

CEC 中国电科

红太阳 照亮美好生活

RED SOLAR BRIGHTENS A BETTER LIFE



SEMICORE

**湖南红太阳新能源
科技有限公司**

HUNAN RED SOLAR NEW ENERGY SCIENCE
AND TECHNOLOGY CO., LTD.

湖南红太阳新能源科技有限公司
HUNAN RED SOLAR NEW ENERGY SCIENCE AND TECHNOLOGY CO.,LTD

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SEMICORE 烁科红太阳

十载风雨 筑梦绿色发展

Ten years of experience accumulated Building a green development dream

企业概括篇

Company overview

CEIC 中国电科



GROUP PROFILE

集团简介

中国电子科技集团有限公司（简称“中国电科”）成立于2002年，是经国务院批准，由中央直接管理的国有重要骨干企业；现有二级成员单位52家，上市公司9家，拥有国家级重点实验室18个，国家级研究中心和创新中心10个，位列世界500强企业第370位（2019年）。中国电科是国内唯一覆盖电子信息安全领域的大型科技集团；国内唯一在国家海洋、太空、网络三大战略领域发挥重要作用的军工集团；国内唯一能够同时为各兵种全方位提供信息化武器装备的军工集团；国内唯一能够为我军各种型号的装备提供各类关键元器件的企业集团；国内在公共安全和电子信息装备、仪器仪表的研制、生产和服务方面实力最强的国有中央企业。

中国电子装备集团有限公司（简称“电科装备”）成立于2013年，是中国电子科技集团有限公司的独资公司，由中国电科22所、45所和48所及11家控股公司整合而成。本部设在北京丰台科技园，注册资金24.5亿元，地域横跨6省市，分布在8个产业圈，包含3个研究所、11家全资及控股公司。电科装备是国内仪器仪表制造装备、新型平板显示器装备、光伏新能源装备以及太阳能光伏产业为主的科研生产骨干单位、大型企业集团，拥有国家光伏装备工程技术研究中心、国防科技工业军用微组装技术研究应用中心、国防科技工业有源层优化生长技术研究中心等国家级研发基地，具备集成电路高部成套和系统集成能力以及光伏太阳能产业链整线交钥匙能力。

CHINA ELECTRONICS TECHNOLOGY GROUP CORPORATION

A 100% china central government owned, super-large group which rank 370 in Fortune Global Top 500 and has 18 national key laboratories, 10 national research center and innovation center, 52 national engineering research centers (PV included), 52 affiliated research institute, and 9 public listed subsidiary companies. CETC core business: electronics for military use, electronics for security control, electronics for energy efficiency, electronics for system integration and information service, electronic devices and components and its advanced manufacturing.

CETC ELECTRONICS EQUIPMENT GROUP CO., LTD
Founded in 2013, CETC-E is a key member of CETC which has 2 institutes and 11 wholly owned holding companies. The HQ of CETC-E is located in Beijing Fengtai Science Park and registration capital 2.45 billion. Core business: PV equipment; PV products, IC manufacturing equipments, new flat panels display equipment, magnetic materials etc.





COMPANY PROFILE

公司简介



GROWTH FOOTPRINTS

成长历程

湖南红太阳新能源科技有限公司成立于2008年6月，隶属于中国电子科技集团有限公司，是中电科电子装备集团有限公司的全资子公司。公司集硅材料、高效单晶电池、光伏组件、光伏系统集成应用于一体，是先进的光伏全产业链制造商，产值规模位列长沙市工业前十强。

公司拥有2GW高效多晶硅锭、400MW切片，1GW太阳能高效电池（其中600MW高效PERC电池）、组件1.5GW的光伏光伏组件智能生产线，具备电力工程施工总承包资质、机电设备安装工程专业承包资质、承接(修、试)电力设施许可和工程咨询资质等，可为光伏发电系统工程提供一站式解决方案。

作为国家首批符合《光伏制造行业规范条件》企业、国家两化融合管理体系贯标试点企业、国家火炬计划重点高新技术企业、湖南省高新技术企业和企业技术中心，公司坚持科技创新引领，奋力推进高质量发展，组件产品获得欧洲TUV/CE、美国UL、英国MCS、澳洲CEC、中国CCC等权威机构质量认证。同时公司也是国家“领跑者计划”中坚成员，承担了国内外大量的光伏电站项目，在行业内具有很高的知名度和美誉度，获得客户的一致赞誉。

公司现有职工1200人，其中研究员级高工17人、高级工程师81人、工程师287人、国家级突出贡献科技专家19人、人才引擎推动创新发展。

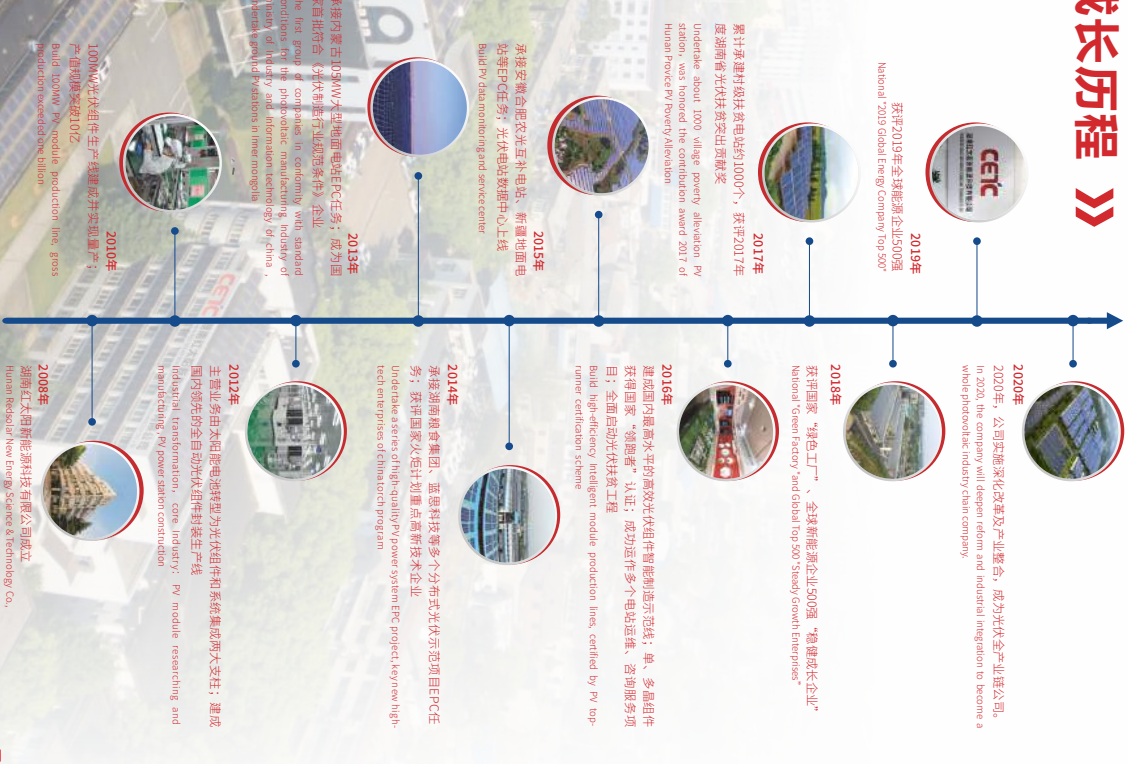
Hunan Red Solar New Energy Science and Technology Co., Ltd founded in June 2008, is a member of the China Electronic Technology Group Corporation and a wholly-owned subsidiary of the CETC Electronic equipment Group Corporation. The company is an advanced whole PV industry chain manufacturer with a top 10 production scale in Changsha, and it has integrated silicon materials, high-efficiency mono-crystalline cells, photovoltaic modules, and photovoltaic system integrated applications fully.

The company has several intelligent production lines, including 2GW high-efficiency polycrystalline silicon ingot production line, 400MW silicon slicing production line, 1GW high-efficiency solar cell (including high-efficiency PERC cell) production line, and 1.5GW photovoltaic module production line. It also has the corresponding qualifications for general contracting of power engineering construction, professional contracting of mechanical and electrical equipment installation, and engineering consulting, and is licensed to undertake installation (maintenance and commissioning) for electric power facilities. Therefore, it can provide one-stop solution for photovoltaic power system engineering.

The company as one of China's first batch of enterprises in line with "the standard conditions for the photovoltaic manufacturing industry", a pilot enterprise that implements the standards of the integration of informatization and industrialization management systems, a key high-tech enterprise of China torch program, and a new high-tech enterprise and enterprise technology center of Hunan Province, adheres to scientific and technological innovation leading and strives to promote high-quality development, and its component products have won Europe TUV/CE certificate, the US UL certificate, UK MCS certificate, Australia CEC certificate, China CQC certificate and other authoritative quality certificates. Meanwhile, the company is a backbone member of China's "leader program", and has undertaken a large number of photovoltaic power station projects at home and abroad. It has a high reputation in the industry and has won unanimous praise from customers.

The company owns about 1200 employees at present, including 17 researcher level senior engineers, 81 senior engineers, 287 engineers, and 19 state outstanding contributors. It uses talents as an engine to promote innovation and development.

In 2020, the company will deepen reform and industrial integration to become a whole photovoltaic industry chain company.



HONOR
荣誉资质



COMPANY CULTURE
企业文化

责任 创新 卓越 共享
Responsibility Innovation Excellence Shared



WIN-WIN COOPERATION
合作共赢



湖南红太阳新能源科技有限公司作为中国电科成员单位，秉承电科使命，传承电科价值观，在风雨砥砺前行中谋求新发展。

Hunan Red Solar New Energy Science & Technology Co., Ltd. as a member of the China Electronics Technology Group Corporation, adheres to the mission and values of CETC, and seeks new development in the new era.

电科定位 / Purpose of CETC

军工电子国家队 国家科技创新骨干力量 电子信息产业的领头羊。
Military Electronics National Team/National Key Force of Scientific and Technological, leader of Electronic Information Technology Industry.

电科愿景 / Vision of CETC

成为电子信息领域具有全球影响力的科技型企业集团。
Become a scientific enterprise group with global influence in the field of electronic information.



High efficiency manufacturing Superior quality Leader of exquisite technologies
高效制造 精工品质 担当精品工艺领跑者

硅材料篇

Silicon materials

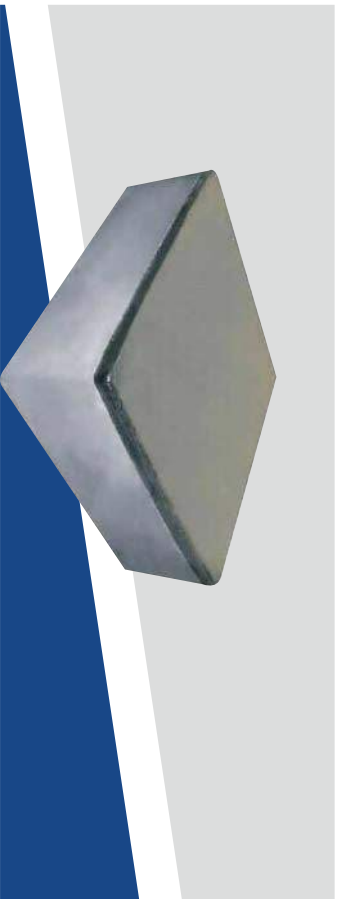


【先行者】

一代工艺、一代装备，公司作为光伏装备的国家队，在做好装备研发的同时，积极向光伏产业链延伸，以装备推动工艺发展，以工艺验证装备。在北京、长沙、太原等地拥有2GW高效多晶硅锭、400M硅片、1GW高效晶硅电池、1.5GW组件生产基地。

【Pioneer】

The company, as a member of the national team of photovoltaic equipment, actively extends to the photovoltaic industry chain while doing a good job in equipment research and development, striving to promote process development with equipment, and verify equipment with processes. It has built 2GW high-efficiency polycrystalline silicon ingot production bases, 400MW silicon slice production bases, 1GW high-efficiency crystalline silicon cell production bases, and 1.5GW module production bases in Beijing, Changsha, Taiyuan and other places.



公司多晶硅锭依靠自身设备研发优势，在原有的450型铸锭炉基础上进行改进，顺利完成680型、800型、1200型高效多晶硅铸锭技术升级，高效多晶硅铸锭晶向一致性好，晶粒尺寸均匀，杂质缺陷少，位错密度低。其中，1200型G7铸锭运行周期短（投料1200KG，平均75h/炉），能耗低（平均6.0度/KG）。

In terms of polycrystalline silicon ingots, the company has made improvements based on the original type 450 ingot furnaces, relying on its own equipment research and development advantages, and has successfully completed technology upgrading for type 680, type 800 and type 1200 high-efficiency polycrystalline ingots. Its high-efficiency polycrystalline ingots are well consistent in the crystal orientation with uniform grain size, less impurity or defect, and lower dislocation density. Among them, its type 1200 G7 ingot has shorter operation cycle (a average 75h/furnace for a feeding capacity of 1200KG) and lower energy consumption (average 6.0 kWh/KG).

基本参数	生长方法: 定向凝固	Growth method: directional solidification
	边长: 158.75 ± 0.25mm 166 ± 0.25mm (可定制)	Side length: 158.75 ± 0.25mm 166 ± 0.25mm (customizable)
Basic parameters	高度: 2# 100mm Height: 2# 100mm	
	对角线: 223.0 ± 0.5mm 233.3 ± 0.5mm (可定制)	Diagonal line: 223.0 ± 0.5mm 233.3 ± 0.5mm (customizable)
	倒角角度: 45 ± 0.5° Chamfer angle: 45 ± 0.5°	
	直边角度: 90 ± 0.5° Straight side angle: 90 ± 0.5°	
	导电型号: P型 Conductive type: type P	
	掺杂剂: B或B/Ga共掺 Dopant: B or a mixture of B and Ga	
电化学性能	电阻率范围: 1-3Ω cm Resistivity range: 1-3Ω cm	
	少子寿命: 6.5 μs Minority carrier lifetime: 6.5 μs	
	氧含量: 5 X 10 ¹⁷ atoms/cm ³ Oxygen content: 5 X 10 ¹⁷ atoms/cm ³	
	碳含量: 8 X 10 ¹⁷ atoms/cm ³ Carbon content: 8 X 10 ¹⁷ atoms/cm ³	
Electrochemical Performance	位错密度: 105pcs/cm ² Dislocation density: 105pcs/cm ²	



公司切片部拥有产能400MMW。切片机为自主研发生产，在现有传统切割工艺基础上，经过技术研发改进，机器通过改型，采用更先进的金刚线切割工艺，提升了切片效率，并大量节约成本，硅片产量大幅提升。采用自主开发的高效多晶硅技术，高效多晶硅硅片在微观结构上进行了优化，其位错、层错等晶体缺陷也获得了精确的控制，拥有更低的碳氧及金属杂质浓度，更长的少子寿命，更加均匀的掺杂分布；外观上晶粒更小，分布更加均匀。

The company's slice department has a production capacity of 400MW. Its self-designed and self-produced slicers have been improved through technological research and development based on the existing traditional cutting processes and have greatly improved the slicing efficiency and the silicon slice output and significantly reduced the production costs with the more advanced diamond wire cutting technology. The company has optimized the high-efficiency polycrystalline silicon slices in microstructure through its self-developed high-efficiency polycrystalline technology, and also realized accurate control over the dislocation, stratification and other crystal defects. The silicon slices produced by the company have lower concentrations of carbon, oxygen and metal impurities, longer minority carrier lifetime and more uniform doping distribution. Their grains are also smaller in size and more uniform in distribution.

导电类型 Conductive type	P型 Type P
尺寸 Size:	158.75 × 158.75 ± 0.25 166 ± 0.25mm (可定制) 166 ± 0.25mm (customizable)
对角线 Diagonal line:	223.0mm ± 0.5mm 233.3 ± 0.5mm
倒角 Chamfer:	1.0 mm-2.0mm
厚度 Thickness:	190um+20/-10um
垂直度 Perpendicularity:	90° ± 0.1°
电阻率 Resistivity:	1.0-3.0Ω cm
少数载流子寿命 (平均值) Minority carriers life time (average):	≥ 2μs
氧含量 (单位: atoms/cm ³) (oxygen)	≤ 5.0 × 10 ¹⁷
碳含量 (单位: atoms/cm ³) (carbon)	≤ 8.0 × 10 ¹⁷



INTELLIGENT PRODUCTION LINE OF HIGH EFFICIENCY PHOTOVOLTAIC MODULE 智能制造 践行中国制造2025》

公司积极践行中国制造2025，攻克电池、组件效率提升的核心关键技术，自主研发并集成了全套国产化自动光伏生产设备，高标准打造高效perc电池、高效光伏组件智能生产线（国家工信部工业企业技术改造升级导向计划项目），形成了一种集自动化、柔性化、集成化和智能化于一体的先进制造模式，推动光伏产业生产制造与互联网、人工智能深度融合，实现转型升级。

高效：

- 劳动效率提升50%以上。
- 实现单、多晶“领跑者”一级高效组件的批量生产。

智能：

- 全自动化生产。
- 全程信息控制和智能管理，人与机器、机器与机器间高效对话。
- 可兼容多种新型电池及组件生产。

The company takes part in the china manufacturing 2025 actively, and have already conquered the core technology of PV module and PV cells efficiency improvement. We have independently developed and integrated a complete set of domestic automatic photovoltaic production equipment, and built two highly efficient intelligent production lines of photovoltaic module. The company has formed an advanced manufacturing model which integrates automation, flexibility, integration and intelligence, and promotes the integration of the photovoltaic industry with the internet and artificial intelligence to achieve the transformation and upgrading.

High efficiency:

- Increasing the labor efficiency by more than 50%.
- Realizing mass production of high efficiency PV module.

Intelligence:

- Fully automated production.
- Full process information control and intelligent management.
- Compatible with a variety of new PV module and PV cells.



高效制造 军工品质 黑色组件的电池供应商

High efficiency manufacturing Superior quality Supplier of black PV modules for cells

高效单晶电池

High-efficiency mono-crystalline cells

【更具竞争优势】

公司电池生产线全部采用自主研发生产的电池设备，多年积累的工艺设备经验使得我们的产品不但能满足常规组件的电池片需求，在全黑组件的应用上更具竞争优势。

【More competitive advantages】

The company's production lines all adopt self-developed and self-produced cell equipment. Relying on years of accumulated experience in process equipment, our products not only can meet the needs of regular modules on cells, but also have more competitive advantages in the applications of black PV modules.



正面 156.75*156.75 , D210



背面 156.75*156.75 , D210

电池参数 Cell parameters

主栅 Front busbar	5BB*0.7mm 实心*2分段半片 5BB*0.7mm solid two segments and half-cell
副栅 Finger	116 线 116 fingers
背极 Back busbar	电极分段 5*4 Segmented electrodes 5*4 宽度 * 长度: 1.7mm*17.5mm width* length: 1.7mm*17.5mm
尺寸 Dimension	156.75mm*156.75mm ±0.25mm 156.75mm*156.75mm ±0.25mm

关键工艺 Key technology

21.4% 以上 EL 全检、热氧化抗 PID 工艺、光注入抗 LID、21.5%~22.2% 档位电压分档。

Cells with efficiency above 21.4% are required to be EL tested,using thermal oxidation process to anti-PID, using photoinjection process to anti-LID, cells with efficiency between 21.5% to 22.2% is divided by voltage parameter.

功率 Pmpp

档位 Eff	功率 Pmpp(W)	最大功率电流 Imp(A)	最大功率电压 Umpp(V)	短路电流 Isc(A)	开路电压 Voc(V)	FF(%)
21.40%	5.23	9.031	0.577	9.554	0.669	81.76
21.50%	5.25	9.06	0.58	9.559	0.67	81.99
21.60%	5.28	9.078	0.582	9.566	0.672	82.15
21.70%	5.30	9.094	0.583	9.584	0.673	82.24
21.80%	5.33	9.129	0.584	9.612	0.674	82.33
21.90%	5.35	9.15	0.585	9.639	0.674	82.38
22.00%	5.38	9.179	0.586	9.662	0.676	82.42
22.10%	5.40	9.215	0.586	9.675	0.677	82.44
22.20%	5.42	9.233	0.587	9.710	0.677	82.45



正面 158.75*158.75 , D223



背面 158.75*158.75 , D223

电池参数 Cell parameters

主栅 Front busbar	5BB*0.7mm 2分段半片 5BB*0.7mm solid two segments and half-cell
副栅 Finger	122 线 122 fingers
背极 Back busbar	电极分段 5*4 Segmented electrodes 5*4 宽度 * 长度: 1.7mm*17.5mm width* length: 1.7mm*17.5mm
尺寸 Dimension	158.75mm*158.75mm ±0.25mm 158.75mm*158.75mm ±0.25mm

关键工艺 Key technology

21.4% 以上 EL 全检、热氧化抗 PID 工艺、光注入抗 LID、主栅档位进行高低电压分档 (共 5 个效率档位)。

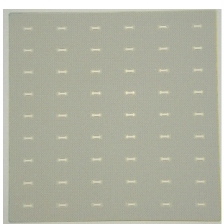
Cells with efficiency above 21.4% are required to be EL tested,using thermal oxidation process to anti-PID, using photoinjection process to anti-LID, cells for main efficiency are sorted by High and Low voltage(5 efficiency levels will be sorted).

功率 Pmpp

档位 Eff	功率 Pmpp(W)	最大功率电流 Imp(A)	最大功率电压 Umpp(V)	短路电流 Isc(A)	开路电压 Voc(V)	FF(%)
21.00%	5.29	9.497	0.557	9.906	0.657	81.26
21.10%	5.32	9.534	0.558	9.915	0.66	81.28
21.20%	5.34	9.536	0.560	9.916	0.662	81.33
21.30%	5.37	9.555	0.562	9.945	0.662	81.56
21.40%	5.39	9.557	0.564	9.957	0.662	81.75
21.50%	5.42	9.593	0.565	9.970	0.664	81.85
21.60%	5.44	9.594	0.567	9.979	0.665	81.96
21.70%	5.47	9.613	0.569	10.007	0.666	82.06
21.80%	5.49	9.618	0.571	10.031	0.666	82.15
21.90%	5.52	9.634	0.573	10.058	0.667	82.27
22.00%	5.54	9.652	0.574	10.082	0.667	82.36
22.10%	5.57	9.665	0.576	10.098	0.668	82.50
22.20%	5.59	9.681	0.577	10.120	0.668	82.63
22.30%	5.62	9.726	0.578	10.141	0.669	82.85



正面 158.75mm*158.75mm±0.25mm



背面 158.75mm*158.75mm±0.25mm

电池参数 Cell parameters

主栅 Front busbar	9BB*0.1mm 2分段半片 9BB*0.1mm solid two segments and half-cell
副栅 Finger	122 线
背板 Back busbar	电极分段 9*6 Segmented electrodes 9*6 宽度 * 长度: 1.5mm*5.5mm width * length: 1.5mm*5.5mm
尺寸 Dimension	158.75mm*158.75mm±0.25mm 158.75mm*158.75mm±0.25mm

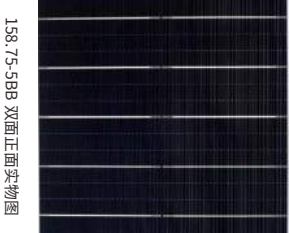
关键工艺 Key technology

通过扩散和丝印匹配，9BB PERC电池效率提升0.1-0.2%，这满足客户对高效电池组件的需求。

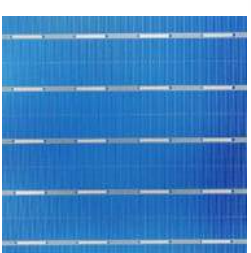
The efficiency of 9BB PERC solar cell is increased by 0.1-0.2% through the matching of diffusion and screen printing process, which meets the customer's demand for high efficiency cells and modules.

功率 Pmpp

档位 (正面) Eff	正面功率 Pmpp(W)	最大功率电流 Imp(A)	最大功率电压 Umpp(V)	短路电流 Isc(A)	开路电压 Voc(V)	FF(%)
21.20%	5.34	9.536	0.560	9.916	0.662	81.33
21.30%	5.37	9.555	0.562	9.945	0.662	81.56
21.40%	5.39	9.557	0.564	9.957	0.662	81.75
21.50%	5.42	9.593	0.565	9.970	0.664	81.85
21.60%	5.44	9.594	0.567	9.979	0.665	81.96
21.70%	5.47	9.613	0.569	10.007	0.666	82.06
21.80%	5.49	9.618	0.571	10.031	0.666	82.15
21.90%	5.52	9.634	0.573	10.058	0.667	82.27
22.00%	5.54	9.654	0.574	10.059	0.67	82.27
22.10%	5.57	9.674	0.576	10.059	0.673	82.27
22.20%	5.59	9.694	0.577	10.080	0.676	82.27
22.30%	5.62	9.714	0.579	10.061	0.679	82.27
22.40%	5.64	9.734	0.580	10.061	0.682	82.27
22.50%	5.67	9.754	0.581	10.062	0.685	82.27



158.75-5BB 双面正面实物图



158.75-5BB 双面背面实物图

电池参数 Cell parameters

主栅 Front busbar	5BB*0.7mm 2分段半片 5BB*0.7mm solid two segments and half-cell
副栅 Finger	122 线
背板 Back busbar	电极分段 5*4 Segmented electrodes 5*4 宽度 * 长度: 1.5mm*18mm width * length: 1.5mm*18mm
尺寸 Dimension	158.75mm*158.75mm ± 0.25mm 158.75mm*158.75mm ± 0.25mm

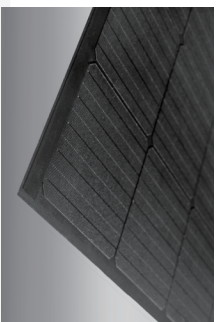
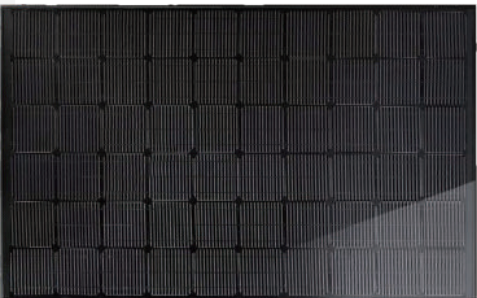
关键工艺 Key technology

双面PERC电池（半片）的优势：通过绒面及镀膜结构工艺优化，实现优异的双面抗PID性能；双面因子70%以上，双面双液组件发电量增益20%以上。

The advantages of bifacial PERC solar cell (5BB-half) includes: The bifacial PERC solar cell can achieve excellent bifacial anti-PID performance by optimizing texture and passivated film structure. The bifacial factor of cell exceeds 70%, so the power generation gain of bifacial PERC module is more than 20%.

功率 Pmpp

档位 (正面) Eff	正面功率 Pmpp(W)	最大功率电流 Imp(A)	最大功率电压 Umpp(V)	短路电流 Isc(A)	开路电压 Voc(V)	FF(%)
21.70%	5.47	9.613	0.569	10.007	0.666	82.06
21.80%	5.49	9.618	0.571	10.031	0.666	82.15
21.90%	5.52	9.634	0.573	10.058	0.667	82.27
22.00%	5.54	9.654	0.574	10.059	0.67	82.27
22.10%	5.57	9.674	0.576	10.059	0.673	82.27
22.20%	5.59	9.694	0.577	10.060	0.676	82.27
22.30%	5.62	9.714	0.579	10.061	0.679	82.27
22.40%	5.64	9.734	0.580	10.061	0.682	82.27



公司一贯注重新技术、新产品的创新及研发，坚持走定制化、差异化特色产品技术路线，将黑色电池作为公司拳头产品推向国内外市场，作为行业首批推出黑色电池的厂家，黑色电池膜层工艺行业领先，产品满足高端全黑组件要求，行业一流高端全黑组件供货产品。

The company has always focused on innovation and R&D of new technologies and new products, adhered to the customized and differentiated technical route of featured products, and taken the black cell as its flagship product on the markets at home and abroad. As one of the first black cell manufacturers, the company takes the lead in the black cell film process in the industry, with its products meeting the requirements for high-end all-black PV modules and becoming first-class high-end all-black PV modules in the industry.

BLACK CELLS 黑色电池》

产品优势 Product advantages

- 优异的膜层结构设计，全黑组件各角度颜色均匀性、一致性优；
- Excellent film structure design and excellent color uniformity and consistency;
- 全黑电池产品 产出可达总产能60%以上
- The output of all-black cells can reach more than 60% of the total capacity;
- 正面热氧化工艺、PE膜层工艺深度优化、主流光注入LID设备，实现产品优异的抗PID、LID性能；
- Frontal thermal oxidation process, deep optimization of PE film process, mainstream LID device with light injection, and excellent performance against PID and LID;
- 主流正背面电极设计，组件端适应性强，制程低硅片厚度损耗工艺、低热应力工艺，使产品具备优异的机械耐久性要求
- Mainstream front and back electrode design, excellent adaptability, low silicon wafer thickness loss process, low thermal stress process, and excellent mechanical load performance;
- 全自动外观、EL、电性能测试设备，保证产品质量稳定性
- Automatic appearance, EL, and electrical performance test equipment for product quality stability;
- 高颜值、高效率全黑光伏组件
- Good-looking and efficient all-black PV modules;
- 全黑光伏组件与建筑屋顶色调搭配视觉效果更佳，实现与屋顶及生态的完美融合
- The all-black PV modules can better match with the building roof in color to realize a better visual effect and the perfect integration between the roof and the ecology.



光伏组件篇

The general situation of PV module

High efficiency manufacturing Superior quality Leading the technology in the photovoltaic field
高效智造 军工品质 担当光伏技术领跑者



【领跑者】
作为首批满足《光伏组件制造条件》的光伏组件制造企业，公司积极响应国家工信部、国家能源局、国家认监委发布的《关于促进先进光伏技术产品应用和产业升级的意见》，加快技术升级领跑，率先通过单晶、多晶领跑者认证。公司始终致力于组件高效化技术研究、质量提升和规范化生产，具备1.5GW组件生产能力，拥有行业领先的高效光伏组件智能生产线，成功开发半片、叠瓦、贴膜、双玻（双面）等高效产品，组件生产迈入高效与智能制造新时代。

【Top-Runner】
As the first group of companies in conformity with "Standard conditions for the photovoltaic manufacturing industry of ministry" of industry and information technology of china , red solar actively carry out technological innovation, has become a certified company of PV Top-Runner certification Scheme.Redsolar always committed to improving the efficiency , quality and standardization level of PV products, has high efficiency intelligent module production lines with annual production capacity of 1.5GW. Redsolar has successfully developed half-cell,imbricate,double glass high efficiency PV modules.



QUALITY AND INNOVATION

品质与创新

品质 —— 军工品质 零缺陷 / Quality - Military quality zero defect

- 100%产品检验;
- 10年材料与工艺质量保证;
- 25年及以上输出功率线性质保;
- MES系统实时监控: 对从原材料到组件成品的所有环节进行系统管控, 确保每一工序都可追溯源头;
- 严格按照ISO9001: 2015质量管理体系, 按照至少2倍IEC测试标准进行严苛可靠性测试;
- 公司产品100%严格执行二道EL与三道外观检验。
- 100% Product inspection;
- 10 Years material and process quality assurance;
- 25 Years and above, output power linear warranty;
- Real-time monitoring of MES system, each process can be traced back to the source;
- ISO9001: 2015 Quality management system;
- We strictly implement EL inspection twice and visual inspection three times for each piece of our product.



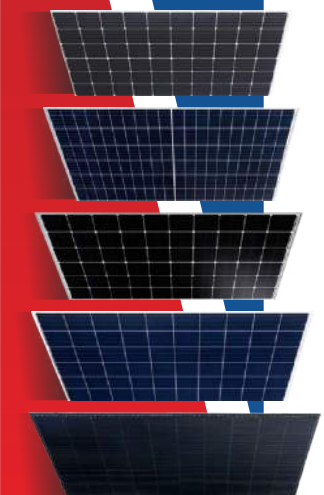
创新 —— 高效光伏组件研发测试中心 / Innovation - High-efficiency PV module R&D center

公司拥有湖南省首家综合性光伏组件研发与测试实验室, 与各大高校建立紧密的合作, 可提供光伏组件国际标准IEC61215/IEC61730规定的测试和全方位光伏组件质量评估测试服务, 配套有14项光伏组件专业测试能力, 5项光伏电站专业测试能力对规范湖南省光伏市场起到积极作用。

Test in accordance with IEC61215 / IEC61730 international standards;
14 terms professional test capability for PV module;
5 terms professional test capability for PV power station.



PHOTOVOLTAIC MODULE
 新型产品系列 >>



➔ 双面双玻组件 / Bi-facial PV module

- 双面发电更高效，发电量提升20%以上
- 优越的低光衰性能
- 双玻组件无PID效应
- 防火等级A
- 30年输出功率保证
- Increasing the power generation by 20%
- Superior weak light performance
- PID free
- Fire rating: A
- Guaranteed 30 years output power



➔ 高效多晶半片组件 / Polycrystalline half-cell high efficiency PV module

- 降低电池片电流和串阻损失，组件功率更高效
- 优越的弱光性能，保证客户收益
- 优越的抗热斑性能，有效降低阴影遮挡对发电量的影响
- 优越的抗PID性能
- Decreased cell current and series impedance losses, higher efficiency
- Excellent performance under low light, higher yielding
- Superior anti hot spot performance
- Superior anti PID performance



➔ 高效单晶半片组件 / Monocrystalline half-cell high efficiency PV module

- 高功率降低度电成本
- 经UVNORD测试验证，通过IEC 61701耐盐雾等级6、IEC62716耐氮气测试认证以及PID认证
- 更低的内部电流和回路功率，有效降低热斑致热
- 可融合多种高效电池片新技术，叠加技术增益
- Reduce LCOE by high efficiency module
- Certified by TUVNORD test, passed IEC 61701 salt spray corrosion (grade 6), IEC 62716 ammonia corrosion test certification, passed 192h PID resistant certification
- Lower internal current and power to effectively reduce hot-spot heating can integrate a variety of high efficiency new technology of solar cell, super position technology gain



➔ 高效多主栅组件 / Multi-Busbar high efficiency PV module

- 提升电池受光，降低焊带封装损耗
- 更好的内反射，显著增加入射光的利用率
- 降低隐裂对功率衰减的影响，有效缓解隐裂致热
- Improving photosensitivity, reducing welding packaging losses
- Better internal reflection, increasing the utilization ratio of incident light
- Reducing the power attenuation and over heat caused by cracks



➔ 高效叠瓦组件 / Shingled high efficiency PV module

- 最大化提升电池受光，降低电气封装损耗
- 极佳的抗热斑性能，发热量相当于传统组件的50%
- 可融合多种高效电池片新技术，叠加技术增益
- Improving photosensitivity, reducing welding packaging losses
- Superior anti hot spot performance, increasing power generation by 50%
- Combining latest battery technology, improving comprehensive performance





单晶72片组件
Mono-crystalline
module(72 Cells)

多晶72片组件
Poly-crystalline
module(72 Cells)

单晶120半片组件
Mono-crystalline
120 halfcell module

单晶144半片组件
Mono-crystalline
144 halfcell module

类型 / Module	规格尺寸(mm) Size (mm)	功率档位(W) Power (W)	备注 / Remarks
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单坡72片 72 cells	1980*1002*40/35	380-430	系统电压 1000&1500V 可选 System voltage 1000&1500V alternative
单坡144片 Half-cell 144 cells	2022*1002*40/35	390-440	

单坡60PCS 60 cells	1660*1002*35	300-360	可根据需求提供边框 Single and double sided PV modules available on request,solar module frame available on requests.
单坡120片 Half-cell 120 cells	1700*1002*35	300-365	

双坡72片 Half-cell 72 cells	2020*1010*30(含边框) 2014*1004*6(无边框)	380-430	可根据需求提供边框 Single and double sided PV modules available on request,solar module frame available on requests.
双坡144片 Bifacial Double-glass 144 cells	2030*1010*30(含边框) 2024*1004*6(无边框)	390-440	

双坡60片 Bifacial Double-glass 60 cells	1700*1010*30(含边框) 1694*1004*6(无边框)	300-360	可根据需求提供边框 Single and double sided PV modules available on request,solar module frame available on requests.
双坡120片 Bifacial Double-glass 120 cells	1705*1010*30(含边框) 1698*1004*6(无边框)	300-365	

单坡72PCS 72 cells	1956*992*40	325-345	系统电压 1000&1500V 可选 System voltage 1000&1500V alternative
单坡144PCS Half-cell 144 cells	1986*992*40	325-350	
单坡60PCS 60 cells	1640*992*35	270-290	可根据透光率 要求定制 Customizing by required transmittance
单坡120PCS Half-cell 120 cells	1675*992*35	280-295	
双坡72PCS Double Glazing 72 cells	1968*992*6	320-340	可根据透光率 要求定制 Customizing by required transmittance
双坡60PCS Double Glazing 60 cells	1658*992*6	265-285	

全面的产品和体系证书

Comprehensive product certification and system certification

IEC 61215 IEC 61730
IEC TS 62504(抗PID Resistance)
IEC 62716(耐氨气/Ammonia corrosion)
IEC 61701(耐盐雾/Salt spray corrosion)
IEC TS 62541(光伏质量体系/
PV quality management system)
ISO9001:2015(质量管理体系/
Quality management system)
ISO14001(环境管理体系/
Environmental management system)
OHSAS18001(职业健康安全管理体系/
Occupational health and safety management system)

1 抗PID保证 / PID-resistant guarantee

严选的封装材料能有效消除PID风险。
Strict selection of encapsulation materials eliminates PID risk.

2 严酷环境适用性 / Severe weather resilience

经TUV/NORD测试验证，通过IEC 61701耐盐雾等级6、IEC62716耐氨气测试认证。
Verified by TUV/NORD test, passed IEC 61701 salt spray corrosion grade 6, IEC62716 ammonia corrosion test certification.

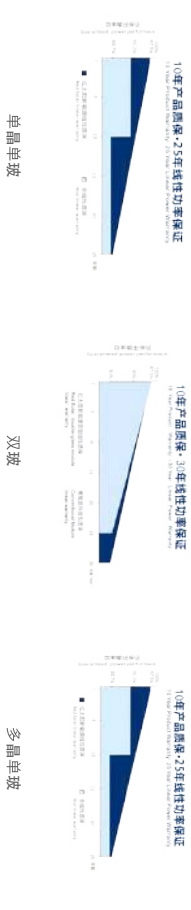
3 弱光性能 / Low light performance

出色的封装材料及电池工艺，弱光条件下依然表现出色。
Excellent packaging materials and cell technology, excellent performance under low light conditions.

4 自清洁 / Self-cleaning

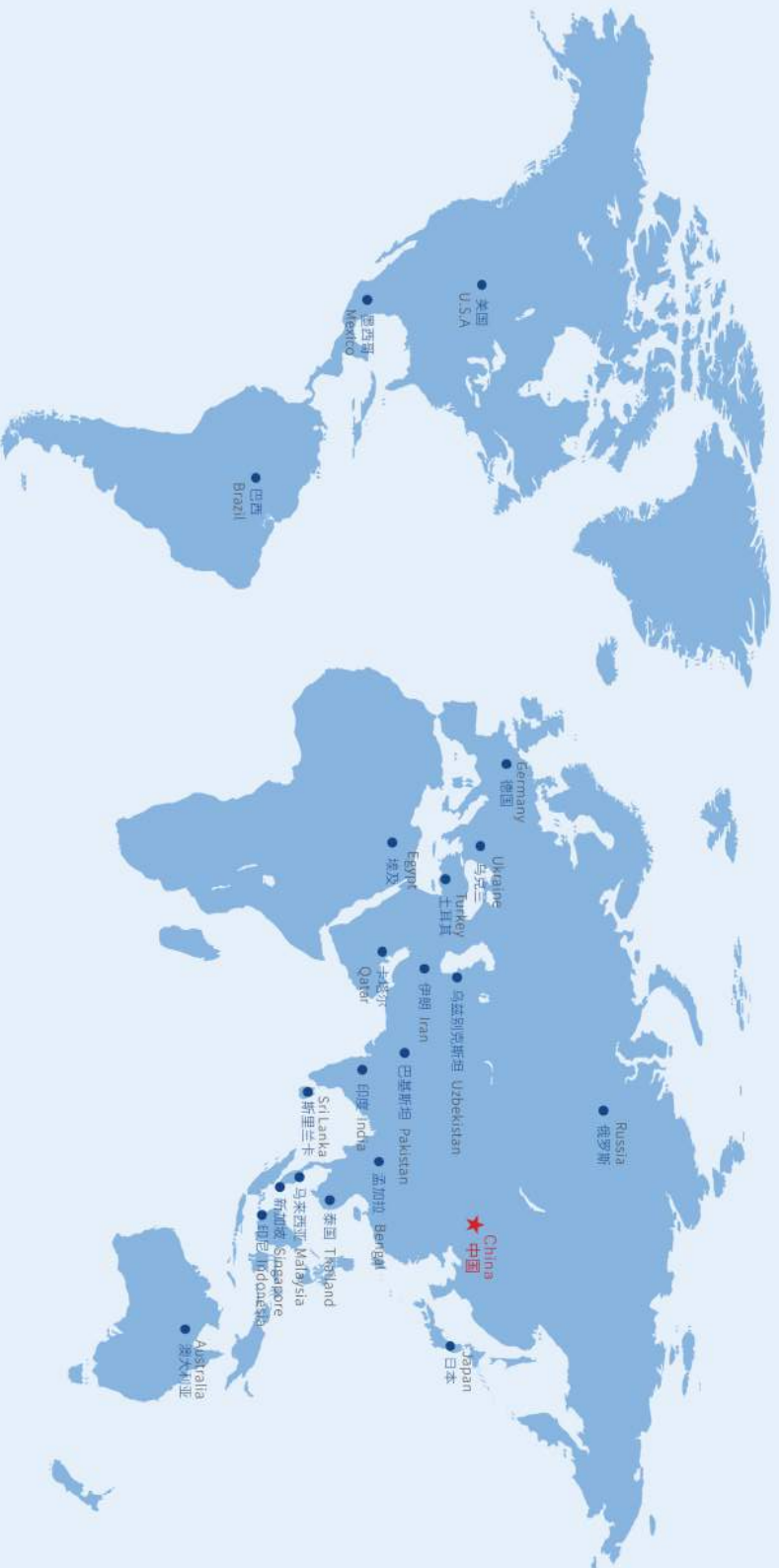
优异、可靠的玻璃镀膜技术，保证恶劣环境下稳定的功率输出。
Excellent and reliable glass coating technology to ensure stable power output in severe environment.

衰减曲线 / Decay curve



光伏应用篇

打造精品 专业服务 担当平价上网先行者
Producing the elaborate Product providing the professional service
To be the forerunner of non-subsidy PV market



【一站式解决方案】

作为国内起步最早的专业的光伏系统集成服务商，公司拥有一支高素质专业化人才队伍，具备电力工程施工总承包资质、机电设备安装专业承包资质、电力承装（修、试）资质和工程咨询资质，可为客户提供各类光伏电站一站式解决方案。

【One-stop solution】

As the earliest professional PV system integration service provider, our company has a high quality professional team, and is qualified to undertake electrical engineering, EPC project, mechanical and electrical equipment installation project, qualification of electric power decoration test and engineering consulting project, etc. We can provide one-stop solution about various PV systems for our customers.



CENTRALIZED PV POWER GENERATION PROJECT 集中式光伏发电项目 >>

➔ 常规大中型地面光伏发电项目 / Conventional large and medium-sized ground PV power generation project

在太阳辐射资源好的戈壁、沙漠、荒山、盐碱、废矿等地区，充分利用土地资源集中建设，全额上网的大中型地面光伏电站。

In gobi, desert, barren mountain, salt alkali, waste mine and other areas with good solar radiation resources, large and medium-sized ground PV power stations with centralized construction of land resources and full feed into the grid shall be fully utilized.

- 1 内蒙古乌拉特前旗50MW地面光伏电站项目
INNER MONGOLIA URADQIANQI 50MW GROUND PV STATION
- 2 内蒙古敖汉旗40MW地面光伏电站项目
INNER MONGOLIA AOHAN BANNER 40MW GROUND PV STATION
- 3 内蒙古阿拉善右旗10MW地面光伏电站项目
INNER MONGOLIA RIGHT FLAG OF ALASHAN 10MW GROUND PV STATION
- 4 内蒙古土左旗65MW地面光伏电站项目
INNER MONGOLIA TUZUOQI OF ALASHAN 65MW GROUND PV STATION

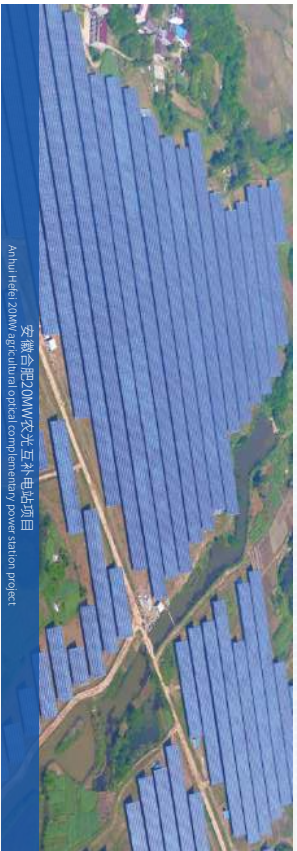




CENTRALIZED PV POWER GENERATION PROJECT 集中式光伏发电项目 >>>

➤ 农光互补光伏发电项目 / Agricultural solar PV project

农业种植与光伏发电相结合，在农业大棚、苗圃等上方安装光伏阵列，达到光伏发电与农业种植双丰收。Combine agricultural planting with PV power generation, and install PV arrays above agricultural greenhouses, nurseries, etc. to achieve double harvest of PV power generation and agricultural planting.



安徽合肥20MW农光互补电站项目
Anhui Hefei 20MW agricultural optical complementary power station project

➤ 渔光互补光伏发电项目 / Solar PV project on fish farm

渔业养殖与光伏发电相结合，在鱼塘、湖泊等水面安装光伏阵列，阵列下方进行渔业养殖，形成“上可发电+下可养鱼”的新模式。

In combination with PV power generation, PV arrays are installed on fish ponds, lakes and other water surfaces, and aquaculture is carried out under the array, forming a new mode of "upper power generation + lower fish cultivation".



湖南岳阳渔光互补光伏发电项目
Hunan Yueyang fishiang complementary photovoltaic power generation project

➤ 光伏扶贫发电项目 / PV poverty alleviation project

公司积极履行社会责任，参与光伏扶贫项目建设，建立光伏扶贫标准体系，累计承建村级光伏扶贫电站1000余个，获评“湖南省光伏扶贫突出贡献奖”。

The company actively performs its social responsibilities, participates in the construction of PV poverty alleviation projects, and establishes a PV poverty alleviation standard system. The company has built more than 1000 PV poverty alleviation power stations at the village level and won the "outstanding contribution award of PV poverty alleviation in Hunan Province".



湖南省武冈市光伏扶贫项目
Poverty alleviation project in Wugang, Hunan

内蒙古化德县扶贫项目
Poverty alleviation project in Huade County, Inner Mongolia

湖北省鄂西县扶贫项目
Poverty alleviation project in Yuxi County, Hubei



湖南省古丈县扶贫项目
Poverty alleviation project in Guzhang County, Hunan

湖南省岳阳市扶贫项目
Poverty alleviation project in Yueyang, Hunan

湖南省临武县扶贫项目
Poverty alleviation project in Linwu County, Hunan



DISTRIBUTED PV POWER GENERATION PROJECT 分布式光伏发电项目 >>>

工业屋顶光伏发电项目 / C&I rooftop PV project

利用工商业厂房屋顶建设光伏电站，多采用自发自用余电上网模式，屋顶规模越大、自用电量越高，收益率越高。

In the construction of PV power station by using the rooftop of industrial and commercial buildings, the mode of self-use surplus electricity is often adopted. The larger the rooftop scale, the higher the self-use electricity and higher the yield.



湖南粮食集团10MW光伏发电工程(金太阳工程)
Hunan Grain Group 10MW PV power plant(Golden sun project)



北京光电产业园
15MW光伏电站项目
Beijing 15MW PV power plant



麓谷科技园12.82MW金太阳工程
LUGU Science Park 12.82MW PV power plant(Golden sun project)



绿源绿谷产业园
2MW分布式电站项目
2MW distributed PV power plant project of
Mingyuan Green Valley Industrial Park



中粮可口可乐4MW
分布式屋顶光伏发电项目
Coca-cola distributed roof photovoltaic project



株洲动力谷100 kW
分布式光伏发电示范项目
Zhuzhou 100kW distributed demonstration project



照山高速服务区
分布式电站项目
Zhaoshan expressway service area
distributed power station project



加加食品6MW
分布式屋顶光伏发电项目
JiJia group 6MW distributed PV power plant



山东海新能源3MW
光电建研示范项目
Shandong photovoltaic energy storage
demonstration project



衡阳机油壳光伏储能项目
Hengyang photovoltaic energy storage
micro-network project



现代御泰酒店分布式屋顶
光伏发电项目
Xindai Gloria Grand hotel Changsha
distributed roof photovoltaic project



蓝晶科技公司
5MW光伏电站项目
Leng crystal technology 5MW PV power plant



湖南华自科技公司
500kW光伏电站项目
Hunan HNZK 500kW PV power plant



双面光伏发电组件
产学研示范项目
Production, learning and research of two-sided
PV module demonstration project



青园小学光伏发电项目
Qingyuan primary school photovoltaic project



DISTRIBUTED PV POWER GENERATION PROJECT 分布式光伏发电项目

BIPV光伏建筑 / BIPV Integration

通过特殊的设计将光伏组件与建筑融为一体，替代原有的建筑外表材料并提供清洁能源，是光伏发电的重要应用形式。

It is an important application form of PV power generation to integrate PV modules and buildings through special design, replace the original building exterior materials and provide clean energy.



长沙市高新区管委会屋顶分布式项目
Roof distributed project of Changsha high tech zone Management Committee



中电科第9研究所1MW光伏车棚项目
1MW photovoltaic vehicle shed project of the 9th research institute of CETC



南京55所1.7mw光伏车棚项目
Nanjing 55 institute 1.7mw photovoltaic vehicle shed project

户用光伏 / Residential PV system

光伏系统 / PV system

户用分布式光伏系统是在自家屋顶或阳台等结构上安装光伏组件，太阳能方阵产生的直流电经逆变之后并入家用电网，为用户提供清洁电力，用不完的电力卖给电网，为用户赚取可观收益。

In a household PV system, the PV modules are installed on the roof, the power generated by the modules are converted into AC by PV inverters, and then used by household power load or sent to the state grid.

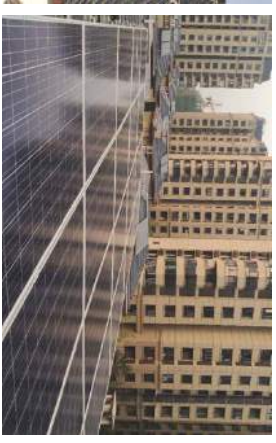
组成结构 / PV system equipment list



- ① 光伏组件
 - ② 光伏逆变器
 - ③ 计量表
 - ④ 交流接线盒
 - ⑤ 智能电表
 - ⑥ 家庭负载
 - ⑦ 系统监控
 - ⑧ 电网
- ① PV modules
 - ② PV inverter
 - ③ Meter
 - ④ AC connecting box
 - ⑤ Smart meter
 - ⑥ The family load
 - ⑦ Monitoring system
 - ⑧ The power grid



湖南方塘十里户用系统
Ten li household system in Dingxiang, Hunan



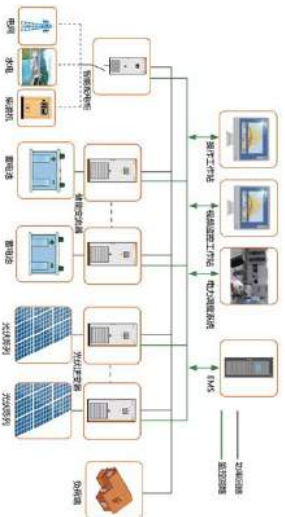
湖南北辰中央公园户用系统
Household system of Beichen Central Park in Hunan Province

SMART ENERGY PV PROJECT 智慧能源光伏应用项目

智能微网发电系统 / Intelligent micro-grid power station

是由分布式电源、储能装置、能量转换装置、监控及保护装置等部件组成智能发电配电系统。
能够实现自我控制、保护和管理，既可以与外部电网并网运行，也可以独立运行。

The system consists of distributed PV power source, storage device, power converter, monitoring and protecting device, etc. It is a smart system since it can realize the self-protection and management, and it can be connected the grid or off-grid operate.



国网湖南综合能源风光储充微网示范项目
State Grid Huanan comprehensive energy scenery storage and charging microgrid demonstration project

光伏储能充电站 / PV energy storage EV charging station

是一个多元互补能源发电微电网系统，可以实现光伏自用，余电存储，一方面解决光伏在应用过程中部分发电冗余和并网问题，一面发挥组合优势，带动光伏、储能、充电桩多向发展。

"PV energy storage charging station" is a micro grid system of multiple complementary energy resources, which can realize PV self use and storage of surplus electricity. On the one hand, it helps PV solve some problems of power generation redundancy and grid connection in the application process, and on the other hand, it enables full performance of the combination advantages to drive the multi-directional development of PV, energy storage and charging piles.



充电桩产品 / EV charging piles

一体式20KW/160KW/240KW双枪直流充电桩 Integrated 20kw/160kw/240kw double gun DC charging pile

操作简便 具有定时、定量、定金额和自动充满等多种充电方式
稳定性高 专业散热设计，模块休眠和轮动技术，保证高效运行
安全性高 具有定时、定量、定金额和自动充满等多种充电方式
兼容性强 支持多种通讯方式，适用于轿车、中巴、大巴等车型

Easy operation It has a variety of charging methods such as timing, quantitative, fixed amount and automatic full charge
Stable and reliable Professional cooling design, module for sleep and rotation technology to ensure efficient operation
High safety IP24 high protection level, with intelligent charging process monitoring and protection
Strong compatibility It supports multiple communication modes and is suitable for cars, buses and other vehicles



7KW立柱式交流充电桩 / 7KW column type AC charging pile

操作简便 彩色触摸屏，界面操作简单，具有定时、定量、定金额和自动充满等多种充电方式。
安全性高 防雨、防尘设计，防护等级IP54。具有紧急停止、漏电、短路保护、过流、过压、欠压保护等功能，安全性好。

Easy operation Colored touch screen, simple operating interface, with timing, quantitative, fixed amount and automatic charging mode
High safety Rainproof and dustproof design, protection grade IP54. With emergency stop, leakage, short circuit protection, over-current, over-voltage, under-voltage protection and other functions, good safety.



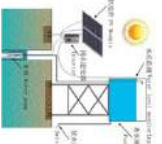
OFF GRID PV POWER GENERATION PROJECT 离网光伏发电项目

水泵 / PV pumping

系统构成 / System composition

光伏水泵系统主要由太阳能电池组件、扬水逆变器、水泵、蓄水池等部件组成。系统具备完整的电气保护功能，水位监测功能，可全自动运行，以蓄水代替蓄电，节约成本。

Solar pump system is mainly composed of solar module, water lifting inverter, water pump, reservoir and other components. The system has complete electrical protection function, water level monitoring function. It can work automatically, save water instead of storing electricity, and decrease costs.

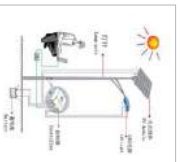


路灯 / Solar street lights

系统构成 / System composition

太阳能路灯系统主要由太阳能电池组件、LED光源、智能控制器、免维护胶体蓄电池或锂电池、灯杆等部件组成。安装与维护简便，经济安全，绿色环保。

The solar street lamp system is mainly composed of solar module, LED light source, intelligent controller, maintenance free gel battery or lithium battery, lamp pole and other components. The system is easy to install and maintain, economical and safety, environment-friendly.



基站 / PV for communication base

系统构成 / System composition

由太阳能电池方阵、控制器、蓄电池组、直流交流逆变器等部门组成。为偏远或不便取电源地区通讯基站供电，确保通讯基站负载正常工作，并将相关信息传至主机端。系统因地制宜，无需人工值守，具备远程监控功能。

PV module, controller, battery, DC / AC inverter and other components. Power supply the communication base station in remote or transient power supply area, ensure the normal operation of the communication base station load, and transmit relevant information to the host terminal. The system adapts to local conditions, does not need to be manned, and has remote monitoring function.



风光互补 / Wind and solar complementary

系统构成 / System composition

由太阳能电池组件、风力发电机、控制器、逆变器、蓄电池组、配电等部件组成，可不间断为用户提供清洁电力。多能互补系统具备供电稳定性强，安装场地限制小等优点。

The system consists of PV module, wind power generator, controller, inverter, storage battery set, power distribution box, etc, and the system can continuously provide clean power. The multi-energy supplement has the advantages of high power supply stability and small limitation of field selection.



OVERSEAS PV PROJECT 海外光伏项目

整线交钥匙工程项目 / Whole Line turnkey project



土耳其200MW光伏组件生产线
Turkey 200MW PV module production line



中埃联合实验室
China-Egypt Joint Laboratory

光伏电站项目 / PV power station projects



土耳其光伏电站
Turkey PV power station



斯里兰卡光伏电站
Sri Lanka PV and central power station



缅甸光伏通信基站
Myanmar PV communication base station



尼泊尔光伏发电系统
Nepal PV power generation system in Nepal

PROJECT MANAGEMENT AND MAINTAINENCE 项目管理和运维》》

公司的项目管理服务包括设备性能监控、运行状态监控、日常维护、故障报警等。

在光伏电站的运维，公司秉承“技术领先、服务为本、长期合作、互利共赢”的运维理念，提供光伏电站全寿命周期的运行维护服务。公司运营体系完善，团队管理经验丰富，尤其擅长电池组件清洗、系统测试与监控，致力于实现运营低成本、服务高质量、上网电量最大化。

同时公司实现了光伏电站远程监控信息化，客户随时随地都能通过手机或网络掌握电站运营状况。

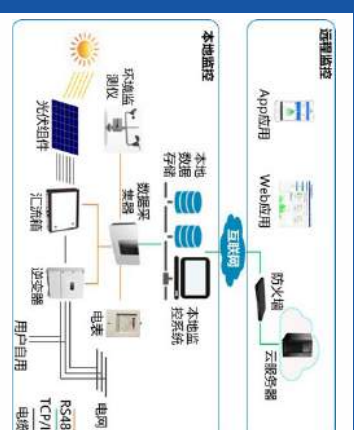
The project management service includes equipment monitoring, operation statement monitoring, daily maintenance, malfunction alarm service, etc.

Our core idea is "technology, service, cooperation, mutual benefit". We provide maintenance service during the whole system life cycle. Our company enjoys basically good health, and the management team is experienced, especially in PV panel cleaning, system debugging and monitoring. We devote to realizing the low cost operation, high quality service, and maximizing the power generation.

Meanwhile, we have realized remote PV system monitoring, enabling customers to check the operation state of PV system by their cell phone.



PV MONITORING PLATFORM 光伏监控服务平台》》



公司通过建立光伏监控服务平台，利用数据采集器对光伏电站内所有设备进行数据采集，并传送至本地监控和远程监控，通过可视化界面展示给用户。

监控服务平台支持全国各地光伏电站的数据接入，支持 ANDROID系统和IOS系统，业主通过网络终端随时随地远程实时监测光伏电站的发电运行情况，查看设备工作状态。

The company have built the PV monitoring platform, which can obtain the operation data of the equipment in the PV system by data collector. The data can be sent to local/remote monitoring system, and shown to customers through a visual window.

中电科光伏电站监控平台

