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平高集团有限公司
PINGGAO GROUP CO.,LTD.




Renewable Energy System Solution
新能源系统解决方案

Henan, China
中国·河南

ABOUT PINGGAO
公司简介

Pinggao Group Co.,Ltd, founded in 1970, is the R & D and manufacturing base of China's medium and low voltage, high voltage, extra-high voltage and ultra-high voltage major switchgears.

After 50-year development, Pinggao 's business covers research and development, design, manufacturing, sales, testing of 10kV-1100kV transmission and distribution equipment, related equipment integration, service and engineering contracting. Meanwhile, PG has been actively developing new businesses such as operation, maintenance, GIL, power energy storage system, PV system , wind power system , comprehensive energy and so on.

Pinggao Group has a first-class team of R&D, production, engineering, service and management talents. It has successively built and operated energy storage projects with more than 3kWh and photovoltaic wind power projects with more than 1GW in many provinces and cities such as Beijing, Tianjin, Jiangsu, Henan, Zhejiang,

Guangdong, Shandong, Gansu, Qinghai, Guizhou, and many countries such as South Africa, Greece, Spain. With years of experience in the electrical field, Pinggao Group has become an excellent supplier capable of providing solutions for new energy systems. As a leader in this field, we always pay attention to the overall cost, and can provide customers with equipment supply, power plant integration, general contracting, and overall solution services. With higher output, lower cost and higher security and reliability, Pinggao Group will make your system more competitive.

平高集团有限公司 始建于1970年，是中国中低压、高压、超高压、特高压开关重大装备研发制造基地。

经过50年的发展，目前业务范围涵盖10kV-1100kV输配电设备研发、设计、制造、销售、检测、设备成套与工程总承包，并积极发展运维检修、GIL、电力储能、光伏、风电、综合能源等新业务。

平高集团拥有一流的研发、生产、工程、服务、管理人才队伍，先后在中国北京、天津、江苏、河南、浙江、广东、山东、甘肃、青海、贵州等多个省市以及南非、希腊、西班牙等多个国家建设运营超过3GWh的储能项目和超过1GW的光伏风电项目。公司凭借在电气领域的多年经验，成为能够为新能源系统提供解决方案的优秀供应商，作为这个领域的领先者，我们时刻关注您的总体成本，可以为客户提供设备供货、电站集成、工程总包、整体解决方案服务。公司以更高的产出、更低的成本以及更高的安全度和可靠性,将使您的系统更具竞争力。

PV SYSTEM AND SOLUTIONS

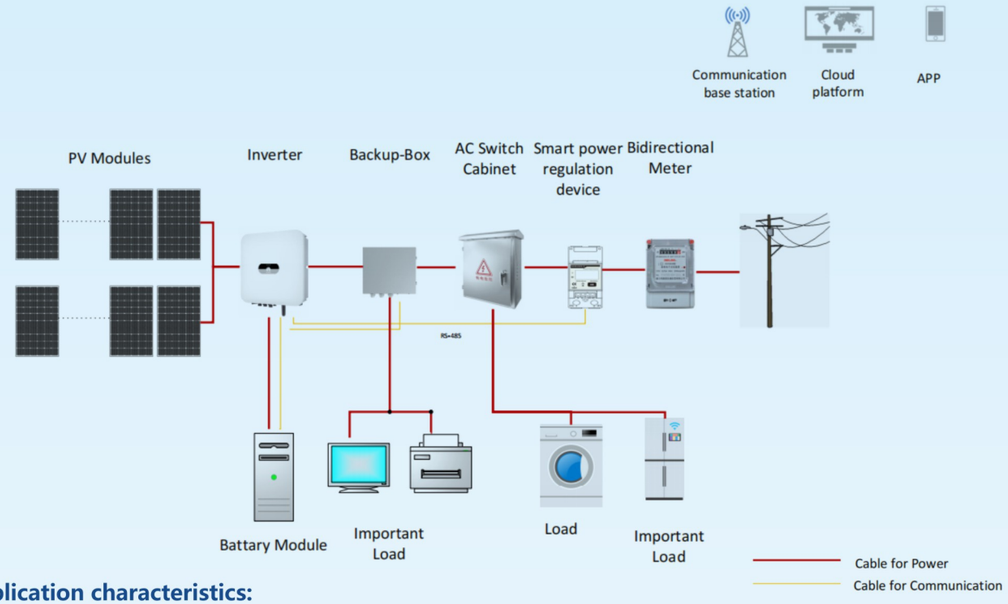
光伏系统及解决方案

1 Household photovoltaic & energy storage system

户用光储系统

The System capacity is generally 5-30kW, which can be installed on residential roofs, balconies, walls, and floors, and BIPV photovoltaic building integration system can be applied. The power generation can be all on-grid, all self-use or spontaneous self-use surplus electricity on grid. The system has a lifespan of 25 years. It can save electricity costs for customers and also make profits by selling electricity. The cost can be recovered in 3-8 years, and the continuous and stable profits can be achived within subsequent 17-22 years. It is suitable for urban high-rise building, multi-storey residences, townhouses, single-family villas, rural residences, etc.

一般为5-30kW，可以安装在住宅屋顶、阳台、墙面、地面，更可以采用BIPV光伏建筑一体化。发电量可以全部上网、全部自用或自发自用余电上网。系统具有25年的寿命，在为您节约电费的同时也能通过卖电获得利润，一次投入之后3-8年就能收回成本，随后的17-22年将获得持续稳定的盈利。适用于城市高层、多层住宅，连栋、独栋别墅，农村住宅等。



Application characteristics:

●Streamline and flexible

Modular design effectively reduces installation, transportation and post-operation and maintenance costs. Quick-plug interfaces and standardized wiring make installation more time saving and convenient. It also speacialized in integrated product design, hidden wiring, beautiful design and simple atmosphere. It has flexible scalability, supports automatic on-off-grid switching of the entire system, and can adapt to the needs of different scenarios.

●Active security

Select high-rate cells to achieve "less cells, large capacity", the battery failure rate can be reduced by more than 50%, and the reliability is higher. The interior of the battery module is physically and electrically isolated to minimize the probability of battery safety accidents, and the built-in fire protection module has thermal runaway fire protection, which can effectively prevent the spread of accidents.

●Intelligent and efficient

Equipped with independent intelligent management system. It can support the mixed use of old and new batteries, and non-destructive expansion. EMS includes a variety of energy management modes, and integrates weather forecasting for mode optimization to realize smart energy dispatching at home, balance the proportion of users' own electricity and backup electricity, and reduce electricity bills.

应用特点：

●精简灵活

模块化设计，有效降低安装、运输和后期运维成本。快速插拔的接口和标准化的配线使安装更加省时方便。产品一体化设计，接线隐藏，设计美观，简洁大气。具备灵活扩展性，支持整个系统自动并离网切换，适应不同场景需求。

●主动安全

选用大倍率电芯，实现“少电芯，大容量”，电池故障率可降低50%以上，可靠性更高。电池模组内部进行物理与电气双重隔离，最大限度降低电池安全事故概率，且内部内置消防模块，具备热失控火警防护，能有效防止事故蔓延。

●智能高效

配备独立的智能管理系统。支持电池新旧混用，无损化扩容。EMS包含多种能量管理模式，并且融合天气预测进行模式优化，实现家庭智慧能源调度，平衡用户的自用电和备电比例，降低电费。

2 Industrial and commercial distributed photovoltaic system

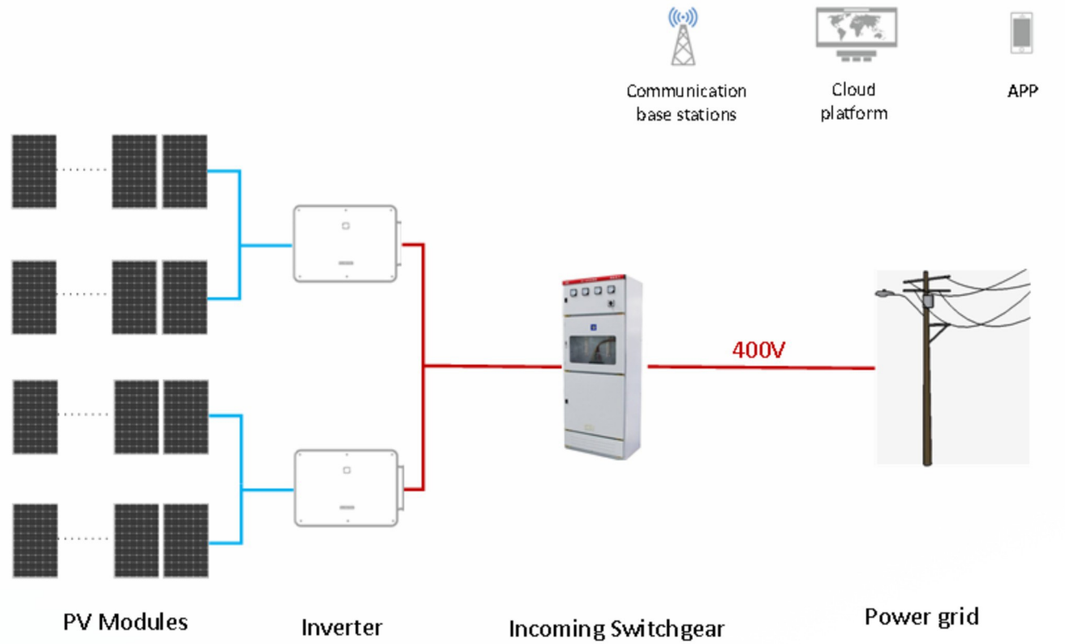
工商业分布式光伏

Industrial and commercial distributed photovoltaic systems can cover the range of 20kW to several megawatts and can be tailored according to the roof area and customer needs. The power generating capacity of the photovoltaic system will be consumed locally to the greatest extent, and only a small proportion of surplus power will be transmitted to the grid. It is suitable for urban industrial parks or enterprises, commerce, office buildings, logistics parks, and other places with large roofs.

The industrial and commercial roof area is large. The electricity consumption of users is large and the electricity price is relatively high. The return on investment is more considerable. At the same time, enterprises can use green electricity, which can bring energy saving, emission reduction and green environmental protection.

工商业分布式光伏电站系统可覆盖20kW到几兆瓦的范围，并可根据屋顶面积和客户需求进行量身定制。光伏系统的发电量将最大程度的在当地消耗，只有小比例的多余电量才输送电网。适用于城市工业园区或者有大面积屋顶的企业、商业、办公大楼、物流园、等场所。

工商业屋顶面积大，用户用电量大且电价相对较高，投资回报更加可观，同时企业能够使用绿色电力，起到了节能减排、绿色环保的功效。



Application characteristics:

●Short construction period and considerable economic benefits

The construction period is short and the benefit period is long, which can effectively save peak electricity costs, reduce electricity costs, and obtain benefits from additional power generation and grid connection. Revitalize a large area of idle roof space to create income for the enterprise.

●Promote energy saving and emission reduction, and produce good social benefits

Distributed photovoltaics are the main force in achieving carbon peaking and carbon neutrality, which helps to enhance corporate brand image and influence and create good social benefits.

●Reduce the temperature inside the factory and increase the comfort of the environment

The photovoltaic power station establishes a thermal insulation layer for the roof of the enterprise, which improves the thermal insulation of the roof and effectively reduces the temperature of the workshop by 3-5 degrees for the roof floor, which not only reduces energy consumption, but also reduces the internal temperature of the factory and improves workers. The working environment reduces the cost of cooling in summer.

应用特点：

●建设周期短、经济效益可观

建设周期短，收益期长，有效节约峰值电费，降低用电费用，额外发电并网获取收益。盘活大面积的屋顶闲置场地，为企业创造收益。

●促进节能减排，产生良好的社会效益

分布式光伏是实现碳达峰、碳中和的装机主力军，有助于提升企业品牌形象及影响力，创造良好的社会效益。

●降低工厂内部温度，增加环境舒适性

光伏电站为企业屋顶建立了一个隔热保温层，改善了屋面的隔热状况，为楼顶有效降低厂房温度3-5度，既降低了能耗，又降低了工厂内部，温度也改善了工人的工作环境，减少了夏天降温的成本。

3 Large and medium-sized photovoltaic power
大中型光伏电站

Large and medium-sized photovoltaic power plants cover a large area. By connecting with the public power grid, they can assume the power supply function of typical power stations, maximize the use of land resources, and achieve a win-win situation between green energy and land conservation. It is suitable for various geographical and terrain conditions such as deserts, barren mountains, wastelands, fish ponds, and tidal flats.

大中型光伏电站占地面积大，通过与公共电网联接从而承担典型的发电站供电职能，最大化的利用土地资源,实现绿色能源与节约土地的双赢。适用于荒漠、荒山、荒地、鱼塘、滩涂等多种地理地形条件。

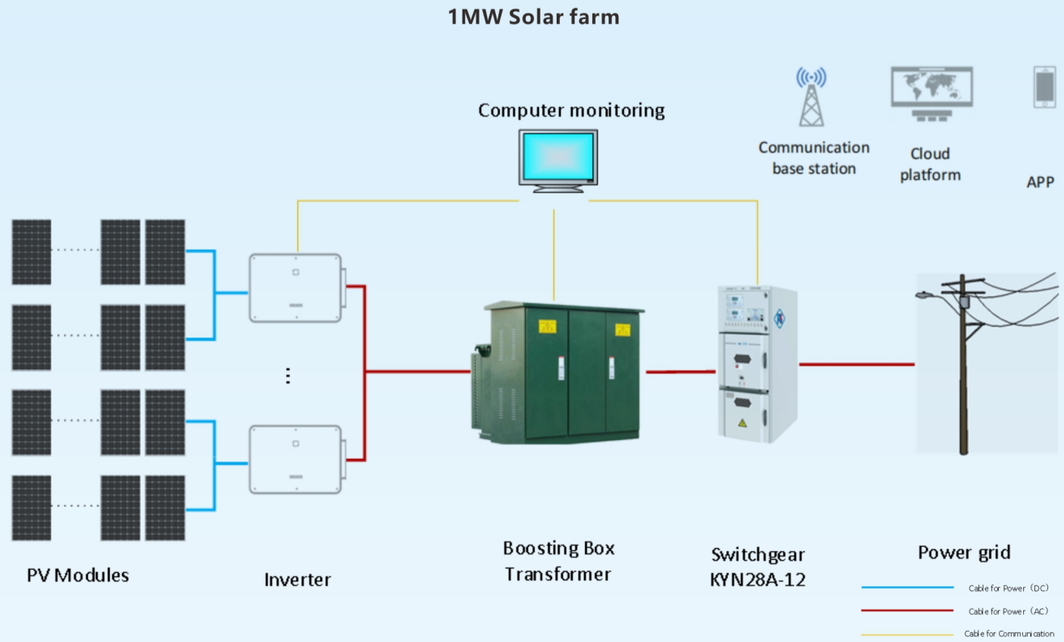
Application characteristics:

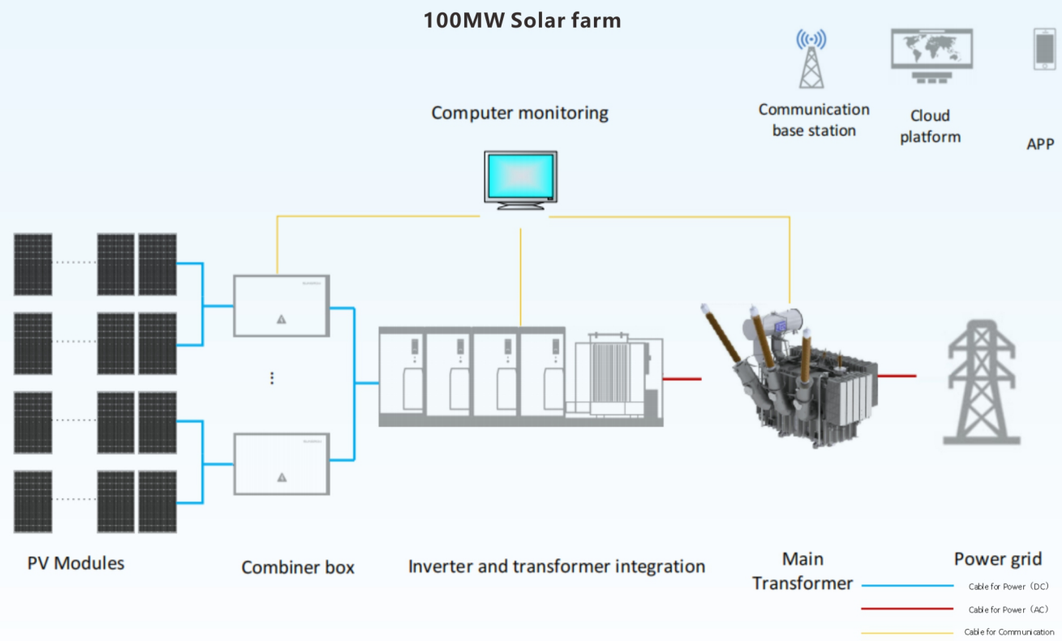
- Flexible site selection, better lighting conditions, increased stability of photovoltaic power generation, and make full use of the positive peak regulating characteristics of solar radiation and electricity load, fuctioning peak cutting.
- Flexible operation mode , which makes reactive power and voltage control more convenient, and makes it easier to regulate the grid frequency.
- Short construction period, strong environmental adaptability, high utilization rate of natural conditions, no need for water, coal transportation and other raw materials, low operation cost, easy to centralized management, less limited by space, easy to achieve capacity expansion.

应用特点:

- 选址灵活，光照条件更好，光伏发电的稳定性有所增加，并且充分利用太阳辐射与用电负荷的正调峰特性，起到削峰的作用。
- 运行方式灵活，更方便地进行无功和电压控制，更容易实现电网频率调节。
- 建设周期短，环境适应能力强，自然条件利用率高，不需要水源、燃煤运输等原料保障，运行成本低，便于集中管理，受到空间的限制小，易实现增容扩容。

Typical schemes:
典型方案：





ENERGY STORAGE SYSTEM AND SOLUTIONS

储能系统及解决方案

1 Renewable energy side-Centralized Renewable Energy Grid Connection

新能源侧 - 集中式可再生能源并网

Renewable energy generation such as wind energy or solar energy has the disadvantages of randomness and volatility. Introduce the smooth renewable energy generation output of a certain amount of energy storage systems into the wind power generation or solar energy generation systems, so as to reduce the impact on the power grid and improve the ability of tracking schedule output; In addition, it can effectively reduce the PV and wind curtailment.

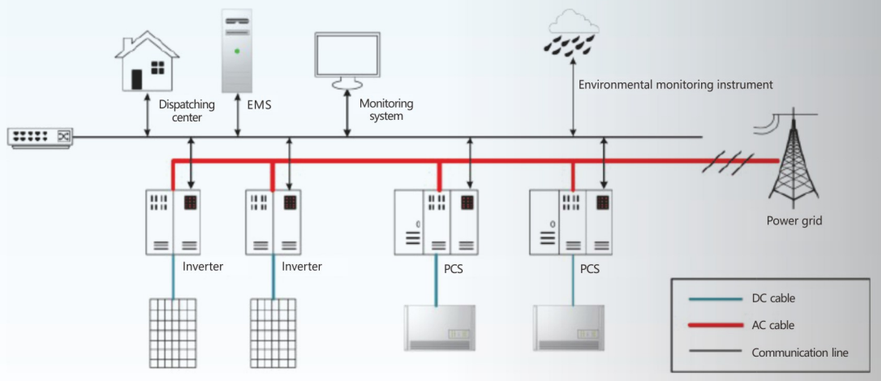
风能或太阳能等可再生能源发电具有随机性和波动性的缺点，通过在风力发电或太阳能发电系统中引入一定量的储能系统可平滑可再生能源发电输出，减少对电网的冲击；提高跟踪计划出力能力；另外，有效减少弃光、弃风现象。

Application characteristics:

- AC busbar connection, suitable for centralized management;
- Reduce the PV and wind curtailment to improve economy;
- Track schedule dispatching to improve grid-connected controllability;
- Improve the accuracy of power generation prediction and grid-connected friendliness.

应用特点：

- 交流母线连接，适合集中管理；
- 减少弃光、弃风，提高经济性；
- 跟踪计划调度，提高并网可控性；
- 提高发电预测精度，提升并网友好性。



2 Power side-Frequency Modulation Service

电源侧 - 调频服务

Traditional power systems have the disadvantage of slow response to the stability of the power grid. After the battery energy storage system is introduced, traditional power systems and AGC equipment can be assisted to quickly respond to frequency modulation and voltage regulation instructions and improve the stability of the power grid.

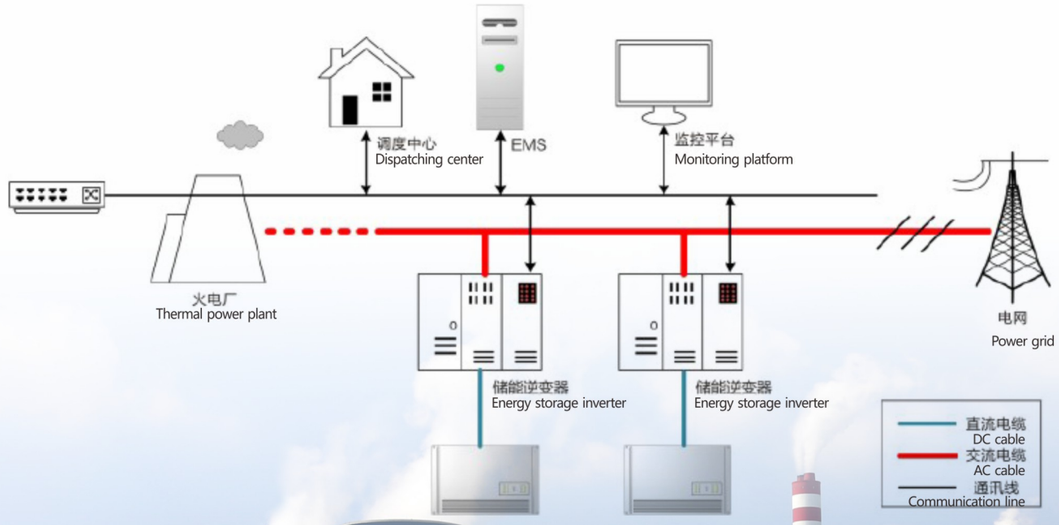
传统电力系统在稳定电网方面存在响应慢的缺点，引入电池储能系统后，可辅助传统电力系统及AGC设备，快速响应调频、调压指令，提高电网稳定性。

Application characteristics:

1.Frequency modulation-frequency modulation;
2.Increase in stability;
3.Increase in rapidity.

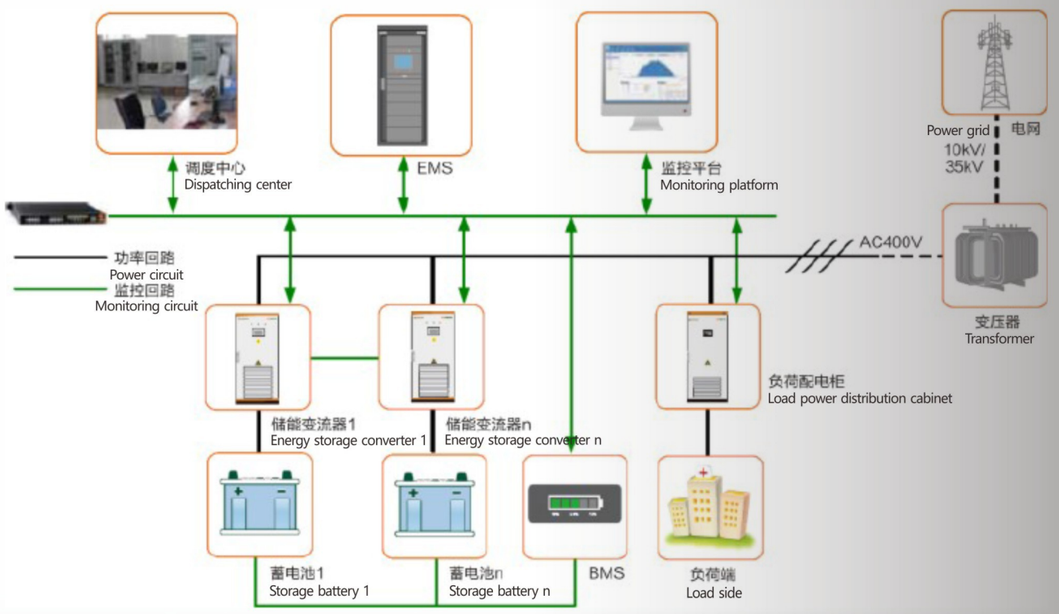
应用特点：

1.双调频；
2.更稳定；
3.更快速。



3 Grid side-Peak load shifting

电网侧 - 削峰填谷



Application 适用场景

Industrial and commercial users 工商业用户

- There is a basic electric charge system. A portion of electric charges exceeding the basic electric charge is exponentially increased;
- Save the cost for upgrading and transformation of substation equipment;
- Charge during the valley electric period and discharge during the peak electric period, and seek for arbitrage by using the electric charge difference;
- Ports, subway stations and high energy-consuming enterprises, etc.

- 有基本电费制度，超过基本电费的部分电费成倍增加；
- 节省变电设备升级改造的费用；
- 谷电时段充电，峰电时段放电，利用电价差套利；
- 港口，地铁站，高耗能企业等。

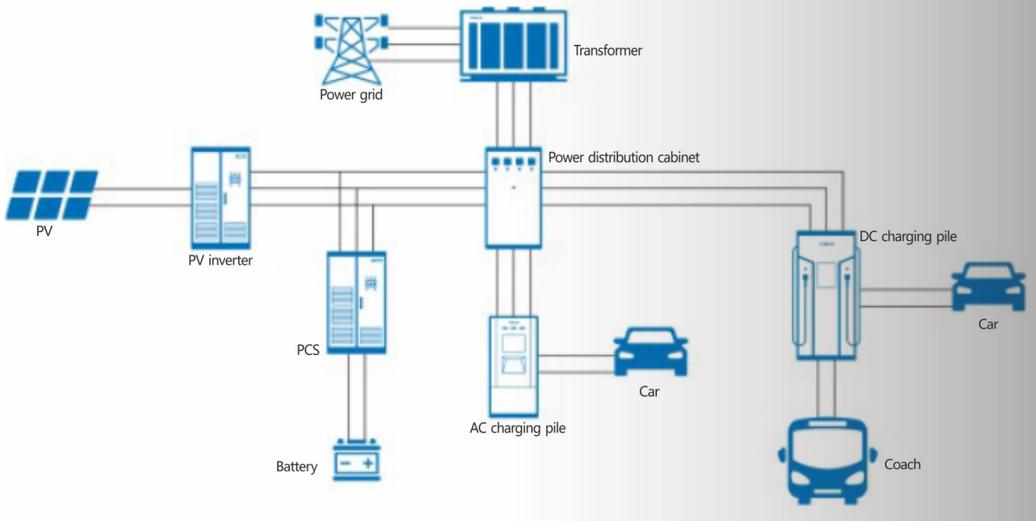
Power grid companies 电网公司

- In the peak period, the impact of the load on the power grid is more severe and may cause damage to the power grid;
- Save the cost of upgrading and maintaining the power grid;
- Do not aim at short-term investment returns.

- 高峰期负荷对电网冲击比较厉害，可能造 成电网的损害；
- 节省升级维护电网的费用；
- 不以短期的投资回报为目的。

4 Microgrid side-Energy Storage Power Station of Industrial and Commercial Parks

微电网侧 - 工商业园区储能电站



Advantage:

- Photovoltaic power generation combined with energy storage to provide reliable power;
- Photovoltaic power generation combined with energy storage to reduce impact on power grid;
- Seamless switching grid and off-grid operation;
- Provide the U/f source under the off-grid state;
- Realize the peak load shifting.

优势：

- 光储结合提供可靠电力；
- 光储结合减少对电网冲击；
- 可无缝切换并、离网运行；
- 离网状态下储能系统提供U/f源；
- 削峰填谷。

4 Microgrid side-Integrated Power Station of PV, Energy storage and Charging

微电网侧 - 光储充一体式电站

PV is the main power supply under the operating state of the micro-grid. Energy storage is used to establish the grid voltage and supplement the electricity when the PV generating capacity is insufficient, as well as supply power at night and in rainy days. When neither PV nor energy storage can conduct output, the system is connected to the power grid to supply power to the charger.

光伏作为微电网运行状态下的主电源，储能用于建立电网电压，并对光伏发电量不足时进行补充和夜晚、阴雨天时的供电。在光伏和储能都无法进行输出时，系统接入电网给充电机进行供电。

Application characteristics:

1.Delay and reduce the capacity expansion requirements of electric vehicle charging to the power grid;
2.Through the reasonable distribution of charging time and charging power, the peak load shifting is performed to ease the peak-to-valley difference in the power grid.

应用特点：

1.延缓和减少电动汽车充电对电网的扩容要求；
2.通过充电时间、充电功率的合理分配，削峰填谷，缓解电网的峰谷差。

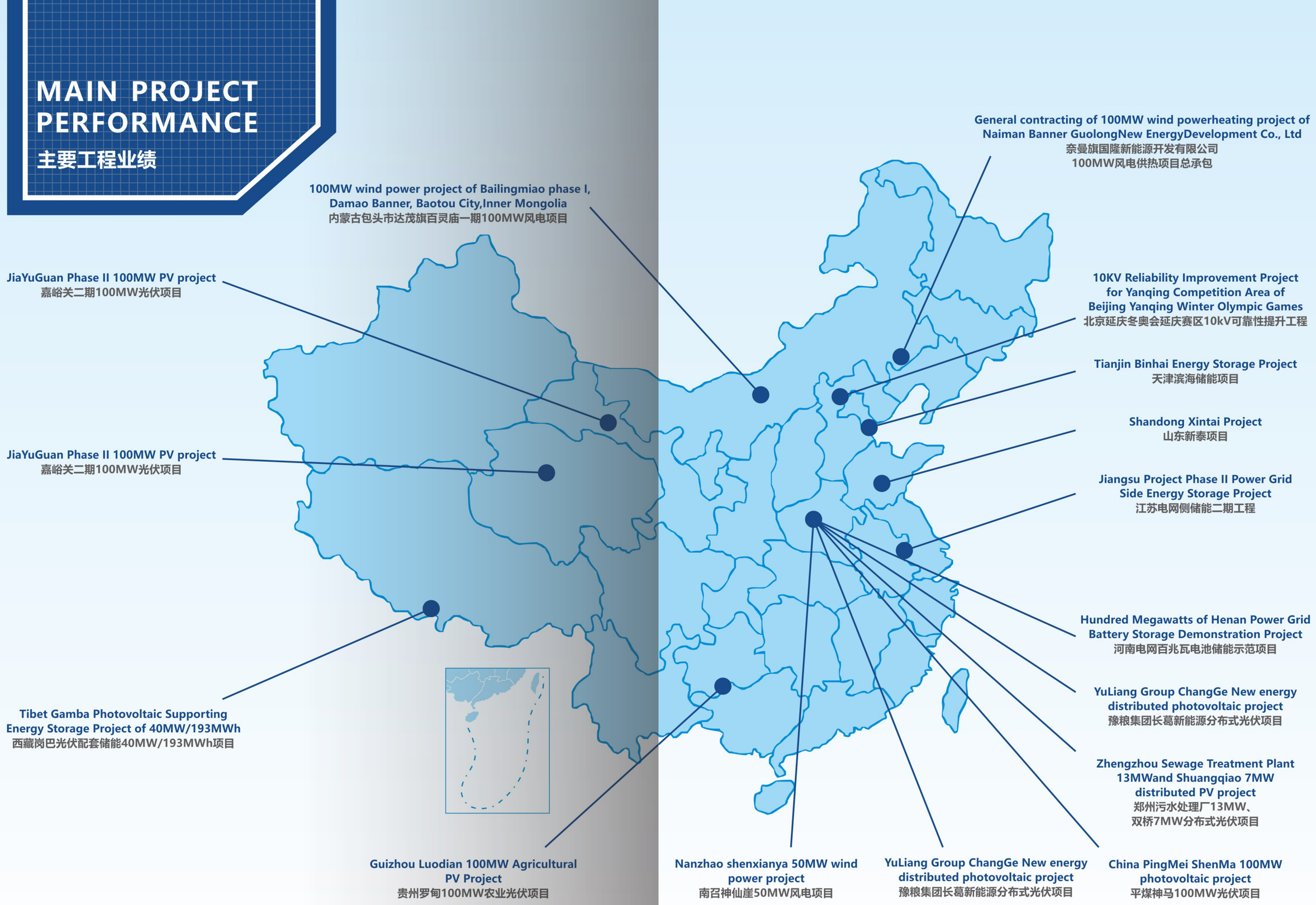
Applicable industries:

Occasions implementing the peak-valley electric charge difference (with a bigger electric charge difference) and having charging needs in the peak period. Such as electric bus stations and parking lots (in industrial and commercial parks and high-end communities).

适用行业：

实行峰谷电价差（且电价差较大）、峰值时段有充电需求的场合。例如电动公交场站、（工商业园区、高档社区）停车场。

MAIN PROJECT PERFORMANCE
主要工程业绩



100MW wind power project of Bailingmiao phase I, Damao Banner, Baotou City,Inner Mongolia
内蒙古包头市达茂旗百灵庙一期100MW风电项目

JiaYuGuan Phase II 100MW PV project
嘉峪关二期100MW光伏项目

JiaYuGuan Phase II 100MW PV project
嘉峪关二期100MW光伏项目

Tibet Gamba Photovoltaic Supporting Energy Storage Project of 40MW/193MWh
西藏岗巴光伏配套储能40MW/193MWh项目

Guizhou Luodian 100MW Agricultural PV Project
贵州罗甸100MW农业光伏项目

General contracting of 100MW wind powerheating project of Naiman Banner GuolongNew EnergyDevelopment Co., Ltd
奈曼旗国隆新能源开发有限公司
100MW风电供热项目总承包

10KV Reliability Improvement Project for Yanqing Competition Area of Beijing Yanqing Winter Olympic Games
北京延庆冬奥会延庆赛区10kV可靠性提升工程

Tianjin Binhai Energy Storage Project
天津滨海储能项目

Shandong Xintai Project
山东新泰项目

Jiangsu Project Phase II Power Grid Side Energy Storage Project
江苏电网侧储能二期工程

Hundred Megawatts of Henan Power Grid Battery Storage Demonstration Project
河南电网百兆瓦电池储能示范项目

YuLiang Group ChangGe New energy distributed photovoltaic project
豫粮集团长葛新能源分布式光伏项目

Zhengzhou Sewage Treatment Plant 13MWand Shuangqiao 7MW distributed PV project
郑州污水处理厂13MW、
双桥7MW分布式光伏项目

Nanzhao shenxianya 50MW wind power project
南召神仙崖50MW风电项目

YuLiang Group ChangGe New energy distributed photovoltaic project
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China PingMei ShenMa 100MW photovoltaic project
平煤神马100MW光伏项目

China PingMei ShenMa 100MW photovoltaic project
Location: Ye County, Pingdingshan City, Henan Province
Installed capacity: 100MW
Commencement time: June 2015
Grid connection time: June 2016
平煤神马100MW光伏项目
项目位置：河南省平顶山市叶县
装机容量：100MW
开工时间：2015年6月
并网时间：2016年6月

YuLiang Group ChangGe Renewable energy distributed photovoltaic project
Location: Puyang, Weihui, Wuzhi and other 9 counties (cities) in Henan Province
Installed capacity: 20MW
豫粮集团长葛新能源分布式光伏项目
项目位置：河南省濮阳、卫辉、武陟等9个县（市）
装机容量：20MW

JiaYuGuan Phase II 100MW PV project
Location: Jiayuguan City, Gansu Province
Installed capacity: 40MW
嘉峪关二期100MW光伏项目
项目位置：甘肃省嘉峪关市
装机容量：40MW

Guizhou Luodian 100MW Agricultural PV Project
Location: Luodian County, Guizhou Province
Installed capacity: 100MW
Commencement time: May 1, 2020
Completion time: June 30, 2020
贵州罗甸100MW农业光伏项目
项目位置：贵州省罗甸县
装机容量：100MW
开工时间：2020年5月1日
竣工时间：2020年6月30日

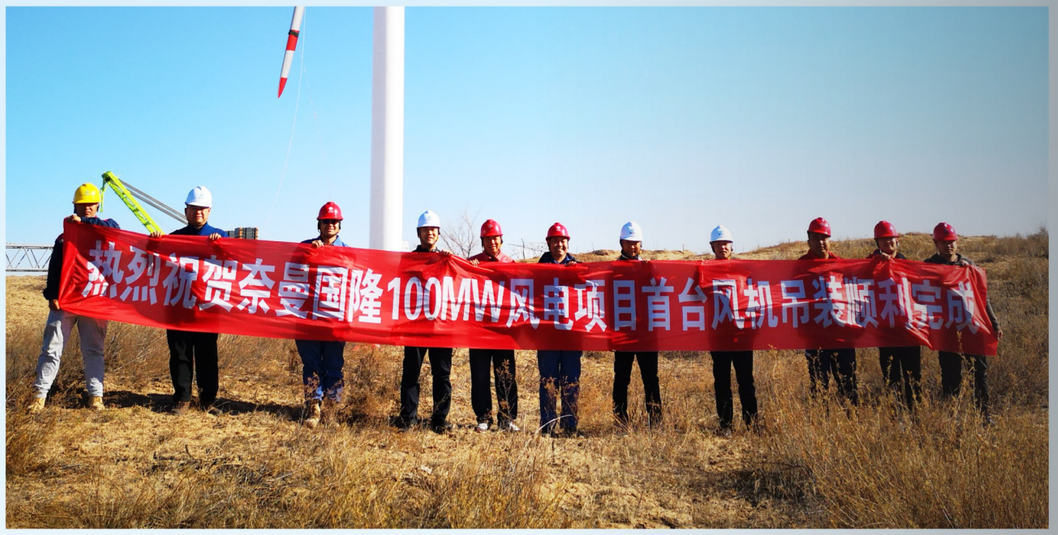
Zhengzhou Sewage Treatment Plant 13MW and Shuangqiao 7MW distributed PV project
Location: Zhengzhou city, Henan Province
Installed capacity: 20MW
郑州污水处理厂13MW、双桥7MW分布式光伏项目
项目位置：河南省郑州市
装机容量：20MW

2*1MW Photovoltaic Power Plants in Komnina on Turnkey Basis , Greece
Project Location: Komnina on Turnkey Basis , Greece
Installed capacity: 2×1MW
Commencement time: April 2022
Completion time: October 2022
希腊弗西奥蒂斯州莫洛斯市科姆尼娜 2×1MW光伏项目
项目位置：希腊弗西奥蒂斯州莫洛斯市
装机容量：2×1MW
开工时间：2022年4月
竣工时间：2022年10月

100MW wind power project of the first phase of Damaoqi Bailing Temple in Baotou City, Inner Mongolia
Project Location: Inner Mongolia Damao Banner Bailing Temple Wind Farm
Installed capacity: Phase I wind power generation capacity of 100MW
Commencement time: June 2015
Grid connection time: September 2016
内蒙古包头市达茂旗百灵庙一期100MW风电项目
项目位置：内蒙古达茂旗百灵庙风电场
装机容量：一期风力发电装机容量100MW
开工时间：2015年6月
并网时间：2016年9月

Nanzhao Shenxian Cliff 50MW wind power project
Project Location: Southwest mountainous area of Nanzhao County
Installed capacity: 50MW
Grid connection time: December 26, 2020
南召神仙崖50MW风电项目
项目位置：南召县西南部山区
装机容量：50MW
并网时间：2020年12月26日

Naimanqi Guolong New Energy Development Co., Ltd. 100MW wind power heating project general contractor
Project Location: Naiman Banner, Tongliao City
Installed capacity: 100MW
奈曼旗国隆新能源开发有限公司100MW风电供热项目总承包
项目位置：通辽市奈曼旗
装机容量：100MW



Qinghai Beijiao Renewable Energy Gonghe 50MW wind farm project PC contracting
Project Location: Langniang Village, Gonghe County, Hainan Prefecture, Qinghai Province
Installed capacity: 50MW
青海北交新能源共和50MW风电场项目PC承包
项目位置：青海省海南州共和县浪娘村
装机容量：50MW

Hundred Megawatts of Henan Power Grid Battery Storage Demonstration Project
Location: 16 in-transit substations in 9 prefectures and cities of Henan Province
Installed capacity: 100.8MW/100.8MWh
Grid connection time: December 28, 2018
河南电网百兆瓦电池储能示范项目
项目位置：河南省9个地市16个在运变电站
项目规模：100.8MW/100.8MWh
并网时间：2018年12月28日

Jiangsu Project Phase II Power Grid Side Energy Storage Project
Installed capacity: 272.16MW/475.2MWh
江苏电网侧储能二期工程
项目规模：272.16MW/475.2MWh

Tianjin Binhai Energy Storage Project
Location: Binhai New Area, Tianjin
Installed capacity: 10MW/10MWh
天津滨海储能项目
项目位置：天津市滨海新区
项目规模：10MW/10MWh

10KV Reliability Improvement Project for Yanqing Competition Area of Beijing Yanqing Winter Olympic Games
Location: Dongxingyuan Energy Storage Power Station , Beijing Yanqing
Installed capacity: The total scale of the Winter Olympic Energy Storage Station is 14MW/14MWh, including 12MW/12MWh for the fixed energy storage system and 2MW/2MWh for the mobile energy storage system.
北京延庆冬奥会延庆赛区10kV可靠性提升工程
项目位置：北京延庆东杏园储能电站
项目规模：冬奥会储能电站总规模为14MW/14MWh，其中固定式储能系统为12MW/12MWh、移动式储能系统为 2MW/2MWh

Shandong Xintai Project
Location: Xintai City, Tai 'an City, Shandong Province
Installed capacity: 5MW/10MWh
Grid connection time: June 28, 2020
山东新泰项目
项目位置：山东省泰安市新泰市
项目规模：5MW/10MWh
并网时间：2020年6月28日

Tibet Gamba Photovoltaic Supporting Energy Storage Project of 40MW/193MWh
Project Location: Gamba County, Tibet
Installed capacity: 40MW/193MWh
西藏岗巴光伏配套储能40MW/193MWh项目
项目位置：西藏岗巴县
项目规模：40MW/193MWh