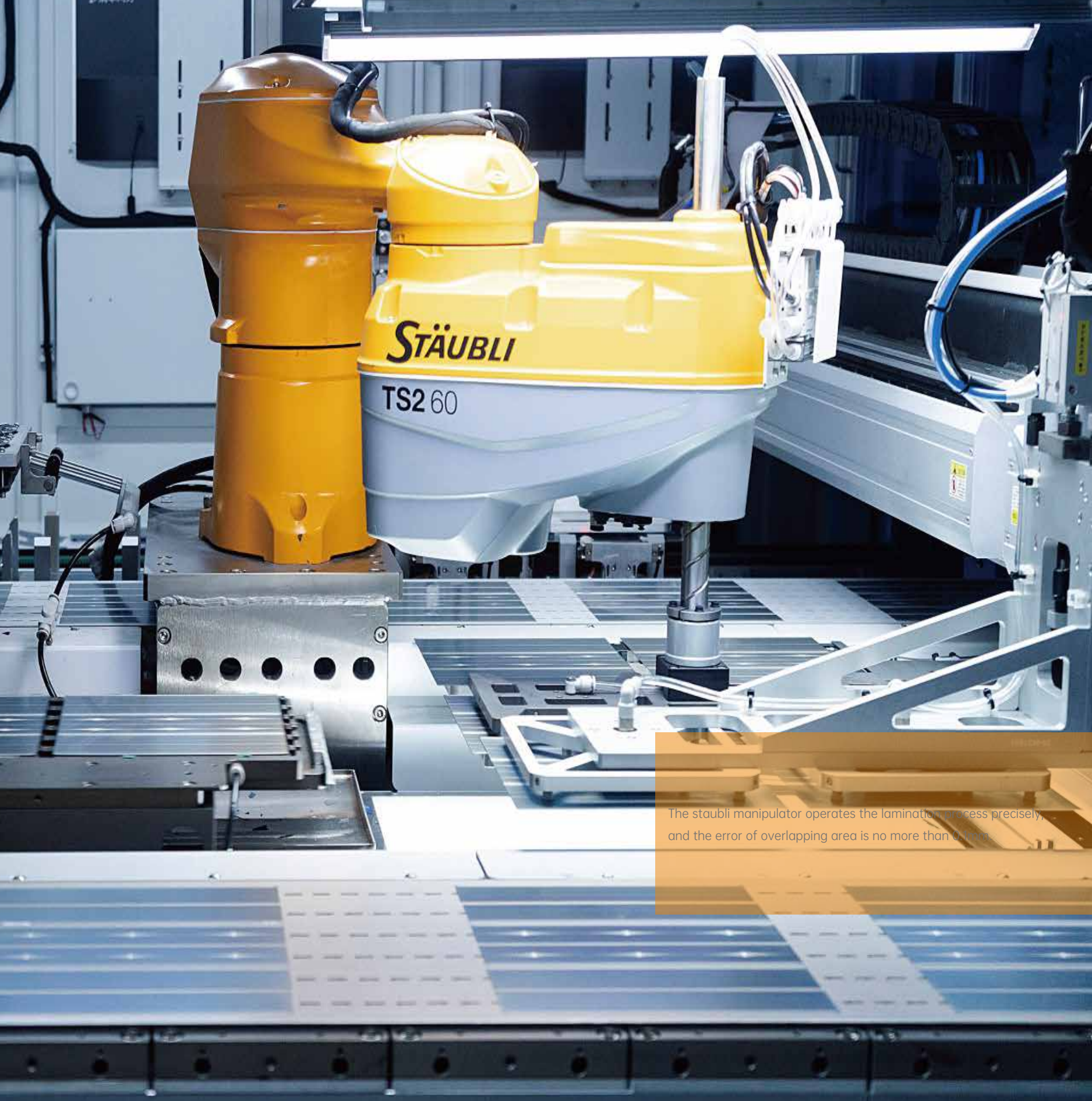
Tongwei High-purity Silicon Green Factory



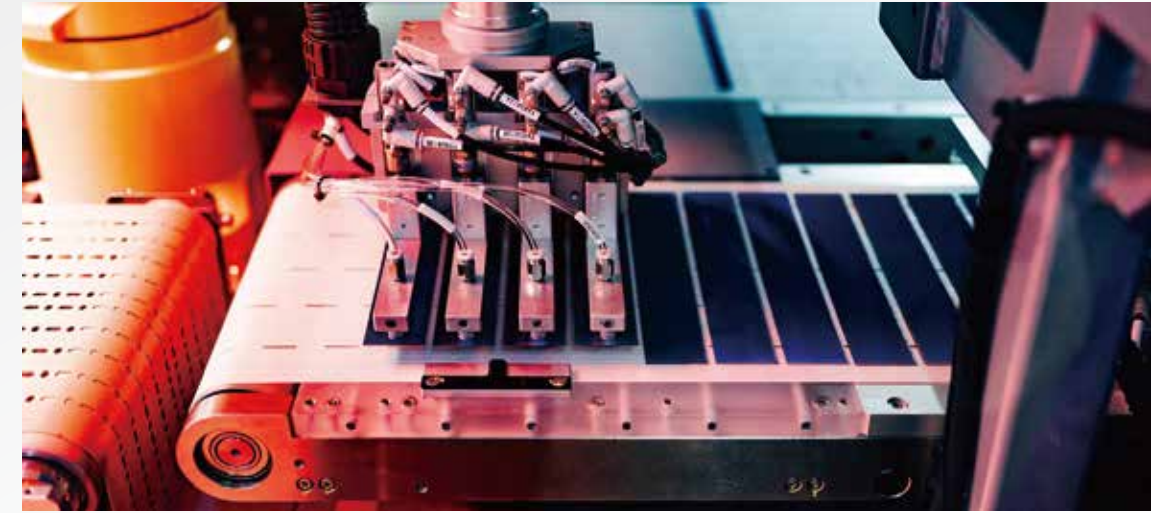
Tongwei Rectifying Tower Unit

# GREEN TONGWEI

Tongwei has implemented a large number of independent innovations in resource recycling, closed operation of materials, and recycling of by-products. The Self-established "Poly-silicon Technology Research Institute" focusing on exhaust gas recovery and gas separation technology. Besides, the calcium carbide slag cement production line can produce calcium carbide slag and cinder generated by PVC as raw materials to produce cement, and the utilization rate of waste slag reaches 100%. In addition, after the implementation of the technical transformation of coal-fired boilers, high-efficiency and eco-friendly gas boilers were put into use, and had the advantages of high degree of automation, less environmental pollution, less maintenance and less manpower investment.



The Staubli manipulator operates the lamination process precisely, and the error of overlapping area is no more than 0.1mm.



The all-in-one cutting and stacking machine ensures lossless slices and accurate lamination.

# QUALITY TONGWEI

The production manufacturing of Tongwei Solar is completed by highly intelligent and automated production equipment. By introducing smart management, the tracking of the entire production process is realized, and deviation correction can be completed in time by on-line detection equipment, so that the production capacity and product quality are much higher than the industry average. Tongwei solar has formulated dozens of production and technical indicators such as conversion efficiency, comprehensive energy consumption, and capacity utilization rate, and strictly follow the quality principle to ensure safe and reliable Tongwei quality.

# APPLICATION SCENARIOS

Spain, 7.8KW

10 TONS CO<sub>2</sub> EMISSIONS SAVED ANNUALLY



SWEDEN, 33KW

43 TONS CO<sub>2</sub> EMISSIONS SAVED ANNUALLY



UKRAINE, 20KW

26 TONS CO<sub>2</sub> EMISSIONS SAVED ANNUALLY



POLAND, 21KW

27 TONS CO<sub>2</sub> EMISSIONS SAVED ANNUALLY



UK, 1.99MW

2613 TONS CO<sub>2</sub> EMISSIONS SAVED ANNUALLY



ITALY, 20MW

26130 TONS CO<sub>2</sub> EMISSIONS SAVED ANNUALLY



ARMENIA, 6.7MW

8753 TONS CO<sub>2</sub> EMISSIONS SAVED ANNUALLY



CHINA, 120MW

156770 TONS CO<sub>2</sub> EMISSIONS SAVED ANNUALLY



# ESG PLAN

**83.05%**

Proportion of recycled water usage

**100%**

Employee health examinations coverage

**33%**

Proportion of female directors

**113%**

YoY growth rate of clean energy electricity usage

**455**

Distributions of care fund

**34**

Anti-corruption positions



**138.70 billion kWh**

Annual clean energy generation

**755,644 hectares**

Equivalent area of planted forest



**Over 55 million tons**

Annual standard coal reduction



**138 million tons**

CO<sub>2</sub> emission reduction



**14,009 tons**

SO<sub>2</sub> emission reduction

