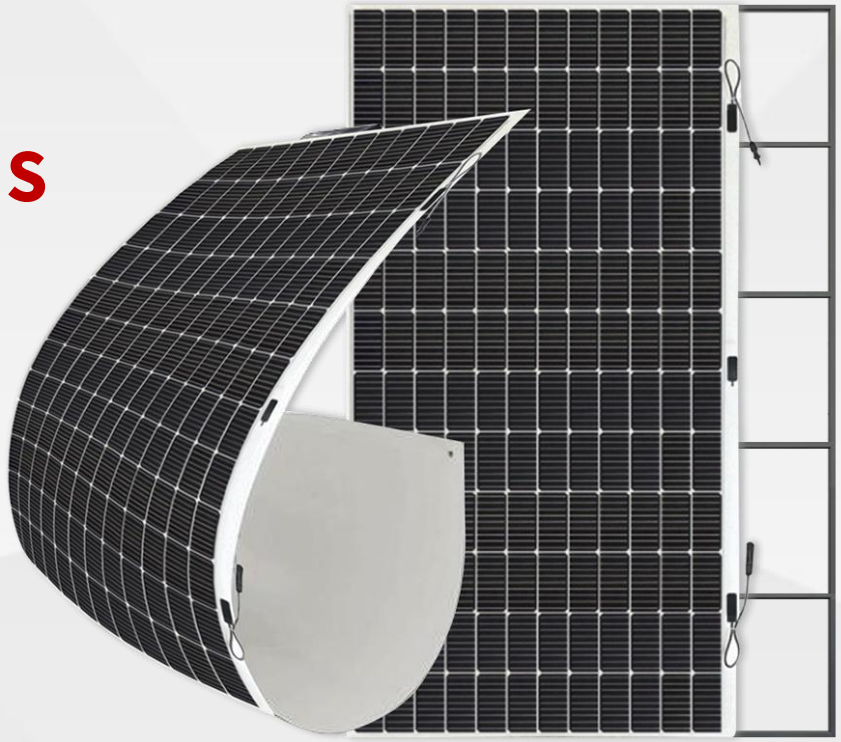
X-SOLAR™

X-solar XSFM series

LIGHTWEIGHT FLEXIBLE MODULES INTRODUCTION

INTRODUCTION TO LIGHTWEIGHT FLEXIBLE MODULES

Lighter **Softer** **Thinner**



August 2025

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COMPANY INTRODUCTION

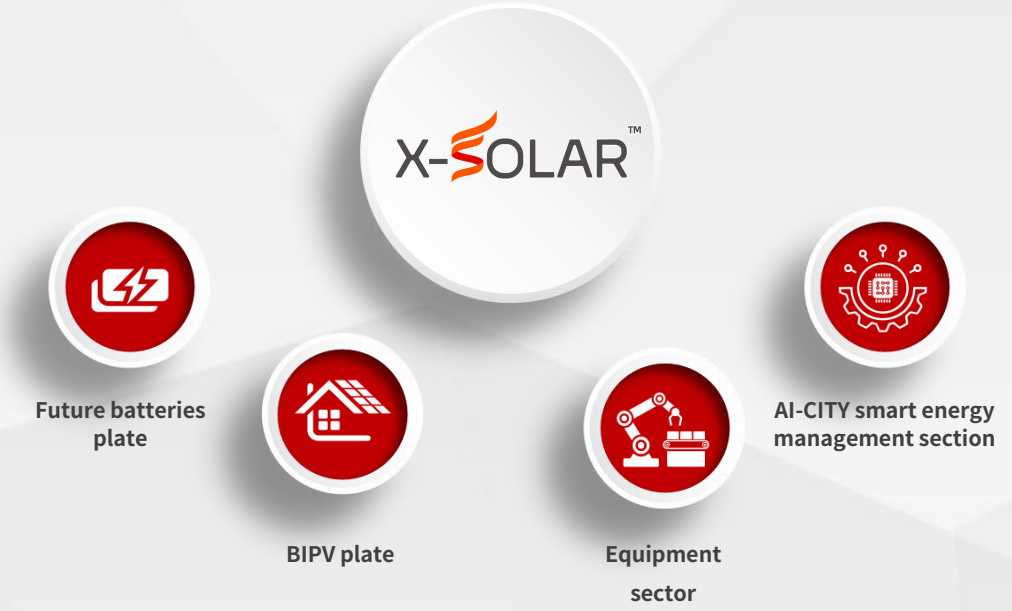
1.1 Company Profile

Beijing X-solar Energy Co., Ltd. was established in September 2020 and is headquartered in Beijing. It is a technology-innovative energy company with future cell process research and development, flexible photovoltaic modules, BIPV building photovoltaic modules, high-end equipment manufacturing, production line delivery, and AI-CITY smart energy management services as its main business.

In July 2023, the company's first demonstration factory, Jiangsu X-Solar Green Building Technology Co., LTD., was established in Jiangyin. Jiangsu Yuanteng Fengsheng Intelligent Manufacturing Technology Co.,Ltd., a wholly-owned equipment company of the company, has developed and delivered the world's first "three-in-one" automated production line for the Jiangyin base. This production line is capable of manufacturing three major categories of products: Flexible photovoltaic modules, BIPV building photovoltaic tile modules, and BIPV building photovoltaic wall modules, as well as customized products. X-solar's photovoltaic series products have the advantages of integrating architectural aesthetics, conforming to design standards, and creating energy value.

In 2024, X-Solar Energy launched a global layout, providing sustainable energy products and services to many countries, and has been widely recognized and praised by domestic and foreign customers.

The company's mission is: to create a better life with sustainable energy.



1.2 Relevant patents

Since its establishment, the company has completed product research and development, process research and development, equipment research and development
There are 220+ patents in reserve, and 38 patents have been issued so far, including 11 invention patents.

1.3 Authoritative certification

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Domestic and foreign authoritative certification, is the recognition of X-solar quality!

- ✔ ISO three-system certificate
- ✔ TÜV SÜD certification certificate
- ✔ National compulsory product certification 3C certificate
- ✔ Product quality CQC certification
- ✔ EU CE certification
- ✔ IEC certification


NOA

质量管理体系认证证书

江苏兴晟绿建科技有限公司

注册地址：江阴市申港街道申新路 502 号

审核地址：江苏省无锡市江阴市镇澄路 1011 号 M2 厂房

GB/T 19001-2016 idt ISO9001:2015 标准

认证范围

BIPV 光伏组件的研发，生产和销售


CERTIFICATE

No. Z2 124365 0001 Rev. 00

Holder of Certificate: Jiangsu X-Solar Green-Building Technology Co., Ltd.
No.502 Shenxin Road, ShengangStreet
214400 Jiangyin City
PEOPLE'S REPUBLIC OF CHINA

Certification Mark:

Product: Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
Mono-Crystalline Silicon Photovoltaic Module

Test report no.: 704062409001-00

Valid until: 2029-06-10

Date, 2024-06-13

(Zhulin Zhang)


中国国家强制性产品认证证书

证书编号：2024051302046369

生产企业名称及地址
江苏兴晟绿建科技有限公司（工厂代码：B013589）
江苏江阴市镇澄路 1011 号

产品名称和系列、型号、规格
建筑用太阳能光伏夹层玻璃（晶体硅电池）
玻璃公称厚度 D＞8.07mm 中间层为 1.52mmPVB
详见证书附件

产品标准和技术要求
GB15763.3-2009《建筑用安全玻璃 第 3 部分：夹层玻璃》

上述产品符合 CNCA-C13-01：2014<<强制性产品认证实施规则 安全玻璃>>的要求，特发此证。

发证日期：2024 年 6 月 21 日　有效期至：2029 年 6 月 20 日

证书信息和有效性可扫描下方二维码或登录发证机构网站查验，
也可在认监委网站（www.cnca.gov.cn）查询。

签发人：

中国检测认证集团有限公司

www.ctc.ac.cn　北京市朝阳区管庄东里 100024　电话：010-51167027

Quality system certification

TÜV certification

China Quality Certification Center

EU mandatory product safety certification

China Compulsory Certification

IEC certification

Honor builds the brand, strength witness the glory

2024
Influential photovoltaic new enterprise

2024 China's new energy industry High-tech and high-growth enterprise

The 7th China User and Business Fair will be held in 2025 Industry Optical storage and charging industry project award

02
Part

FLEXIBLE MODULES INTRODUCTION

2.1 Pain points of traditional modules and industrial scenario applications

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PAIN POINTS OF TRADITIONAL MODULES APPLICATIONS>>>

- **HIGH LOAD REQUIREMENTS**
  Heavy weight, bracket installation, high roof load requirements
- **HIGH ADDITIONAL COST**
  Steel structure/consumables costs, labor costs due to complex construction
- **SECURITY RISKS**
  The rate of glass explosion is 3/1000, which is a potential safety hazard.

INDUSTRIAL SCENARIO APPLICATIONS PAIN POINTS>>>

2.2 Hit the pain point (product advantages)

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VS Traditional glass modules

Lighter

- Only about 30% of the traditional weight, to solve the problem of insufficient roof load of storage weight
- No need to take root, solve the application difficulties of color steel plate drilling
- Lightweight BIPV components, lightweight + the best choice to prevent hidden cracks

Softer

- It can be better integrated into the architectural design, provide more diversified appearance and composite solutions, adapt to different surfaces and shapes, so that the photovoltaic system can be perfectly combined with the building, reducing the restrictions on the design

Energy conservation environmental protection

- Good thermal insulation performance, the heat conduction coefficient is 1/8 of glass carbon footprint is low, green environmental protection

VS Other similar lightweight modules

X-solar flexibility

- In-depth research and technical iteration on packaging materials can solve the shortcomings of other light component brands, such as insufficient light transmission and poor water resistance, and have higher and more stable power generation efficiency.

Product weight

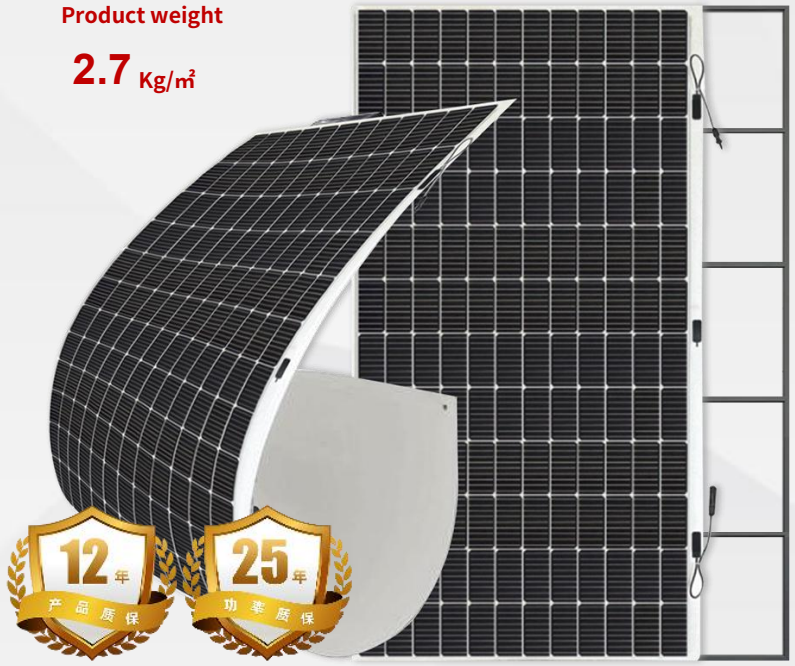
2.7 Kg/m²

Module model	Module size
XSFM-120-T2	1545×425×2.7mm
XSFM-200-T	1150×927× 2.7 mm
XSFM-290-T2	2260×1209× 2.7 mm
XSFM-300-T2	2260×644× 2.7 mm
XSFM-350-T2	2260×735× 2.7 mm
XSFM-390-T2	2260×825× 2.7 mm
XSFM-430-T2	2260×918× 2.7 mm
XSFM-490-T2	2260×1020× 2.7 mm
XSFM-530-T2	2260×1110× 2.7 mm
XSFM-580-T2	2260×1209× 2.7 mm
XSFM-430-T3	1750x1150× 2.7 mm

2.3 Specifications of flexible modules

Product weight

2.7 Kg/㎡



High reliability in harsh environment testing

High flexibility fit all kinds of roofing

The lack of scaffolds cuts labor and reduces costs

Customizable dimensions save transportation costs

Realize mobile energy through various uses

Module model	Module size
XSFM-120-T2	1545×425×2.7mm
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XSFM-430-T3	1750x1150× 2.7 mm

2.4 Core advantages of X-solar flexible modules
—— Independent research and development of production lines

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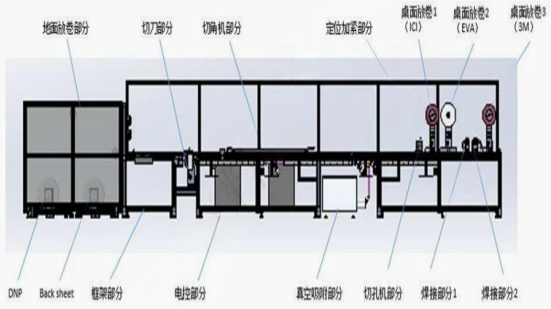
1 **The production process is stable and reliable**

Jiangsu Yuanteng Fengsheng, a wholly-owned equipment subsidiary of X-solar Energy, has independently developed a complete flexible component automated production line, which effectively and reliably guarantees the quality of mass-produced flexible components. With strong equipment maintenance capabilities, it greatly reduces product defects caused by faults.

BIPV整线工艺设备概述-MAS

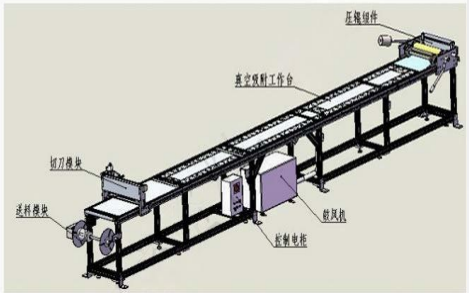
Module Assembly Station（组件铺设台）

设备整体结构



BIPV整线工艺设备概述-ADH

设备整体结构



BIPV整线工艺设备概述-MAS

设备包括：

(1) 台面：6米×1.2米×0.9米尺寸，木制或其他绝缘材料的光滑表面。

(2) 电源：产生测试需要的稳定电流。

(3) 手持红外相机

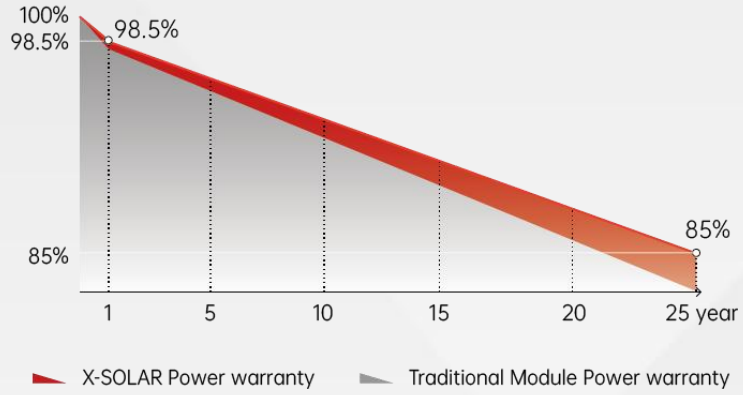
BIPV整线工艺设备概述-PLT

设备整体结构

2.4 X-solar flexible module core advantages —— High efficiency warranty

2

High security rating
Long warranty period



series	product model	Limited product warranty period	Limited power warranty period	First year decay rate	Annual decay rate	Power output guaranteed
Lightweight flexible modules	XSFM-580-T2	12	25	⩽1.5%	⩽0.4%	85.00%

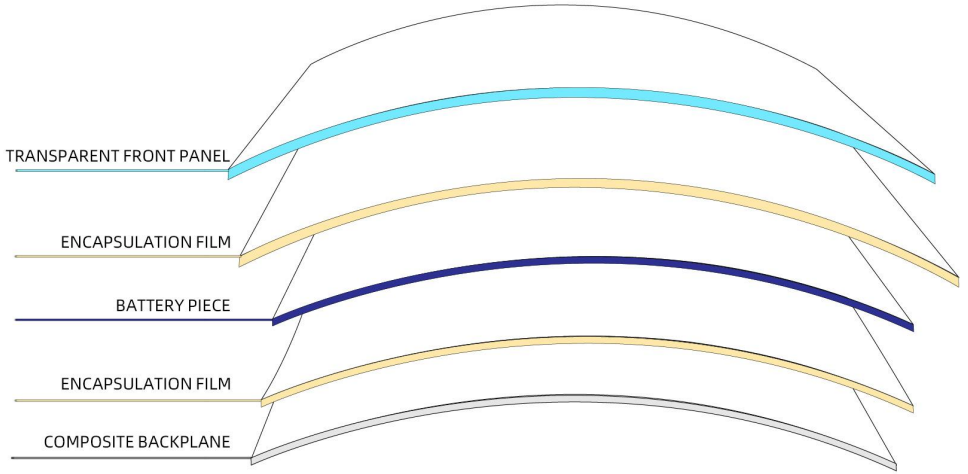
2.4 X-solar flexible component core advantage —— Technology leadership

Safe and reliable|Ultra-long durability |High efficiency power generation

Polymer transparent front film

Glass fiber reinforced materials

Reinforced composite backplane



·Improve water and gas barrier properties to prevent water vapor and other substances from invading the components,causing oxidation of the battery cells and separation from the backplane, thereby improving the stability of the components and extending their service life.

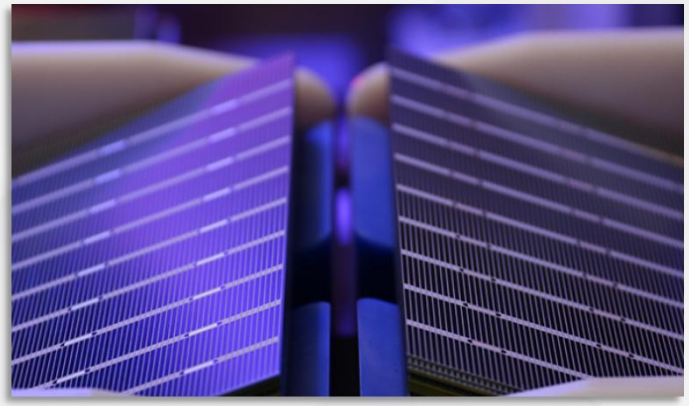
2.4 X-solar flexible module core advantage——Technology leadership

Polymer chain gene improvement technology

Transmittance is more than 91%, far exceeding similar products, photoelectric conversion without barrier Ultra high UV resistance to ensure 25 years of power generation efficiency

(Data support: 20 years of outdoor application data of polymer materials, 20,000 hours of accelerated aging test data, yellow traffic index Δ ≤3)

2.4 Core advantage of X-solar flexible modules——Battery technology



Resin and fiber interface Intensity improvement techniques

The modules is as high as 1300MPa,100% higher than competing products,improving the overall strength of the module,reducing the risk of hidden cracks in the cell,and improving the module's ability to resist hail

2.4 X-solar flexible modules core advantage——Leading performance

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Snow Loads

5400pa ↑ Above

High Winds

2400pa ↑ Above

Flexible Modules

MULTIPLE SPECIFICATIONS

Passed multiple test requirements recognized by TÜV SUD

- Hail Test ✓
  25mm ice ball, 23m/s speed
- Flammability/Fireresistance Test ✓
- Load Test ✓
- UV/ Wet Leakage Test ✓
- TC200/DH1000(Durability) ✓
- HF(Wet Freezing Test) ✓

High light transmittance

The light transmittance of the front membrane is 91% and the maximum conversion efficiency is 23.5%

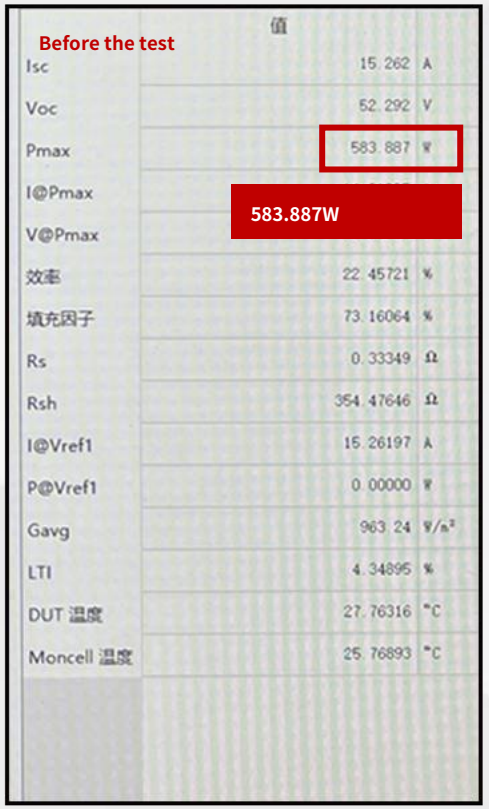
Light and soft

The thickness is 2.7 mm and the lightest weight is 2.7kg /m²
The modulus is 1300mpa and the bending radius is 0.5m

Strong weather resistance

Anti-aging: 28 years outdoor yellow index ΔLT ⩽3
Wind resistance: simulate the vibration frequency of typhoon 5000 times

2.5 Product test —— Hail resistance test data



EL test-slight traces

The test power before the experiment is: 583.887W;
The test power after hailstorm experiment is 582.568W,
The power attenuation is 1.319W, and the attenuation rate is 0.225%(the hail test standard is: the power attenuation is less than or equal to 5% is qualified)

2.5 Product test —— Hail resistance test video

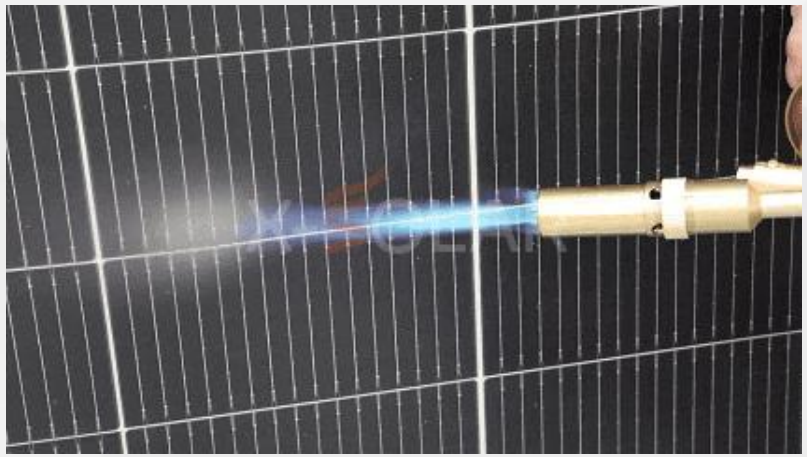
（The video can be provided by the proposer of the proposal）

2.5 Product test —— Flammability/fire resistance test

Nanohybrid modification and surface treatment flame retardation technology

The flame retardant grade of the components reaches building CLASS ii

Pass EN45545 EU flame retardant standard, TB/T3237 China iron standard flame retardant standard



The destructive test of laboratory fire proved that the component would self-extinguish within 0.8 seconds under open flame, and no ignition would occur within 30 seconds under dark fire 600°C.

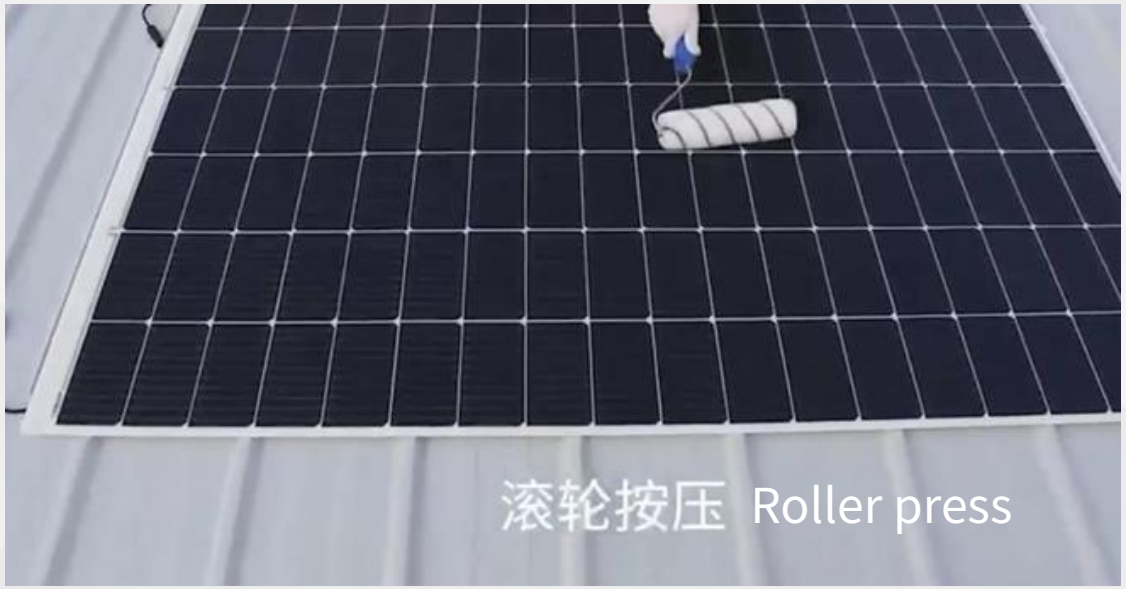
2.5 Product test —— Resistance to a 14th-level typhoon video

(Video can be provided by the proposer)

2.6 X-solar Flexible Modules Core advantages
—— Installation and operation advantages

- The product uses high strength, impact-resistant packaging materials. After many simulated transportation tests, the product is guaranteed to be intact in land transport, sea transport and other environments.
- The use of structural glue or fixture installation can be adapted to different roofs.

Clutch installation	Clutch installation	Gum	Gum
Vertical color steel roof	Corner shaped color steel roof	Tie trapezoidal color steel roof	Cement flat roof
Gum	Gum	Gum	Gum
PVC Waterproof roof	Asphalt waterproof roof	TPO waterproof roof	A curved roof



2.7 X-solar Flexible Modules-after—— Sales service

In order to ensure the efficient and stable operation of the photovoltaic system, X-solar Energy also provides professional photovoltaic operation and maintenance services.

System monitoring And data analysis	Real-time monitoring of power generation, performance ratio and other key indicators. Data-driven optimization strategy.
Regular inspection Cleanliness	Check and clean the components regularly to maintain efficient light absorption.
Preventive maintenance	Change vulnerable parts regularly and check electrical connections.
Fault diagnosis Repair and restoration	Quick response and processing of system alarms to reduce downtime.
Security administration And training	Formulate and improve the safety management system to ensure the safe operation of operation and maintenance personnel. Provide skills training for the operation and maintenance team to improve service level.

2.7 X-solar Flexible Module PV-After-sales Service

Real-time data monitoring

AI technology

- Intelligent data acquisition
- Intelligent fault alarm
- Automatically create and assign defects
- Intelligent inspection
- Intelligent trend analysis

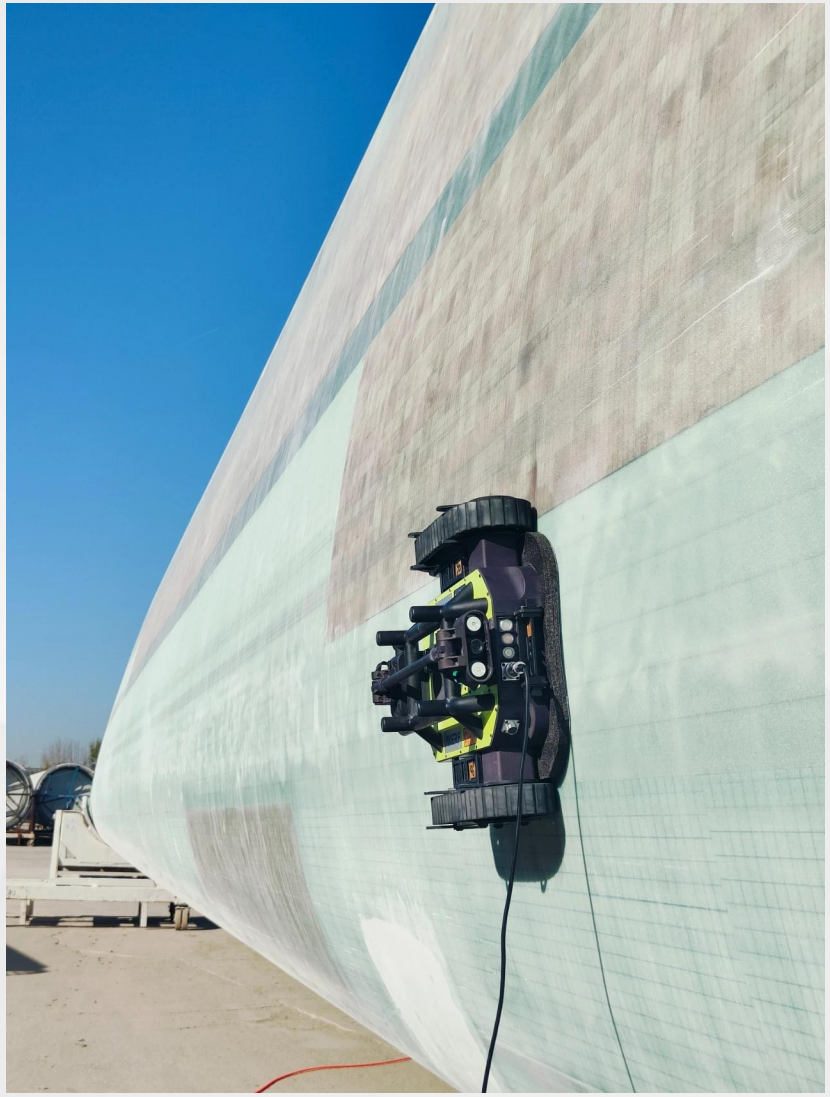
Big data technology

- A benchmarking platform based on big data technology
- Performance analysis based on big data technology

2.7 X-solar Flexible Module PV-After-sales Service

Regular inspection and cleaning

The company provides scheduled maintenance for photovoltaic equipment, recommending 1-2 annual cleanings. Optimal cleaning times are during off-peak hours or early morning/evening when sunlight is minimal. Industry-standard robotic cleaners are widely adopted due to their cost-effectiveness and thorough cleaning performance. For heavily soiled modules, use soft brushes or water-based solutions instead of corrosive solvents or abrasive materials. Regular surface cleaning effectively removes dust and contaminants, maintains optimal light transmission, and enhances power generation efficiency.



2.7 X-solar Flexible Module PV-After-sales Service

Hidden danger investigation

During routine inspections, thoroughly identify potential fault risks and perform scheduled maintenance on power lines. When photovoltaic modules malfunction, replace them promptly while meticulously documenting their installation locations within the solar array. The backend system enables real-time monitoring of power generation output. Should any fluctuation in output exceed normal parameters, immediately investigate the cause and implement corrective measures.

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03
Part

APPLICATION SCENARIOS

3.1 Application scenario categories

Commercial building

Industrial architecture

Agricultural greenhouses

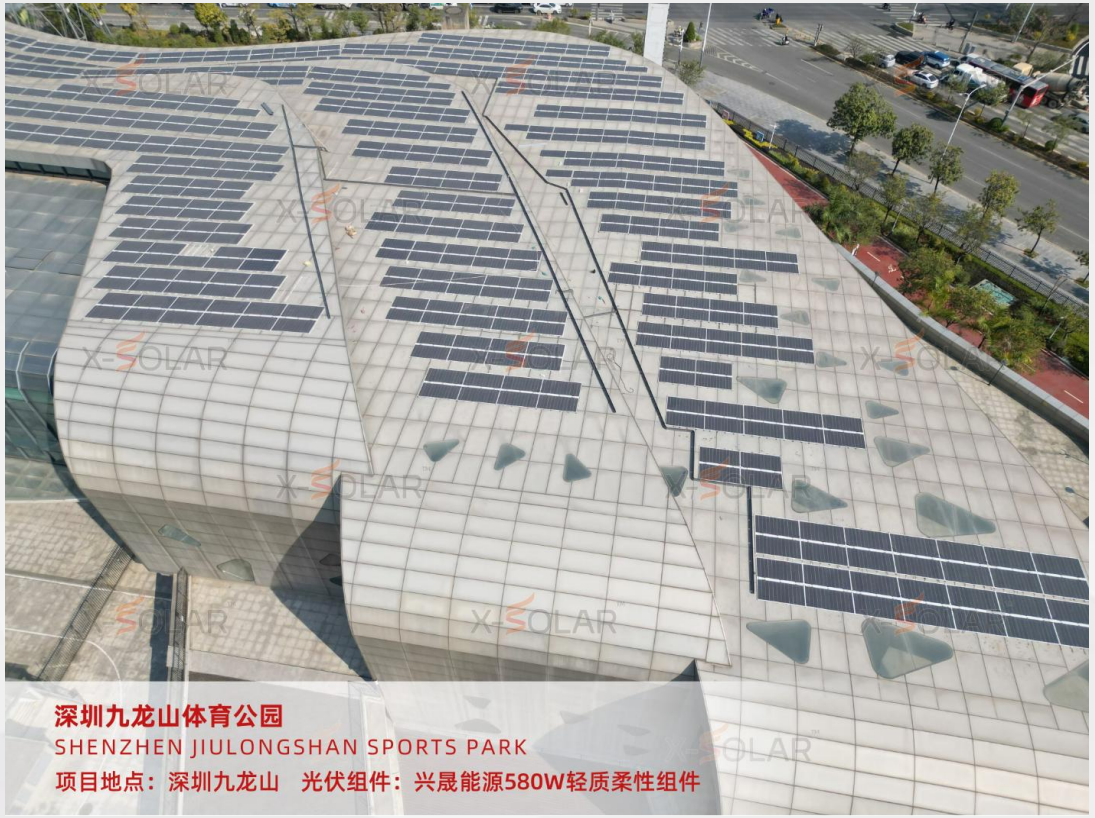
Residential villa

Balcony

Shipping

Vehicle

3.1 Application scenarios



Project location: Shenzhen

Component type: Flexible module

Installed capacity: 500kw

The gas stations roof is equipped with lightweight flexible panels that generate solar power to meet its energy needs. These panels, featuring a "light, thin, flexible and safe" design, seamlessly integrate with the rooftop structure. Operating autonomously under sunlight without emitting any pollutants, they deliver true low-carbon efficiency and eco-friendly solutions through sustainable energy production.

3.1 Application scenarios

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Light softens all things, and light takes a new dimension

High-speed rail station

Factory roof

Commercial complex

Conference and exhibition center

Stadium

Road sound barrier

3.2 Application layout

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- Industrial and commercial factory roofs

- Public/municipal buildings

- Transportation photovoltaic

3.3 Application scenarios —— Lightweight flexible modules

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Tianjin photovoltaic bus stop project

➢The platform top is equipped with lightweight flexible modules that generate solar power to supply energy for public transportation systems. These modules feature a "thin, lightweight, and flexible" design that seamlessly integrates with the platform surface. As long as sunlight is available, the station can self-power itself without emitting any pollutants, truly achieving low-carbon energy efficiency and eco-friendly operation.

➢As a vital mode of transportation in urban life, public buses are deeply intertwined with peoples daily routines. The implementation of this project serves as a positive demonstration, providing robust support for comprehensively showcasing a multi-dimensional and aesthetically pleasing urban image, establishing a complete integrated ecosystem, creating convenient supporting facilities, and ultimately building a national green development demonstration zone.

3.3 Application scenarios —— Lightweight flexible modules

Flexible roof project at Maaspoort Sports Center, Netherlands

- Project location: Den Bosch, Netherlands
- Component type: flexible module
- Installed capacity: 150kw

3.3 Application scenarios —— Lightweight flexible modules

X-SOLAR™

BIPV photovoltaic project, Raphael Cloud Corridor, south of Chaohujing, Shanghai

The lightweight flexible module technology adopted by Rafael Cloud Corridor, whose battery modules are light, thin and flexible, can be easily installed and flexibly applied to complex environments such as light steel roof which cannot be handled by traditional photovoltaic modules. It has been widely used in the world.

3.3 Application scenarios —— Lightweight flexible modules

ABG Solar truck application project in the Netherlands

Location: Netherlands Category: Vehicle installed capacity: 4 kW Component technology: Lightweight flexible modules

Project Introduction: This project is an innovative application of flexible modules. The 4kW flexible modules are installed on the top of trucks as an off-grid system application solution for transportation company trucks.

Lightweight flexible module shed

Creating a better life with sustainable energy

August 2025