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# A WORLD-CLASS SOLAR PRODUCT MANUFACTURER

**SHIFTING • THE FUTURE**

# ABOUT US

Stringent quality control is the cornerstone of Seraph's manufacturing. We have developed a thorough understanding of all of our customer's requirements, ensuring that our products can perfectly fit their requirements and applications. And these high-quality products have earned us increased loyalty from our long-term partners and newest customers. From an industry follower, Seraphim has now become a leader in every aspect of the business. Today Seraphim has more than 25 local offices around the world, employs more than 1500 people worldwide, and is dedicated to being a leader in product innovation and service upgrades.



Since its foundation in 2011, Seraphim has accomplished significant achievements and has been continuously pushing the boundaries of our industry in terms of production R&D and technology innovation. By far, Seraphim has reached a 12GW global production capacity. We have earned the Tier 1 distinction from BNEF for 10 consecutive years, and the Top Performer distinction from PVEL for 5 times. By the end of 2023, nearly 30GW of Seraphim modules were installed in over 100 countries, the excellent performance of these products has been widely verified under various natural conditions.



**TIER 1**

Listed by BNEF for 10 Consecutive Years



**12GW**

Global Production Capacity



**100+**

Technology Patents



**100+**

Destination Countries



**100+**

Global Financial Partners



**120+**

Technicians



**TOP PERFORMER**

By PVEL for 5 Times



**1500+**

Global Employees

# DRIVEN BY INNOVATION DELIVER BUSINESS VALUE

Seraphim has established itself as a technology leader in the solar industry. Focusing on the unique needs and installation conditions of customers in various countries, we've launched a variety of products including customized services, project types from large-scale power stations to commercial and residential rooftops.

The company has been awarded a number of advanced solar patented technologies. Our emphasis on R&D enables us to stay at the forefront of the solar industry, assisting customers in achieving higher returns.



Up to 22.5%  
Module Efficiency



Over 100 Global  
R&D Engineers



Multi-certification  
Laboratory

## World-Class R&D Center

As one of the world's leading manufacturers of photovoltaic products, Seraphim established an in-house R&D center in 2013. The center specializes in R&D and product testing for further development, new materials testing, client customization and periodic sample testing, etc., to provide technical support, thereby guaranteeing the product development and quality control.

The laboratory has been recognized as a CSA, TÜV Rheinland, and DEKRA witness laboratory, meanwhile obtaining accreditations and certifications from CNAS, CTC, TÜV SÜD, CGC, and other globally renowned institutions. This allows Seraphim to shorten the certification period and accelerate the speed of new product releases under our strict reliability control procedures.



A+A+A+ Rated  
H.A.L.M. Sun Simulator



ATLAS Fluorescent / UV  
Instrument



VOTSCH Walk-in  
Climate Simulation Chamber

# SMARTER MANUFACTURING, MORE GUARANTEED QUALITY

Seraphim has steadfastly worked with its partners to overcome any technical issues encountered. For the plant layout, a complete set of highly automated manufacturing architectures has been developed. In addition, Seraphim also uses statistical engineering, equipment control, and a variety of management systems to achieve lean production. While ensuring the consistency of product quality, we also strive to shorten the yield learning curve and new product mass production cycle, reduce production costs, and improve customer profitability.



HIGHLY  
AUTOMATED



REDUCE  
PRODUCTION COSTS



IMPROVE  
CUSTOMER PROFITABILITY



## AI-empowered Highly Flexible Modular Fully Automatic Production Line

To achieve a high utilization rate and efficiency, Seraphim has divided the entire production chain into separate closely united automatic production sectors, achieving 90%+ overall automation coverage. This results in the high-efficiency output of products and improves overall reliability, quality, and guarantees an easy configuration and modification to the production lines.

The upgraded new production line is fully compatible with 182mm, 210mm, TOPCon, HJT, and other specifications. Equipped with a fully digital management system and production equipment, and integrating AI intelligent detection, it enables precise inspection and intelligent positioning of risk points in key processes of the production line. This promotes the elevation of production data visualization and the network management of the workshop. Over 40 patents are applied to the production process optimization, which effectively avoids manual errors and makes sure all the production processes from raw material inspection to packing are all monitored online and saved for later use.

At the same time, the production department collects data from various key monitoring points in the production process to achieve further improvement in equipment, manufacturing process and yield.

**15%**

Lower  
production cost

**15%**

Higher equipment  
effectiveness

**24\*7**

Real-time online  
monitoring

**100+**

Patents on products and  
production process  
optimization

**99.9%**

Good product  
yield rate

**35%**

Higher production  
efficiency



## Real-Time Monitored And Recorded

Seraphim implements fully transparent manufacturing management and quality control. Through the self-developed ERP system, we track all procedures for manufacturing each PV module, achieving complete traceability from raw material to processing, testing, and delivery.

Starting from the first step of production, the ERP system assigns a unique barcode to each module. Information such as raw material suppliers, operators of each process, each online inspection result, and production date can be all viewed online through the ERP system. The data is stored on our servers for retracing all details, and it is available to clients as well. Thanks to this, Seraphim realized full-cycle monitoring of products. This huge database provides data support for us to further standardize product manufacturing and process improvements, also significantly improving the yield rate.



## Improved Company Competitiveness



Optimize line efficiency and process management



Increase yield rate and reduce production costs



Continuously improve capacity utilization



Transparent and traceable production processes

## Added Value For Customer



Customers can access real-time production data including BOM detail, EL reports, power data, etc.



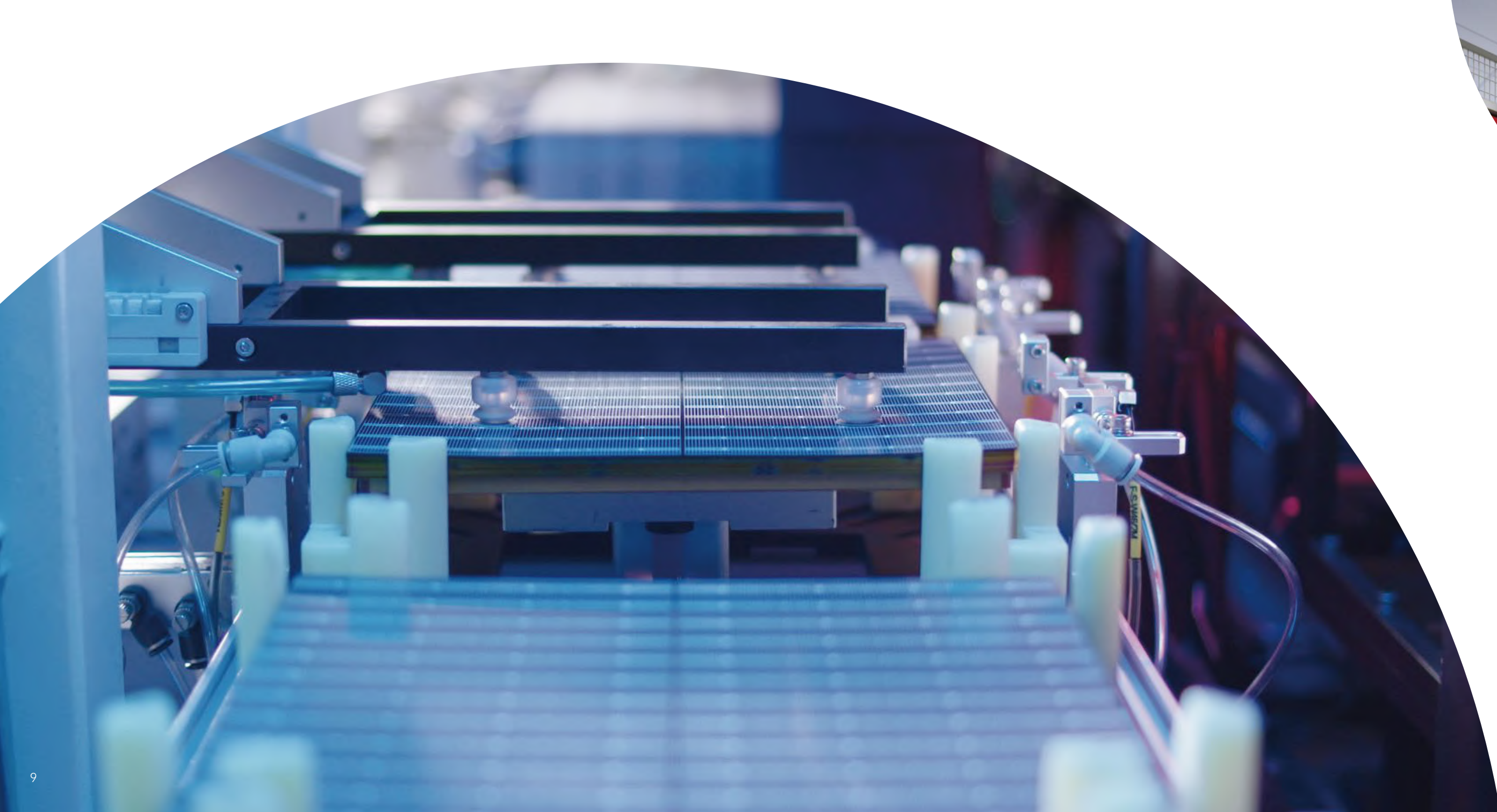
A unique barcode enables you to track all the information related to your order within 20 years



Real-time update of the order production status, delivery specifics, etc.



Visual access to real-time workshop floor monitor recordings via our ERP system



## **EXCELLENT PERFORMANCE AND CONSISTENT QUALITY**

Quality is Seraphim's core competitiveness. Starting from the initial stages of production, we rigorously control every step and hold ourselves and our products to strict standards. We take pride in the quality and reliable performance of our products, even in the most extreme conditions.

With over a decade of dedication, Seraphim has always insisted on the highest standards of product quality and performance. In the tide of advancing times, Seraphim values and seizes each opportunity to accelerate our path toward a greener future.



# Quality Management System




Seraphim has received certifications for Quality Management System (ISO 9001: 2015), Environment Management System (ISO 14001: 2015) and Occupational Health and Safety Management System (ISO45001: 2018) from both DNV and GZCC.



## Supply Chain Control

-  Stringent Supplier Management
-  Automatic Material Filtration and Sorting
-  Spot Check Every Feedstock Batch
-  Proper Storage at Fixed Temperature and Humidity
-  Supplier Quality Engineering (SQE)
-  Incoming-material Quality Assurance

## Production Control

-  300+ Quality Check Points
-  3 \* EL Tests
-  HALM Inside Production Lines

## After Production Inspection

-  Open Box Audit (OBA) Test



# Proven High Module Efficiency and Output

## Seraphim Has Been Recognized as a Top Performer in the PVEL PV Module Reliability Scorecard for the Fifth Time.

Seraphim passed the strictest accelerated stress testing and characterization under PV Evolution Labs Product Qualification Program (PQP) and earned 2017, 2019, 2020, 2021 and 2022 Top Performance. The PQP is a comprehensive evaluation of environmental sensitivities and degradation mechanisms of PV module designs.

In addition, Seraphim's module products have received the China Quality Certification Center's ("CQC") Top Runner Program Level One energy efficiency certification.





# DIVERSIFIED SOLAR MODULES MEET VARIOUS NEEDS

Seraphim redefines a variety of products by integrating large silicon wafers with bifacial-cell, multi-busbar, high-density encapsulation and other related technologies. With years of R&D investment, Seraphim innovates and continues to deliver highly competitive products and value to customers.



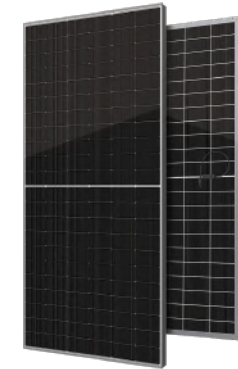
## Sable TOPCon series

- Module efficiency up to 22.45%
- Higher temperature coefficient (-0.29%/°C)
- Lower attenuation, Longer warranty (30 years)
- Lower BoS costs, Better ROI



## Seco PERC series

- Power output up to 670W
- Module efficiency up to 21.89%
- Lower internal consumption, parallel circuit design reduces shading impact
- Lower risk of hot spot effects
- Significantly reducing LCOE, savings BOS costs



## Hydra HJT series

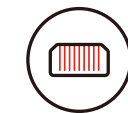
- Higher efficiency up to 23.18%
- Excellent temperature coefficient (-0.258%/°C)
- Higher bifaciality (90%±5%)
- Extremely low LID & PID degradation



## Nebula Lightweight dual-glass series

- Module efficiency up to 21.3%
- Thinner, lighter, with greater efficiency
- Significantly reducing LCOE, savings BOS costs
- Longer warranty (30 years)

## Product Advantages



**Multi-busbar Technology**  
Effectively increasing the efficiency and output power



**Superior load capacity**  
Able to withstand 5400 Pa pressure at front side and 2400 Pa at back side



**High module efficiency**  
Improved efficiency compared to PERC modules



**Excellent low-light performance**  
Output more power in low light conditions such as haze and cloudy days



**Reduced hot spot effect**  
Reducing the module hot spots risk



**Harsh environmental adaptability**  
Reliable quality enables better sustainability in harsh environments

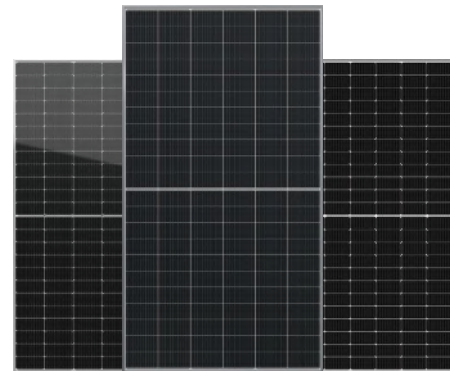


**Lower annual attenuation, Longer warranty**  
First year attenuation < 1%, annual attenuation < 0.4%



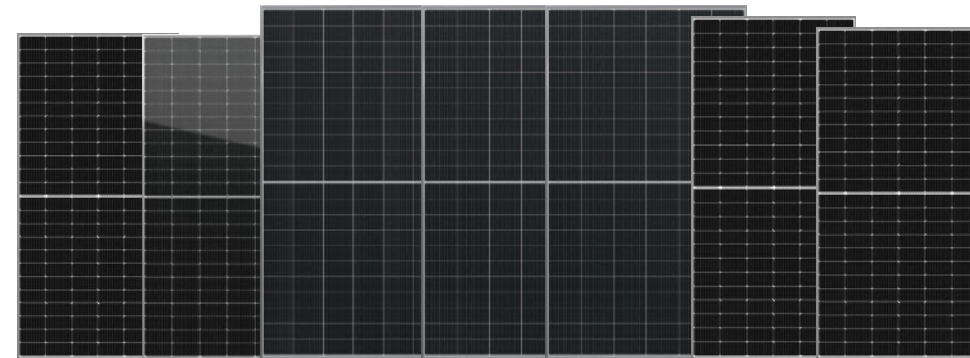
**Multi-busbar Technology**  
Effectively increasing the efficiency and output power

# Seraphim Product Roadmap



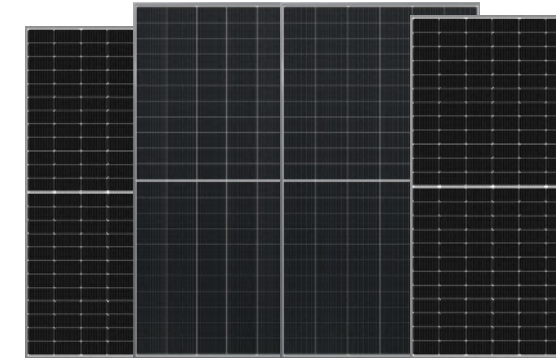
**560-680W**

PERC | TOPCon | HJT  
182\*182mm | 210\*210mm



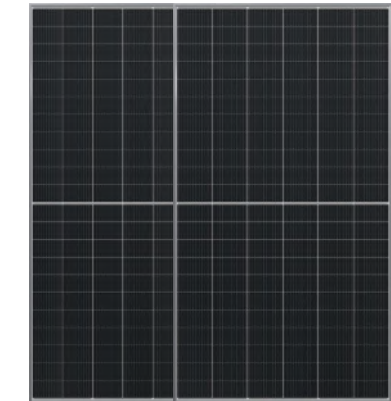
**560-730W**

PERC | TOPCon | HJT  
182\*182mm | 182\*188mm | 182\*191.6mm | 182\*210mm | 210\*210mm



**615-740W**

TOPCon | HJT  
182\*188mm | 182\*191.6mm | 182\*210mm | 210\*210mm



**640-750W**

TOPCon | HJT  
182\*210mm | 210\*210mm

**2023**

**2024**

**2025**

**2026**



# HIGH STANDARD ESG CONSTRUCTION LEADING SUSTAINABLE DEVELOPMENT

Seraphim is committed to becoming an enterprise that pays attention to social responsibility and sustainable development, adhering to the "community with a shared future for mankind" as its core and promoting the integration of sustainable development concepts into the company's decision-making, operations and management processes.

## Sustainable Development Path

### Strategic Development

Adhere to the promotion of sustainable development through scientific and technological innovation. Seize key strategic opportunities in the renewable energy sector, such as the 'Belt and Road' initiative, and more.

### Environmental Management

Firmly adhere to the carbon peaking and carbon neutrality goals and reduce the carbon footprint in the entire project process.

### Talent-oriented Management

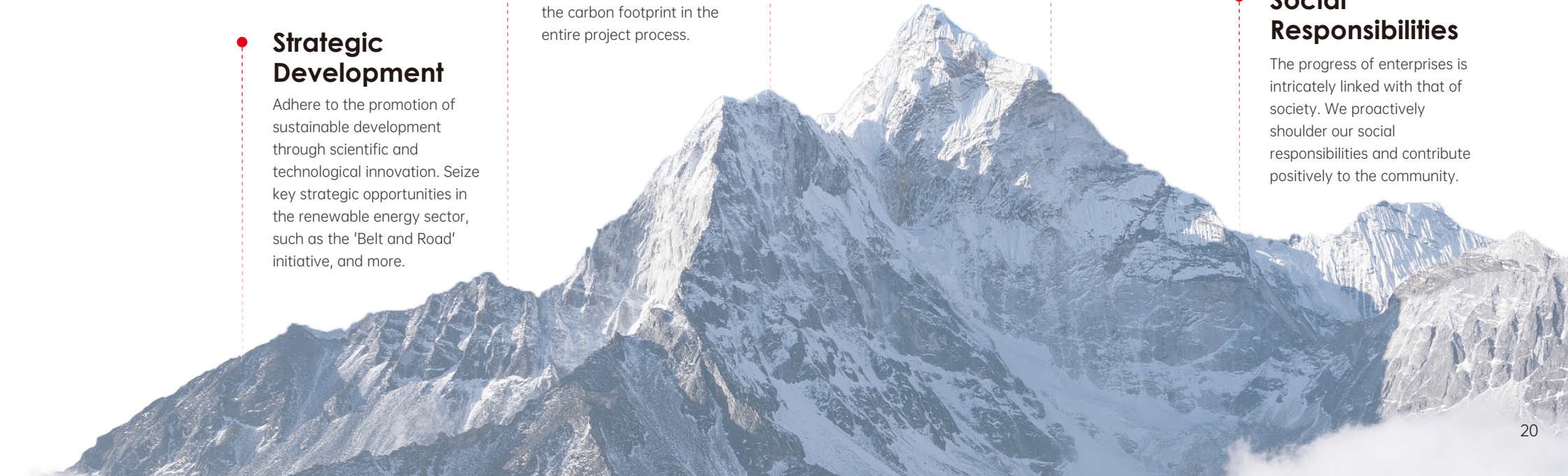
Talent is the key to the competition and development of modern enterprises. We pay attention to talents and aim to build a core team with international vision and responsibility.

### Sustainable Supply Chain

Standardize partners and work together to promote sustainable development.

### Social Responsibilities

The progress of enterprises is intricately linked with that of society. We proactively shoulder our social responsibilities and contribute positively to the community.



## Low-Carbon Product

In March 2023, Seraphim received the "low-carbon" certificate from CERTISOLIS for its PV modules. This adds advantages to Seraphim's European market development and injects vigorous momentum into our global strategic layout.

## Social Responsibilities

Adhering to the vision of "Shifting the Future", we leverage our advantages to support public welfare undertakings, seamlessly integrating environmental protection, humanistic care, and economic benefits, thus contributing Seraphim's strength to global sustainable development.

### Seraphim is devoted to promoting global sustainable development.



In December 2023, Seraphim was awarded another silver medal in the EcoVadis corporate social responsibility (CSR) rating, and will continue to make positive contributions to promoting energy reform, sustainable energy development, and creating a more beautiful social environment.



In May 2018, driven by our mission, Seraphim joined PV CYCLE, an international PV waste recycling organization. In this way, Seraphim's products can be recycled, and reused in the areas covered by the association, thereby contributing to the sustainable development of the economy and the environment.



In November 2021, Seraphim announced that it has officially joined the UN Global Compact, and will work with like-minded leading enterprises in various industries around the world to jointly promote global sustainable development and create a beautiful new world that meets human aspirations.

## Delivering Green Hope to the World



In October 2013, Seraphim donated a 5kW PV system to Heni Village Primary School in Litang, Sichuan, and Pajiang Village Primary School in Zhongba, Tibet.



In January 2018, the 10kW PV system jointly donated by Seraphim and China Energy Yunnan Power Technology Co., Ltd. was put into operation on the roof of Myanmar Ministry of Energy.



In November 2020, a 60kW rooftop PV system was donated to Hubei Xiangyang No. 12 Middle School. The project was connected to the grid in February 2021, generating 60,000 kWh of clean power.

## Convey Warmth to the Society



In February 2018, Seraphim and iHEARu Charity Fund reached a long-term partnership on the "Cognitive Center" project for hearing-impaired children.



On April 1, 2021, the World Autism Day, Seraphim joined the international "Light It Up Blue" campaign in Changzhou, donated ¥100,000 for autistic children's rehabilitation and was awarded "Caring Enterprise" by the Changzhou government.



In September 2022, Seraphim provided material assistance to Fenghang Children's Learning Ability Training and Rehabilitation Center in Tanning District, Changzhou to help the healthy growth of autistic children and contribute to the realization of global sustainable development.

# SEAMLESS SERVICES LET YOU ENJOY THE SUNSHINE



Seraphim provides all aspects of services prior to an order being placed. Meticulous and professional technology consultation is available, fully transparent ERP, including local offices and an online instant response system. This seamless service structure delivers all the benefits to guarantee your cozy life.



**24 \* 7 REAL-TIME MONITORING**  
ERP system allows you to observe production process online



**48-HOUR RESPONSE**  
Timely response warranty calls



**LOCAL OFFICES**  
Global network insures rapid on-site support



**TECHNOLOGY SUPPORT**  
Professional technical team helps maximize the benefits of your projects



**FINANCING SERVICE**  
Professional bankability support and assistance



**TAILOR-MADE EVALUATIONS AND RECOMMENDATIONS**  
Experienced sales and technical staff provide professional consultation



**MARKETING SUPPORT**  
Co-marketing to enhance your brand awareness



**CUSTOMIZED SERVICE**  
Customized service to meet your unique needs



**PV POLICY CONSULTATION**  
Experienced team of analysts provides up-to-date analysis and forecast

- Sales Center
- Manufacturing Plant



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