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Note: This datasheet is not legally binding. Phono Solar reserves the right to make specifications changes without notice. Further information can be found on our website: www.phonosolar.com

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Phono Solar  
SHARE THE SUN, POWER THE FUTURE!

2017



# In Search of Remarkable

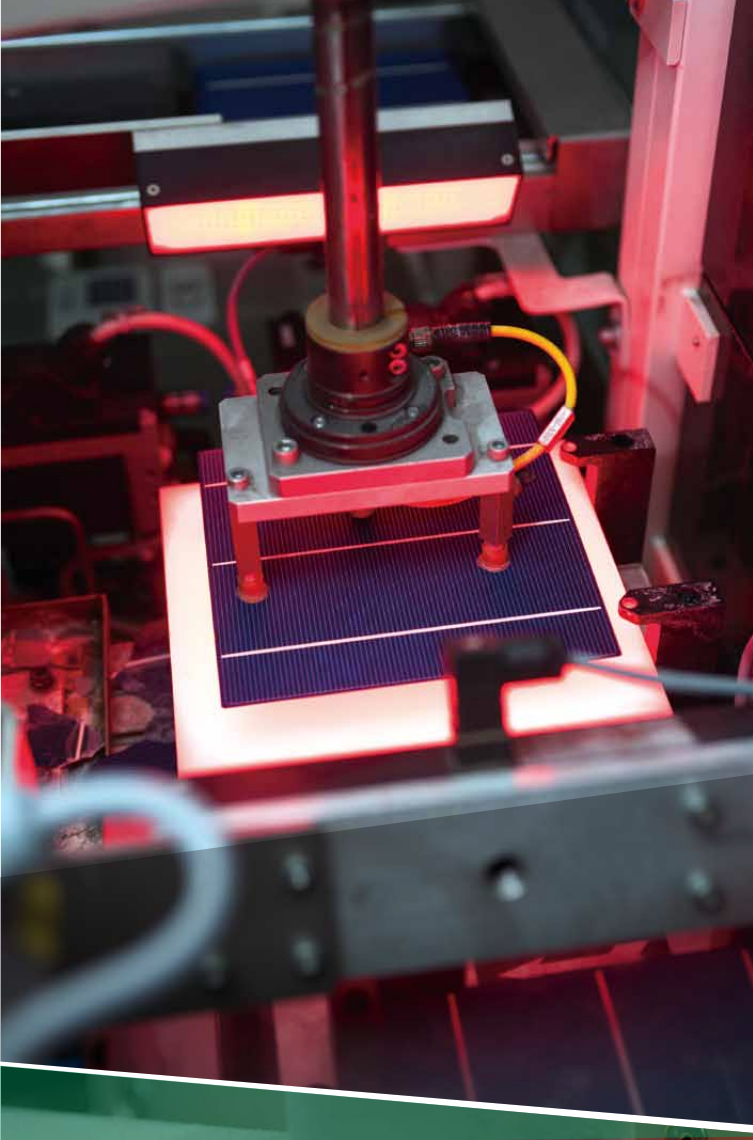
NOT COMPROMISING  
NOT MEDIOCRE  
NOT IGNORED

Member of SUMEC Group





# About Phono Solar



## Company Overview

Phono Solar Technology Co., Ltd., was founded by SUMEC Group Corporation, a member of the China National Machinery Industry Corporation (SINOMACH). Phono Solar is a leading brand in the new energy industry, providing high quality new energy products since 2004.

Driven by both innovations in technology and an effective brand strategy, Phono Solar continuously extends the industry chain downstream and has realized moderate horizontal expansion. This has been achieved through cutting-edge applications of technology including on/off-grid systems and smart micro-grid systems and also through the successful implementation of PV power plant investments, construction and operations globally.

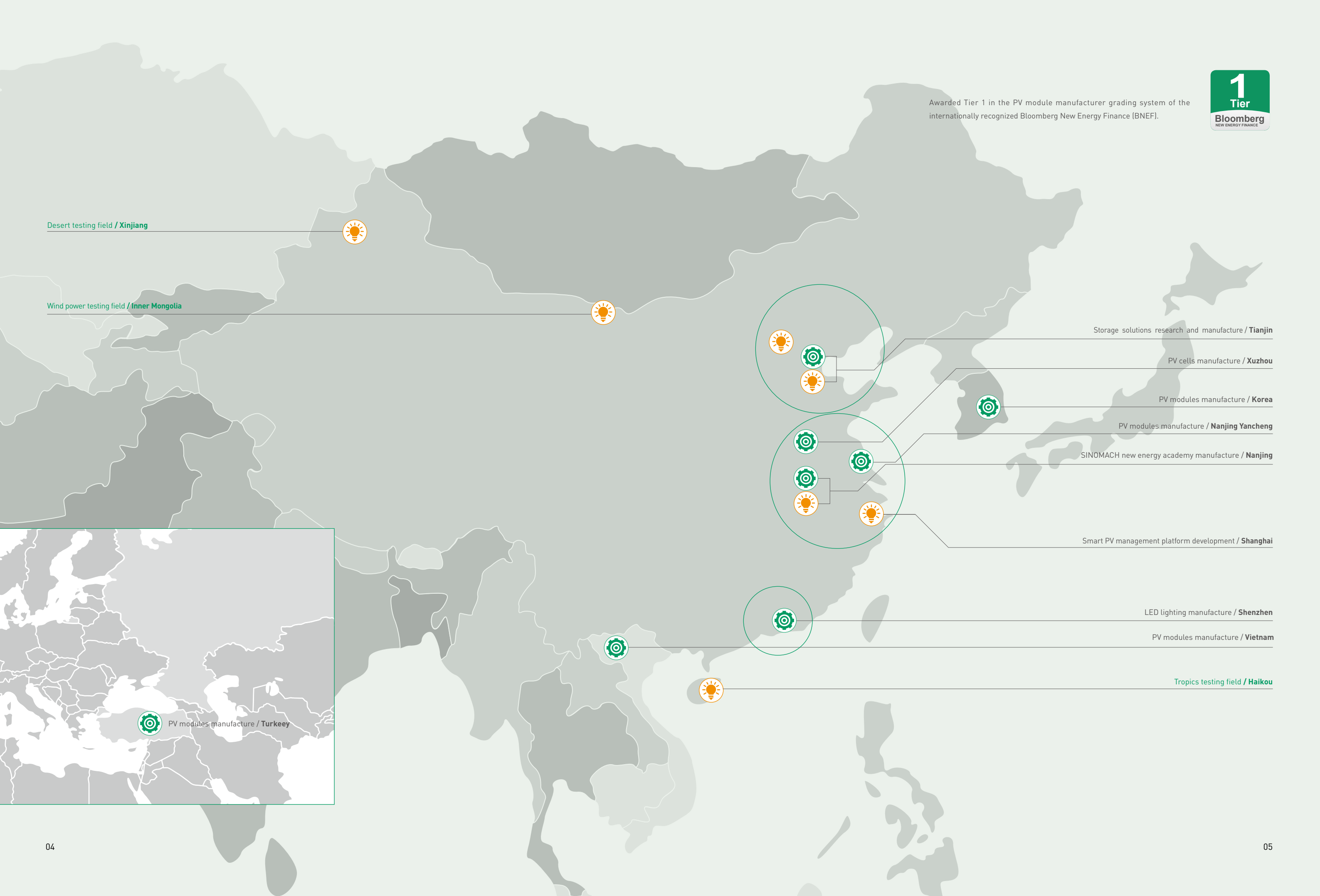
The Phono Solar brand has become synonymous with high performing, top quality photovoltaic modules and specializes in PV technology innovation, application and system development. The company is a KEY COMPONENT SUPPLIER, SYSTEM INTEGRATOR and PROJECT DEVELOPER. Phono Solar's worldwide sales and marketing network and service system effectively provides end-users with accessible clean energy, whilst promoting its core brand values of STABILITY, RELIABILITY and CREATIVITY.



## Leading Manufacturing

Phono Solar focuses on the manufacture of solar modules and selects only the highest quality materials and components. This, together with a world leading automated production line enables us to offer a competitive price for our modules. Our experienced engineers are committed to this round-the-clock operation and ensure each module, from soldering to packaging, flows smoothly along this world-class assembly line.





Desert testing field / **Xinjiang**

Wind power testing field / **Inner Mongolia**

Storage solutions research and manufacture / **Tianjin**

PV cells manufacture / **Xuzhou**

PV modules manufacture / **Korea**

PV modules manufacture / **Nanjing Yancheng**

SINOMACH new energy academy manufacture / **Nanjing**

Smart PV management platform development / **Shanghai**

LED lighting manufacture / **Shenzhen**

PV modules manufacture / **Vietnam**

Tropics testing field / **Haikou**

PV modules manufacture / **Turkey**

Awarded Tier 1 in the PV module manufacturer grading system of the internationally recognized Bloomberg New Energy Finance (BNEF).





## Rigorous Testing

Phono Solar owns a world leading PV testing centre, qualified by several international certification authorities. A broad range of equipment is used to conduct quality-control tests, product certifications, material reliability checks, and in-depth research. Up to 35 different tests can be run uninterrupted 24 hours a day, to higher standards than both IEC and UL. A 100% testing ratio for visual inspection, EL testing, pressure testing, mechanical load testing and age testing ensures that Phono Solar modules operate safely and smoothly for at least 25 years, therefore guaranteeing a strong and stable return on investment for investors.

### • Environmental Reliability Testing

*We put a selection of PV modules through extreme environmental testing to ensure reliability and superior performance in even the world's most unforgiving conditions.*

- UV Preconditioning
- Surface Impact
- Corrosive Atmospheres
- Hotspot Endurance
- Insulation (wet and dry)
- Thermal Cycling
- Wet Leakage
- Damp Heat
- Mechanical Load
- Highly Accelerated Stress
- Humidity Freeze
- Outdoor Exposure



### • Qualified Laboratory



## Experienced Products

The best way to verify solar module reliability is to observe its performance in a power plant. Modules must be able to withstand any external environmental factors and resist all types of natural stress as these both ultimately affect the power plant's performance and investment IRR.

Phono Solar can give customers real examples to prove product reliability. In Czech Republic, both Veprek and Smirice power plants use Phono Solar modules. Grid connected since 2010, the power plants have exceeded their expected electricity generation by over 15%.



Anti-PID



Certified to withstand increased loads of up to 5400Pa



Fire test resistance



Salt mist corrosion resistance



Ammonia corrosion resistance



Blowing sand resistance

## Insured Warranty

We provide customers with a 25-year warranty and liability insurance from a world-renowned insurance company to ensure your PV investment is secure.

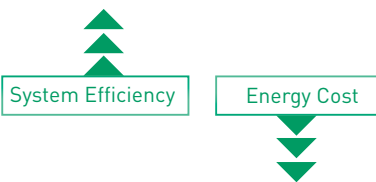
- 25-year Warranty
- Public Liability and Products Liability Insurance
- Manufactures Errors & Omissions Insurance



## Research & Development

We strive to develop products and optimize our business model to meet growing and changing market demands. We are committed to developing highly efficient and affordable new energy products in both technologically and commercially innovative ways, and to offering flexible services to achieve success with our customers.

### • Target



### • Focus

- Cells and Modules
- Black Silicon
- PV System PR
- Storage Systems

### • Partners



HUAWEI







Southeast University

# Top Class Materials

## Ultra Clear AR Coating Tempered PV Glass

**Higher Transmittance**  
Higher Than Common Glass **12%**

**Lower Reflection**  
Lower Than Common Glass **30%**

-   
Impact Resisted
-   
Pressure Resisted
-   
Sand Resisted
-   
Self-Cleaning

## High Efficiency PV Cells

**Higher Efficiency**  
up to **22.00%**

## EVA

**Higher Transmittance** **>91%**

## Longer Durability

No Delamination  
No Yellowing

## Connector & Junction box

**Durability**  
innovative full-glue-filled junction box  
Outstanding sealability

**IP68**  
waterproofness

**4mm<sup>2</sup>**  
qualified cable

**500N**  
tensile strength

**Top Brands**  
top-level accessories


## Back Sheet

**Super Isolation**  
multilayer structure, against 21kV Hi-Voltage breakdown test  
extremely low water absorption & permeability  
guarantee its perfect performance in damp circumstance


**Better Durability**  
withstand fire/dust/UV/tear tests  
ensure its long durability in practical application scenarios

## Frame

**Durability**




**120N**  
Serrated-clip design  
tensile strength




**110%**  
Seal-lip design  
glue injection

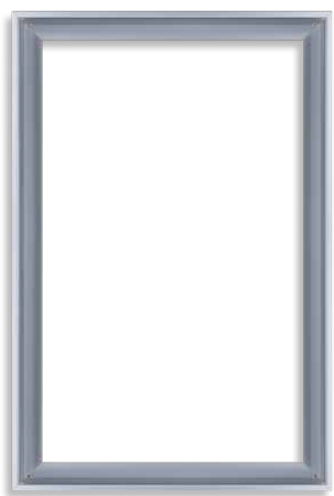
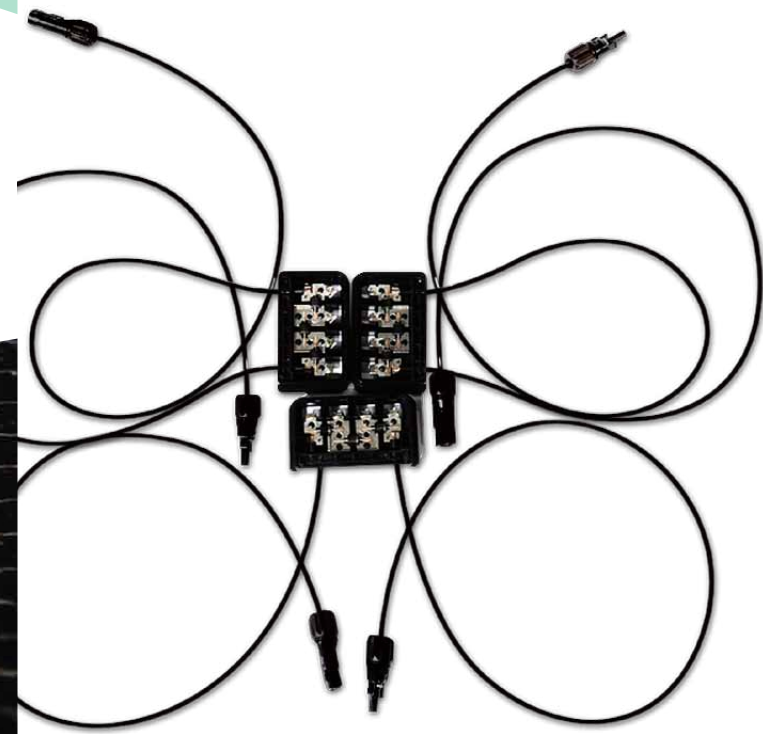
**User-friendly**



**16**  
drain holes  
drain away water  
effectively



☐ ☒  
black/silver  
optional







# Excellent Performance



● IEC standard ● DNV-GL

## THERMAL CYCLING TEST

Temperature	-40~90°C	Cycles	800
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### 4 Times Higher Than IEC Standard

Thermal Cycles Test ensures the modules and its components can withstand the outdoor-exposure for more than 20 years of seasons changing

## HUMIDITY-FREEZE TEST

Temperature	Humidity	Soak	Frozen	Cycles
85°C	85%	21hrs	-40°C	30

### 3 Times Higher Than IEC Standard

Being exposed outdoor in rain and snow during winter is a enormous challenge for modules. Moisture will penetrate into the pores on the glass surface, which will corrode the modules  
Good moisture and freezing resistant modules can survive and operate longer

## DAMP HEAT TEST

Temperature	Humidity	Period
85°C	85%	3000hrs

### 3 Times Higher Than IEC Standard

Working in hot and humid environment for long time, modules and its components such as EVA and back sheet, are subjected to high temperatures moisture erosion  
Good heat-resistant modules can generate more power and maintain its high effectiveness in the tropical and rainy region, while ensuring safety as well

## UV EXPOSURE TEST

Temperature	UV Irradiance
60°C	90KWh/m <sup>2</sup>

### 6 Times Higher Than IEC Standard

The high-intensity ultraviolet radiation in sunlight will destroy the molecular chains of organic compounds in the module material and reduce the light transmission together with its mechanical properties, resulting in lower module efficiency and power generation  
Our modules have superior UV resistance, which can prevent yellowing and delamination caused by ultraviolet light

## PID Test

Temperature	Humidity	Bias	Period
85°C	85%	600hrs	-1000V

Potential induced degradation (PID) is a potential induced performance degradation in modules caused by so-called stray currents  
Our modules' excellent performance in the test, effectively avoid the PID issue for customers





Anhui, China 40MW



Shandong, China 20MW



Germany 6.5MW

## Worldwide Tested Product



Japan 4.5MW



Anhui, China 11MW



Jiangsu, China 50MW





Czech 35MW



Shandong, China 50MW



Anhui, China 8.9MW



Shandong, China 15MW

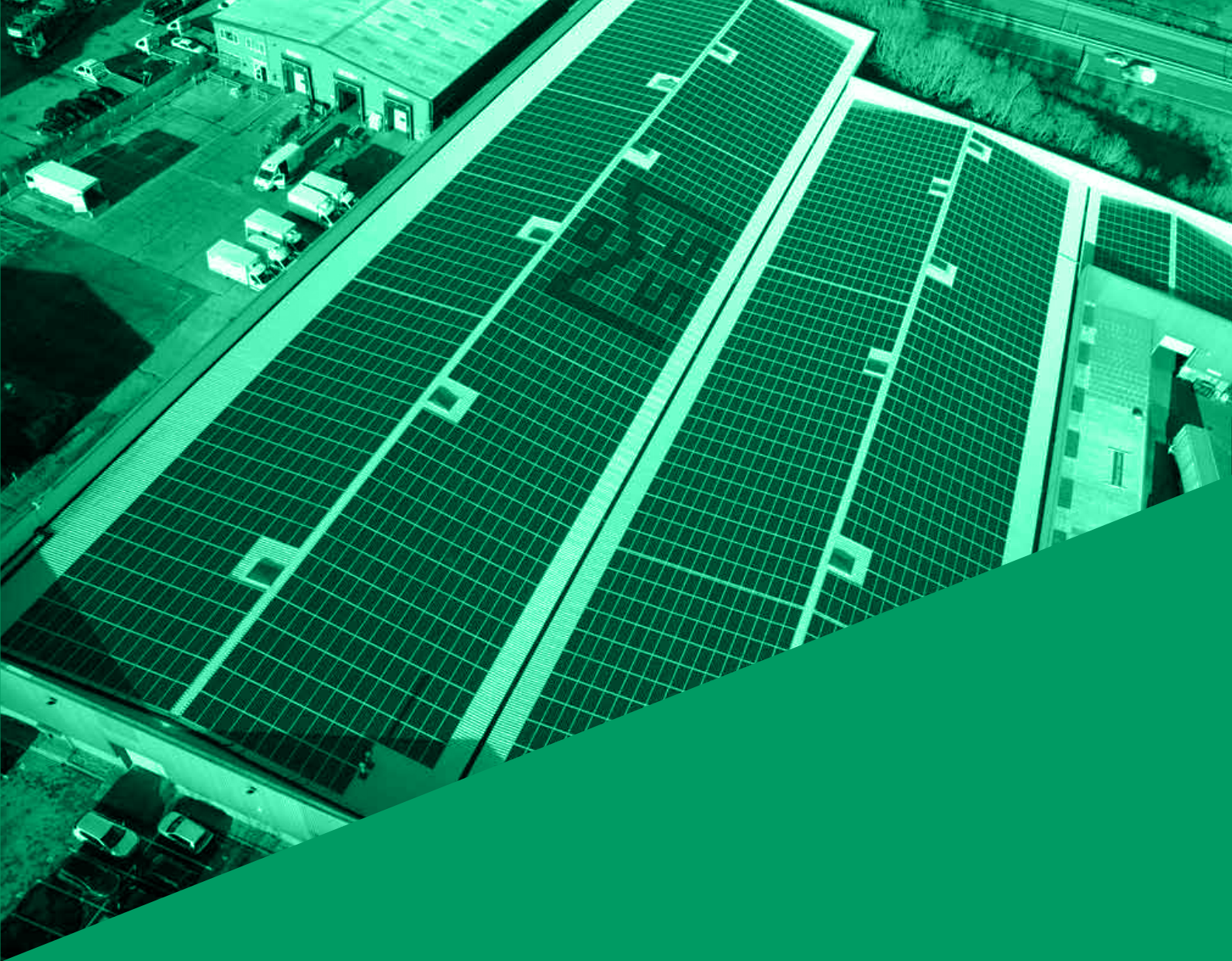


USA 28MW





Anhui, China 100MW



Shandong, China 30MW



USA 632KW