TECHNOLOGY: SOLAR
COMPANY: **SHENZHEN TRONY SCIENCE AND TECHNOLOGY DEVELOPMENT CO LTD.**

Institution Company Supplier	Details
Shenzhen Trony Science and Technology Development Co Ltd.	可再生能源技术成果 (已申请)

Technique Supplier:	Shenzhen Trony Science and Technology Development Co Ltd. 深圳市创益科技发展有限公司		
Contact:	Hu Shengming 胡盛明	**Submission Date:**	2016-07-31
Category of Technology:	Solar energy utilization technology 太阳能利用技术	The Specific Technical Category:	Other solar energy utilization technology 其他的太阳能利用技术
Contact Phone No.:	15989875876	**E-mail:**	hu.shengming@trony.com
Technical Name:	High efficiency low cost of amorphous/ microcrystalline silicon tandom solar cell manufacturing technology and production line		
Technique Supplier:	Shenzhen Trony Science and Technology Development Co Ltd. 深圳市创益科技发展有限公司		
Applicability:	Amorphous /microcrystalline silicon tandom solar cell production field; unrestricted conditions。		
Technology Brief Description:	Low pressure chemical vapor deposition and plasma enhanced chemical vapor deposition technology are used in the production of amorphous /microcrystalline silicon tandom film solar cell; the key technology is crystalline /microcrystalline silicon efficiently and uniformly deposited; the key equipment mainly includes LPCVD, PECVD deposition technique equipments, laser ruling machines, PVD magnetron sputtering equipment.		
Technical Information 技术信息:	Amorphous/microcrystalline silicon tandom solar cell parameters: the conversion efficiency of 8.5% or more; the size of the single cell is 1.1*1.3m; If line added a small number of equipment, production capacity will reach 60 MW; the production area covers an area of 7000 m^2.		
Commercial Application:	Amorphous/microcrystalline silicon tandom solar cell is used in photovoltaic power station, BIPV, off-grid system, garden light, solar streetlight, etc.		
Used Conditions:	Amorphous/microcrystalline silicon tandom solar battery manufacturing technology is high maturity, the use of low maintenance cost, simple operation training; on the basis of the existing equipment and production capacity, if to added slightly a small part of the investment, the company will have 60 mw of fully automated production line.		

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	Commercial Application Contacts/Telephone/E-mail:	JeeYee Solar Energy Intl Development Co., Ltd/ Zhang Xiuhua/ (86)595-68258888 Aurolite Electrical Ltd./Tao Chunying/ (86)20-22902666
	Equipment Investment:	Company has already had a automated production line, production line mainly includes LPCVD, PECVD deposition technique equipment, PVD magnetron sputtering equipment, laser ruling machine, glass washing machine, the main control line, etc., and has achieved some production; on the basis of the complete production line, to invest 150 million yuan to add a small part of the equipment, the production will reach 60 MW capacity. Capacity; the 60 MW automatic production line of the total value is RMB 600 million yuan.
	Operating and Maintenance Fees:	Amorphous/microcrystalline silicon tandom on the raw materials for solar cells includes TCO glass, silane, etc. the automatic production cost mainly comes from the raw materials, water, electricity and other fees, as well as labor, equipment depreciation cost, repair, management fees, etc. By the calculation, production costs per watt for 3 yuan.
	Investment Payoff Period:	With an annual output of 60 mw, need a total investment of RMB 600 million yuan, the payback period of RMB 600 million yuan investment is 4 years.
	Other Revenue:	Because of amorphous/microcrystalline silicon tandom film solar cell conversion rate increasing, the output value is increasing.
	Technology Share:	Amorphous/microcrystalline silicon tandom film solar cell is mainly used in solar garden light, solar lamp, BIPV, off-grid solar energy application product, micro-consumption electronic products, and photovoltaic power station; the domestic market share is more than 40% silicon thin film solar cells.
	Technology Market Potential:	Amorphous/microcrystalline silicon tandom film solar cell production technology includes LPCVD, PECVD deposition technique, laser technique score technology, plasma cleaning technology, tunnel junction, buffer layer and composite tandom structure using technology, high reflectivity back electrode in optical structure technology, laser processing insulation technology, etc. At present, there are many outstanding advantages that are the automatic silicon thin film solar cell production technology with high maturity, the government's new energy policy support, the green energy demand, the tremendous market potential, which can last until 2020.
	Technical Advancement:	Company is one of China's largest silicon thin film solar cell manufacturer and solutions provider, the master of the second generation of thin-film solar cell production and core technology, with independent intellectual property rights. Related technologies with plasma cleaning technology, tunnel junction, buffer layer and the comprehensive use of tandom structure technology, high reflectivity back electrode in optical structure technology, laser processing insulation technology, etc, have a unique innovation, and obtain the corresponding patent. Amorphous/

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		microcrystalline silicon tandom solar cell production technology has reached the international advanced level.
	Technology Maturity：	The company has independent intellectual property rights, using automated production equipment, technical process route, equipment and quite perfect system integration. The process flow：Super white glass cleaning——Transparent conductive film plating——Laser scoring transparent conductive film——Washing again——Silicon thin film deposition——Laser scoring silicon thin film——plating the back electrode metal ——Encapsulation——Testing& storage. The production process has the characteristic of high maturity.
	Technical Suitability：	Because silicon thin film solar cell production technology used by PECVD, LPCVD vacuum coating technique, laser technique technology, high technology maturity, silicon thin film solar cell production has the characteristics of low energy consumption, low pollution, high cleaning degree, low environmental dependence is low, the rich raw material including glass, silane, etc, unencumbered.
	Technical Stability：	The company constantly updates technology, masteres the production of the second generation of thin-film solar cells and core technology, with independent intellectual property rights, and has more than 140 related patents, including 89 invention patents.
	Technology Security：	Company has established a full set of automatic production line, thin film solar cell production, processing, and design of complete supporting facilities, perfect; The market risk is small.
	Achievements Promotion Barriers：	Because the production key technology and key equipment have been successfully solved, the mature technology is no other restrictions in the process of achievement transformation and promotion without solving technical problems and such aspects as talent cultivation.
	Assignment of Intellectual Property：	Company has obtained the related patents and independent intellectual property rights, and can transfer technology in ways such as consultations, negotiations.

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Renewable Energy Technology Result (Application Submitted)			
Technology Provider:	TRUE SOLAR (S) PTE. LTD. a subsidiary of TRONY		
Contact Person:	Shengming Hu	**Submission Date:**	2016-07-31
Type of Technology:	Solar Technology	**Specific Technologies:**	Other solar energy utilization technology
Contact Number:	15989875876	**Email:**	hu.shengming@trony.com
Technical Name:	Sentry Pro		
Technology Provider:	TRUE SOLAR (S) PTE. LTD. a subsidiary of TRONY		
Scope of Application:	Off grid solar lighting applications, especially in the area without electricity		
Brief Description of Technology:	Sentry Pro is a combination of LED lamps and 12V DC power supply with Solar charging function.		
Technical Information:	Four kinds of solar packs:10W,15W,20W,30W;,can be used with Sentry Pro.The biggest output current is 10A and the output power is large.It can work in a wide range of temperature.		

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Commercial Application:	Sentry Pro have been sold to Japan, Kenya and other countries. In Japan, it was used mainly as disaster relief equipment.It brings light and power to the African countries.	
Operating conditions:	The technology of Sentry Pro is mature.It is easily to use and install,you only need to refer to the technical manual.	
Commercial application contact person/contact number/email:	1.ASKOM INCORPORATED 2.Gituka Investment, Kenya	
Equipment investment:	1. Solar Pack test equipment 2. Ultrasonic instrument 3. mould	
Operating and Maintenance Fee:	Due to the depreciation of the internal battery and other devices,it needs to cost 15% of the product cost to make it work.	
Payback Period:	The cycle of return on investment of this product is 1 year.	
Other benefits:		
Technology Share:		
Technology Market Potential :	The electronic circuit of the product is more advanced, the production line is fully automatic, Sentry Pro is reliable .At the same time ,the country's support for solar technology is strong and the clean energy is demanded strongly, so the potential market is huge in 2020.	
Technical Advancement:	Multi functional integrated, advanced and reliable battery, stable 12V power supply	
Technical Maturity:	The company has independent intellectual property rights, automated production equipment, and its technical processes, equipment and systems integration is quite perfect.	
Technical Applicability:	Due to the high maturity of the solar technology, its cleanliness and low environmental dependence, it can be used in power shortage areas.	
Technical Stability:	This product is stable without noise, suitable for electricity or power shortage areas, can be used in harsh conditions.	
Technical Safety:	We are preparing for CE certification and Lighting Africa certification procedure.	
Obstacle to promote the achievement:	The cost of the product is too high, we need to try to cut cost to make sure that low income households can afford it.	
Transfer of Intellectual Property:	In possession of product appearance patent	

Renewable Energy Technology Result (Application Submitted)			
Technology Provide:	TRUE SOLAR (S) PTE. LTD. a subsidiary of TRONY		
Contact Person:	Shengming Hu	**Submission Date:**	2016-07-31
Type of Technology:	Utilization technologies	**Specific Technologies:**	Other utilization technologies of solar energy

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		of solar energy		
	Contact number:	15989875876	**Email:**	hu.shengming@trony.com
	Technical Name:	TGC Mobile Solar Powered Platform		
	Technology Provider:	TRUE SOLAR (S) PTE. LTD. a subsidiary of TRONY		
	Scope of Application:	It applies to the rural areas with last mile logistics problem		
	Brief Description of Technology:	TGC mobile solar powered platform, together with other off-grid solar applications, is committed to addressing last mile distribution network and logistics problems.The platform uses solar panels to charge the internal energy storage system. The energy storage system hasDC outputsof 24V and 12V to drive the LED TV and printer, camera and other equipment, such as GPS positioning and GPRS mobile network.		
	Technical Information:	The platform uses a solar powered system to generate power up to 330W. It comes with 24V and 12V DC output, and equipped with GPS positioning and GPRS mobile network.		
	Commercial Application:	The product is mainly promotedto the countries with Bottom of the Pyramid (BOP) population or the region without electricity, e.g. third world country or rural areas.		
	Operating conditions:	The product technology is mature. It is available in the market. User can easily refer to the technical manual on how to install, use and maintain the product.		
	Commercial application contact person/contact number/email:	Indonesia		
	Equipment investment:	1. Test equipment for solar energy 2. Cloud server 3. Tri-motorcycle 4. Remote monitoring system/backend server		
	Operating and Maintenance Fee:	Due to wear and tear of internal battery and other components, the maintenance cost is about 15% of the system cost every year.		
	Payback Period:	According to the calculation of yearly revenue, the payback period is about 2 years.		
	Other benefits:			
	Technology Share:			
	TechnologyMarket Potential:	This product is designed based on advanced electronic circuit design concept. Fully automated production.High maturity of technology. According to nation support to the new energy, as well as the demand for green energy by 2020, the market potential is huge.		
	Technical Advancement:	Integrated with green solar energy, together with mobile carrier, to address the last mile logistics. Use of advanced and reliable off-grid solar power technology to support the equipment and devices on the mobile carrier.		

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	Technical Maturity:	Off-grid solar technology, GPS positioning technology and remote monitoring technology are considered as mature technology.		
	Technical Availability:	Due to high maturity of solar energy technology, high degree of clean energy and low environmental dependence, this product is rich with source of raw materials and has no other restriction condition.		
	Technical Stability:	The company constantly updates on technology, and is actively applied for several patents. Possess of independent intellectual property rights. Product is stable and reliable.		
	Technical Safety:	For this platform, the company has established a full set of automated production lines, and equipped with supporting facilitiesof the solar powered system and energy storage system. Market risk is minimal.		
	Obstacle to promote the achievement:	Product cost is relatively high. Need to find ways to reduce the cost, in order to reach more general low-income Bottom-of-Pyramid population.		
	Transfer of Intellectual Property:	Is actively applying for multiple patents		
	Renewable Energy Technology Result (Application Submitted)			
	Technology Provider:	TRUE SOLAR (S) PTE. LTD. a subsidiary of TRONY		
	Contact Person:	Shengming Hu	**Submission Date:**	2016-07-31
	Type of Technology:	Utilization technologies of solar energy	**Specific Technologies:**	Other utilization technologies of solar energy
	Contact number:	15989875876	**Email:**	hu.shengming@trony.com
	Technical Name:	TGC Mobile Solar Powered Platform		
	Technology Provider:	TRUE SOLAR (S) PTE. LTD. a subsidiary of TRONY		
	Scope of Application:	It applies to the rural areas with last mile logistics problem		
	Brief Description of Technology:	TGC mobile solar powered platform, together with other off-grid solar applications, is committed to addressing last mile distribution network and logistics problems.The platform uses solar panels to charge the internal energy storage system. The energy storage system hasDC outputsof 24V and 12V to drive the LED TV and printer, camera and other equipment, such as GPS positioning and GPRS mobile network.		
	Technical Information:	The platform uses a solar powered system to generate power up to 330W. It comes with 24V and 12V DC output, and equipped with GPS positioning and GPRS mobile network.		
	Commercial Application:	The product is mainly promotedto the countries with Bottom of the Pyramid (BOP) population or the region without electricity, e.g. third world country or rural areas.		

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	Operating conditions:	The product technology is mature. It is available in the market. User can easily refer to the technical manual on how to install, use and maintain the product.
	Commercial application contact person/contact number/email:	Indonesia
	Equipment investment:	1. Test equipment for solar energy 2. Cloud server 3. Tri-motorcycle 4. Remote monitoring system/backend server
	Operating and Maintenance Fee:	Due to wear and tear of internal battery and other components, the maintenance cost is about 15% of the system cost every year.
	Payback Period:	According to the calculation of yearly revenue, the payback period is about 2 years.
	Other benefits:	
	Technology Share:	
	TechnologyMarket Potential:	This product is designed based on advanced electronic circuit design concept. Fully automated production.High maturity of technology. According to nation support to the new energy, as well as the demand for green energy by 2020, the market potential is huge.
	Technical Advancement:	Integrated with green solar energy, together with mobile carrier, to address the last mile logistics. Use of advanced and reliable off-grid solar power technology to support the equipment and devices on the mobile carrier.
	Technical Maturity:	Off-grid solar technology, GPS positioning technology and remote monitoring technology are considered as mature technology.
	Technical Availability:	Due to high maturity of solar energy technology, high degree of clean energy and low environmental dependence, this product is rich with source of raw materials and has no other restriction condition.
	Technical Stability:	The company constantly updates on technology, and is actively applied for several patents. Possess of independent intellectual property rights. Product is stable and reliable.
	Technical Safety:	For this platform, the company has established a full set of automated production lines, and equipped with supporting facilitiesof the solar powered system and energy storage system. Market risk is minimal.
	Obstacle to promote the achievement:	Product cost is relatively high. Need to find ways to reduce the cost, in order to reach more general low-income Bottom-of-Pyramid population.
	Transfer of Intellectual Property:	Is actively applying for multiple patents

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Anhui Qiguang Energetech Research Institute Co., Ltd	**Renewable Energy Technology Achievement Declaration**			
	QR code			
	Technology provision unit	Anhui Qiguang Energetech Research Institute Co., Ltd.	Submission date	June 30, 2016
	Contact person	Guo Jiahu	Technology type	Solar energy utilization technology
	Tel.	13335548869	E-mail	yaoxian610@163.com
	Technology name	3-6KW photovoltaic energy storage integrated inverter		
	Technology provider	Anhui Qiguang Energetech Research Institute Co., Ltd.		
	Scope of application	Anhui Qiguang Energetech Research Institute Co., Ltd.		
	Brief description of technology	Charge and inverter integrated design Intelligent battery management At the same time, it possesses the off-grid and grid-connected functions Battery can be flexibly configured Safer and more effective Dust-proof and waterproof grade of IP65 Full load output at 45℃ Achieve local monitoring through the software Achieve remote monitoring by computer and mobile phone Integrated thermal dissipation technology without fan		
	Technical information	Discharge power (W) 4,600 3,600 Charging power (W)2,300(can be set) Dimension 516*440*184mm Weight (kg) 30 8		
	Business application situation	A villa located in Nantong City, Jiangsu Province, installed capacity is 6KW, using a total of 8 pieces of 240Wp polysilicon photovoltaic modules and 10 pieces of 230Wp polysilicon photovoltaic modules and 3 lithium batteries and a 6KW optical storage integrated inverter,		
	Service conditions	None		

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	Contact person of business application unit /Tel,/E-mail	Private construction, the project uses our company's optical storage integrated inverter, technology maturity is high, and the market is widely used. Our company's 3-6KW optical storage integrated inverter can be conveniently operated, users do not need training, and they can operate on their own through the operation manual. The product is maintenance-free, easy to install and easy to use.
	Investment on equipment	About RMB 15,000-30,000
	Expense of operation maintenance	Maintenance-free
	Investment payback period	The shortest period of 5 years and the longest period of 10 years (refer to payback period of photovoltaic power generation system)
	Other earnings	1. Obtain earnings by selling power to power companies. 2. National and local subsidies for photovoltaic power generation 3. Saving from self-used electric charge
	Technology occupancy	Our company's 3-6KW optical storage integrated inverter belongs to the high-end position in the market. Market occupancy is about 2.6%
	Market potential of the technology	With the national support of the photovoltaic power generation industry, the domestic photovoltaic power generation system is bound to be widely used.
	Technical advancement	Highly integrated electric circuit design, the smallest volume and weight in the industry
	Technical maturity	Design of Tri-level, design of highly integrated circuit board, unique power device scattering technology, fanless design and natural cooling.
	Technical applicability	The product is mainly taken as the equipment converting DC to AC in domestic photovoltaic power generation system, with the suitable environmental temperature of -25-60℃; Relative humidity of 0-95%, the highest altitude of 4,000m (deloading at 3,000m)
	Technical stability	Hundreds of successful cases of projects, the equipment can be stably repaired at site and maintenance-free.
	Technical safety	Mature technology design, it applies mainstream electronic element on the market, and the maturity of system supporting equipment and technology is high with convenient in purchase.
	Obstacle in achievement transformation and promotion	Confined by too high cost of battery pack of photovoltaic power generation system and other auxiliary materials, it results in a long term for cost payback of photovoltaic power generation system, and it is weak in competition compared with traditional power generation pattern.
	Transfer of intellectual property	An insulation test system used for photovoltaic energy storage system and its test method, a photovoltaic Boost converter double closed-loop control method used in photovoltaic energy storage

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		system and other patents, a full bridge inverter three-closed-loop control method of the photovoltaic storage system islanding mode.		
	Photo caption			
	Renewable Energy Technology Achievement Declaration			
	QR code			
	Technology provision unit	Anhui Qiguang Energetech Research Institute Co., Ltd.	Submission date	June 30, 2016
	Contact person	Guo Jiahu	Technology type	Others
	Tel.	13335548869	E-mail	yaoxian610@163.com
	Technology name	100KW bi-directional energy storage converter		
	Technology provider	Anhui Qiguang Energetech Research Institute Co., Ltd.		
	Scope of application	Anhui Qiguang Energetech Research Institute Co., Ltd.		
	Brief description of technology	Bi-directional DC/DC converter can make flexible adjustment of the voltage difference to achieve the best match battery characteristics With DC side voltage stability, it is conducive to the sustainable and efficient operation of the system Independent charge and discharge circuit and the charge-discharge depth control can effectively maintain the current balance Convenience to switch and maintenance of battery unit is easy to implement large-capacity storage system		
	Technical information	Rated AC power 100kW Rated AC Current 152A Outline dimension (Width/height/depth) 1,200/2,000/850 mm Weight 1,300kg		
	Business application situation	Shanghai Jiao Tong University's 50KW energy storage power station project. Equipment is 5KWh lithium titanate energy storage system consists of: 50kW converter (PCS), battery management system (BMS), monitoring and management system, lithium titanate battery group.		
	Service conditions	Shanghai Jiao Tong University's 50KW energy storage power station experimental project. Contact person: Gao Ning 13816074542		

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	Contact person of business application unit /Tel./E-mail	For Local construction, the project uses the equipment with mature technologies. Our PCS converter is high technology content and needs professional training before operation. Standardized cabinet design, power unit modular design, with easy installation and maintenance.
	Investment on equipment	About RMB 300, 000
	Expense of operation maintenance	Considering the spare parts and equipment and failure treatment, the main device costs about RMB 15,000 during its service life
	Investment payback period	The shortest period of 6-10 years (refer to payback period of photovoltaic power generation system)
	Other earnings	After the energy-storage link is introduced in the system, demand side management can be effectively conducted to eliminate the valley-to-peak difference in the day and night and balance the load. The power equipment can be effectively used not only to reduce the power supply costs but also promote the application of renewable energy or be deemed as a way to improve the stability for system operation, adjust the frequency and compensate the fluctuation of load. However, the converter is one of the key equipment in the energy storage system.
	Technology occupancy	5 sets of PCS of our company are available on the market with stable operation The current market share is around 8%, and there is still much room for improvement in the market share.
	Market potential of the technology	As the state has increased efforts to support energy storage technology, storage technology application market prospects will reach 1 billion levels, while PCS, as one of key components of the energy storage converter, must have market blowout phenomenon inevitably.
	Technical advancement	Unique power device-specific thermal dissipation technology, special circuit design, unique fire-fighting coordination technology, the model of equipment stays in the leading domestic level.
	Technical maturity	Design of Tri-level, design of highly integrated circuit board, unique power device scattering technology and excellent imported power components and parts.
	Technical applicability	The product is mainly used as energy storage power station system, AC and DC equipment which can mutually converted for work environment requires -25℃ - +55℃, Relative humidity of 0-95%, altitude of 2,000m
	Technical stability	Lots of successful cases of projects, and equipment are in stable operation on site.
	Technical safety	Mature technology design, it applies mainstream electronic element on the market, and the maturity of system supporting equipment and technology is high with convenient in purchase.
	Obstacle in achievement transformation and promotion	1. Energy storage technology is a new electric power technology, which is in the initial stage of electric power application. Users don't know much about the application prospect of energy storage devices, and it takes time to explain to the users about the product's market prospects and its economic benefits 2. Limited by the price of the battery, user acceptance of energy storage system is still low. With the

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		maturity of the technology being gradually improved and the drop in the prices of main equipment of energy storage system, the market prospect will be more extensive.
	Transfer of intellectual property	One kind of energy storage equipment battery damping fixed, mobile and battery energy storage systems, mobile energy storage equipment power display systems, battery management system estimation system based on dynamic SOC.
	Photo caption	

Renewable Energy Technology Achievement Declaration

QR code			
Technology provision unit	Anhui Qiguang Energetech Research Institute Co., Ltd.	Submission date	June 29, 2016
Contact person	Guo Jiahu	Technology type	Wind energy utilization technology
Tel.	13335548869	E-mail	yaoxian610@163.com
Technology name	100KW energy storage cabinet		
Technology provider	Anhui Qiguang Energetech Research Institute Co., Ltd.		
Scope of application	Anhui Qiguang Energetech Research Institute Co., Ltd.		
Brief description of technology	Support multi-parallel cabinets, convenient to expansion of power and battery energy level, and can configure different types and capacity of batteries as required. IP65 protection level, standard container design, and constant temperature design in cabinet. The system has 59 items of fault protections and is equipped with automatic humiture control, access monitoring, sound and light alarm light, smoke alarm, making the system safe in all aspects and realizing unattended.		
Technical information	Power 100KW;Capacity 25KWH;Current AC152A;Frequency 47-51.5Hz,Efficiency 0.97;Outline dimension 2500mm *2200mm* 2250mm;weight 3.5t		
Business application situation	None		
Service conditions	None		
Contact person of business application unit /Tel./E-mail	100KW energy storage cabinet of our Company is the type of container, removable energy storage system. The product is in the initial phase of the market promotion. The energy storage cabinet is of high technical content and requires special technical training to users as to its system		

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	Investment on equipment	About RMB 700,000
	Expense of operation maintenance	Considering the spare parts of the main device and equipment troubleshooting, its cost is about RMB 30,000 during the service life
	Investment payback period	The shortest period of 10 years (refer to payback period of energy-storage power generation system)
	Other earnings	After the energy-storage link is introduced in the system, demand side management can be effectively conducted to eliminate the peak and valley difference in the day and night and balance the load. It can not only effectively use the power equipment to reduce the power supply costs but also promote the application of renewable energy or used as a way to improve the stability of system operation, adjust the frequency and compensate the fluctuation of load. And, the converter is one of the key equipment in the energy storage system.
	Technology occupancy	None
	Market potential of the technology	Smart Grid is the development direction of the electric power industry. With the rapid development of smart grid, energy storage system, as the key technology, is playing an increasingly important role We focus on the application areas of energy storage products and have gathered lots of expert teams in the field of energy storage research in China. With the economic development, and the national policy support for energy storage, energy storage in the future by 2020 will be sure to have broad market. We strive to be among the top 5 places in the market share of the domestic trade as to the energy storage cabinet by 2020
	Technical advancement	With the unique heat dissipation technology of the power device, special circuit design, unique harmonic elimination technique, and this type of equipment is in the leading place in China.
	Technical maturity	Design of Tri-level, design of highly integrated circuit board, unique power device scattering technology and excellent imported power components and parts.
	Technical applicability	Suitable environment temperature range, operating temperature -20- + 45 ℃
	Technical stability	Lots of successful cases of projects, and equipment are in stable operation on site.
	Technical safety	Mature technology design, it applies mainstream electronic element on the market, and the maturity of system supporting equipment and technology is high with convenient in purchase.
	Obstacle in achievement transformation and promotion	1. Energy storage technology is a new electric power technology, which is in the initial stage of electric power application. Users don't know much about the application prospect of energy storage devices, and it takes time to explain to the users about the product's market prospects and its economic benefits

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		2. Limited by the price of the battery, user acceptance of energy storage system is still low. With the maturity of the technology being gradually improved and the drop in the prices of main equipment of energy storage system, the market prospect will be more extensive.
	Transfer of intellectual property	It has obtained 25 utility modal patents, 1 software copyright and 20 patents for inventions are in the substantive trial. A communication circuit in the internal system of mobile energy storage power station, an output filtering circuit for household energy storage systems, and a fixed structure invention of vibration damping for energy storage device battery pack.
	Photo caption	

Renewable Energy Technology Achievement Declaration			
QR code			
Technology provision unit	Anhui Qiguang Energetech Research Institute Co., Ltd.	Submission date	June 29, 2016
Contact person	Guo Jiahu	Technology type	Solar energy utilization technology
Tel.	13335548869	E-mail	yaoxian610@163.com
Technology name	Photovoltaic inverter 1-3KW		
Technology provider	Anhui Qiguang Energetech Research Institute Co., Ltd.		
Scope of application	Anhui Qiguang Energetech Research Institute Co., Ltd.		
Brief description of technology	Multiple voltage specifications, unique low-voltage protection function of electrical level, partially customizable functions, LCD display		
Technical information	AC output power (w) 1,000/2,000/3,000; AC voltage 180-260V; MPPT efficiency 95%; Dimension (Length × width × height) mm 270*190*110 Weight 5.3Kg		
Business application situation	The personal proprietor in certain residential community in urban area of Jinan in Shandong Province applies independently, the installed capacity of the system is 2KW, and four 240Wp and five 230Wp polycrystalline silicon photovoltaic components and one set of 2KW inverter are used in total,		
Contact person of business application unit /Tel,/E-mail	The product of this model is small-size inverter and is suitable for domestic photovoltaic power generation system, 1-3KW products of our company are easy for installation, convenient for operation and can be operated by the users without technical training basically.		
Investment on equipment	RMB 1,500-3,000		

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	Expense of operation maintenance	Maintenance-free
	Investment payback period	The shortest period is of 5 years and the longest period of 10 years (refer to payback period of photovoltaic power generation system)
	Other earnings	1. Obtain earnings by selling power to power companies. 2. National and local subsidies for photovoltaic power generation 3. Saving from self-used electric charge.
	Technology occupancy	The product is the earlier equipment developed by our company and has a higher technical maturity with about 5% of market occupancy.
	Market potential of the technology	As the State pays more and more attention to the application of photovoltaic power generation technology; And the support for domestic photovoltaic power generation system has been increased gradually. The market application perspective of 1-3KW photovoltaic inverters is becoming wider and wider.
	Technical advancement	Highly integrated circuit design and the minimum volume and weight in the same industry.
	Technical maturity	Design of highly integrated circuit board, unique power device scattering technology, fanless design and natural cooling
	Technical applicability	The product is mainly taken as the equipment converting DC to AC in domestic photovoltaic power generation system, with the suitable environmental temperature of -25-70℃; Relative humidity of 0-95%, the highest altitude of 4,000m (deloading at 3,000m)
	Technical stability	Hundreds of successful cases of projects, the equipment can be stably repaired at site and maintenance-free.
	Technical safety	Mature technology design, it applies mainstream electronic element on the market, and the maturity of system supporting equipment and technology is high with convenient in purchase.
	Obstacle in achievement transformation and promotion	Confined by too high cost of battery pack of photovoltaic power generation system and other auxiliary materials, it results in a long term for cost payback of photovoltaic power generation system, and it is weak in competition compared with traditional power generation pattern.
	Transfer of intellectual property	An insulation test system used for photovoltaic energy storage system and its test method, a photovoltaic Boost converter double closed-loop control method used in photovoltaic energy storage system and other patents

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Photo caption	

Renewable Energy Technology Achievement Declaration			
QR code			
Technology provision unit	Anhui Qiguang Energy Science & Technology Research Institute Co., Ltd.	Submission date	June 29, 2016
Contact person	Guo Jiahu	Technology type	Solar energy utilization technology
Tel.	13335548869	E-mail	yaoxian610@163.com
Technology name	photovoltaic inverter 3-6KW		
Technology provider	Anhui Qiguang Energy Science & Technology Research Institute Co., Ltd.		
Scope of application	Anhui Qiguang Energy Science & Technology Research Institute Co., Ltd.		
Brief description of technology	It applies the design principal of three-level finishing bridge, and the core components use the imported elements for 10 above of security detection, integratable DC shutdown switch, IP65 dustproof and waterproof grade, output in full load at 45℃, built-in anti-reflux function, 30% weight optimization, 20% volume optimization, wide range of MPPT voltage, and supports various communication modes and integrated fanless heat dissipation technology.		
Technical information	Access string power (W) 3900 4,680 5,460 6,500 AC output (W) 3,000 3,680 4,200 5,000 Volume 347*432*145 14g		

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	Business application situation	Shijiazhuang Installation Project of Solar Energy, installed capacity of 3kW. This Project is in selection of polycrystal component, Model LW250, Number of 12, 3KW of inverter.
	Service conditions	Project for 3KW Solar Power Generation of Shijiazhuang Guangheng Solar Equipment Installation Co., Ltd.
	Contact person of business application unit /Tel./E-mail	Local construction, equipment for household photovoltaic power generation system, simple equipment operation, technical training according to users' demands, maintenance-free for single set of equipment
	Investment on equipment	Solar cell module, AC lateral distribution box, photovoltaic inverter, support, cable and other accessories, one-off investment of RMB 30,000-60,000, wherein RMB 3,000-4,000 for inverter
	Expense of operation maintenance	Maintenance-free
	Investment payback period	The shortest period of 5 years and the longest period of 10 years (refer to payback period of photovoltaic power generation system)
	Other earnings	1. Obtain earnings by selling power to power companies. 2. National and local subsidies for photovoltaic power generation 3. Saving from self-used electric charge.
	Technology occupancy	5%
	Market potential of the technology	In recent two years, the Company has actively invested in the support to R&D projects of new products, including the talent introduction and financial support. In 2015, our Company had market occupancy of 5% in 3-6KW inverter. We will currently put more efforts in promotion of photovoltaic inverter industry aiming at the market conditions in the past year and combining with the current economic situation. Combining with the large marketing capacity of the head office, it is expected that the market occupancy in 3-6KW inverter will be 20% by 2020.
	Technical advancement	Highly integrated electric circuit design, the smallest volume and weight in the industry
	Technical maturity	Design of Tri-level, design of highly integrated circuit board, unique power device scattering technology, fanless design and natural cooling.
	Technical applicability	The product is mainly taken as the equipment converting DC to AC in domestic photovoltaic power generation system, with the suitable environmental temperature of -25-60℃; Relative humidity of 0-95%, the highest altitude of 4,000m (deloading at 3,000m)
	Technical stability	Hundreds of successful cases of projects, the equipment can be stably repaired at site and maintenance-free.
	Technical safety	Mature technology design, it applies mainstream electronic element on the market, and the maturity of system supporting equipment and technology is high with convenient in purchase.

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	Obstacle in achievement transformation and promotion	Confined by too high cost of battery pack of photovoltaic power generation system and other auxiliary materials, it results in a long term for cost payback of photovoltaic power generation system, and it is weak in competition compared with traditional power generation pattern.
	Transfer of intellectual property	An insulation test system used for photovoltaic energy storage system and its test method, a photovoltaic Boost converter double closed-loop control method used in photovoltaic energy storage system and other patents, a full bridge inverter three-closed-loop control method of the photovoltaic storage system islanding mode
	Photo caption	

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COMPANY: **POLY SOLAR TECHNOLOGIES (BEIJING) CO., LTD**

Poly Solar Technologies (Beijing) Co., Ltd	**Renewable Energy Technology Achievement Declaration**			
	QR code			
	Technology provision unit	Poly Solar Technologies (Beijing) Co., Ltd.		
	Contact person	Zhu Xinyu	Submission date	June 17, 2016
	Technology type	Solar energy utilization technology	Specific technology	Solar energy observation station technology
	Tel.	13911560970	E-mail	chengxin@polyslar.cn
	Technology name	System for 3W mini household		
	Technology provider:	Poly Solar Technologies (Beijing) Co., Ltd.		
	Scope of application	Be suitable for solving the lighting problem of one room in a house without electricity		
	Brief description of technology	The product consists of a solar cell module, a host and a LED light bulb, during daytime, solar power can be stored in the battery inside the host, the host can provide power to the light bulb if necessary. There are outlets of USB for power supply in host which can be used for charging for cell phone. In addition, the host volume is very small and portable, with a flashlight, which can be used alone as a flashlight.		
	Technical information	Power of solar cell module: 3W p Battery type: lithium-ion batteries Capacity of battery: 3.7V 4400m Ah Power of light source: 2W		
	Business application situation	African public welfare project of Poly Technologies in 2016, Tanzania, 5,000 sets of systems for 3w households are put into implementation		
	Service conditions	Costs for market transaction, mature technology, systematic training failing to be needed, installation, use and maintenance can be ignored.		
	Contact person of business application unit /Tel./E-mail	Poly Technologies Co., Ltd. Li Laixing 13810042713 lilaixhg@polyinc.com		
	Investment on equipment	RMB 200,000 for mould opening, costs for raw materials and labor: USD 10		

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	Expense of operation and maintenance	Be ignored
	Investment payback period	1 year
	Other earnings	Be ignored
	Technology occupancy	Unknown
	Market potential of technology	The market is expected to need 1,000,000 units
	Technical advancement	The mini solar household system, which has never been seen at home, integrates Charge Pal, flashlight, table lamp and others as a whole with uniqueness in the market..
	Technical maturity	Product executive standards: GB/T19064-2003 Technical conditions and test methods of domestic solar photovoltaic power system GB/T18287-2013 Li-ion storage battery used for mobile phone and general specification for storage battery GB2099.1-2008 Part 1 for domestic plugs and sockets and others with the similar purposes: General requirements GB/T191-2008 Graphic marks for package, storage and transportation GB4943.1 Part I for information technology equipment safety: General safety GB/T17626.2 Electromagnetic compatibility test and measurement technology electrostatic discharge noise immunity test YD/T1591-2009 Technical requirements and test methods of mobile communication terminal power adapter and charging/data interface UL2054 Domestic or commercial storage battery
	Technical applicability	Project process is simple, without too much technical workers to complete, having extensive sources of raw materials, negatively affected by the scale of the geographical factors, the environment, investment and other bad influence.
	Technical stability	1. Board-level inspection a) Detection opportunity: Fully inspect the finished products components during production b) For normal charging indication function, the color of indicator light of charging state is red, and it is blue when the battery is charged fully; c) Inspection of circuit board: All components and parts on the circuit board are welded properly without cold solder joint and solder skips, their locations are clear and neat with three layers of paints coated evenly and completely.

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		d) Surface outside the lens is painted evenly with the chromeplate paint with smooth surface, and surface of lens that the lights come from and the holes that the lights enter into are not contaminated. 2. Ex-factory inspection Detection opportunity: Full inspection of the product when leaving the factory 2.1 Visual inspection of solar power a) The surface of solar power shell shall be subject to high light treatment, and the surface should be smooth and have no impurities, mechanical damage and rust for contact, coating damage. b) The upper and lower covers are required to be fit closely, and all the parts must not have flash, burrs, with strong connection among all fittings of the product; c) Lens is clean and free of stains, enclosure is not leaked; d) Product identification silk-screen does not allow any pattern, the font is not clear, not correct, not complete, ink dragging, print missing, misplaced, overlap, less ink and other undesirable phenomena. e) Plug smoothly from the power socket, connect stably with normal conduction and the output voltage of 5 ± 0.25V f) Charging function of power supply is normal, with solid connection, plugging smoothly, 5V input charging current is less than 900mA
	Technical safety	The product has been verified in the global scope introduced by American, and such verification has a higher recognition degree in Africa.
	Obstacle in achievement transformation and promotion	Almost nothing
	Transfer of intellectual property	The Enterprise has own intellectual property rights with completely localization and transferable technology.

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	Photo captions			
	Poly Solar Technologies (Beijing) Co., Ltd. (sealed)			
	Renewable Energy Technology Achievement Declaration			
	QR code			
	Technology provision unit	Poly Solar Technologies (Beijing) Co., Ltd.		
	Contact person	Yang Jianfeng	Submission date	June 30, 2016
	Technology type	Others	Specific technology	Others
	Tel.	13803802566	E-mail	chengxin@polyslar.cn
	Technology name	Green energy-saving preassembled buildings and renewable energy can use integrated application		
	Technology provider:	Poly Solar Technologies (Beijing) Co., Ltd.		
	Scope of application	It applies to the area with power shortage, building materials, house shortage area, with ability to quickly solve the housing supply		
	Brief description of technology	Standardization of parts, factory production, installation assembly, rapid construction of safe, comfortable, durable, energy-saving permanent housing, the use of renewable energy and building integration		

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		technology realize houses with access to heating water and electricity. Improve the quality of people's lives.
	Technical information	Heat transfer coefficient of wallboard (100mm in thickness) 1.48W/m^3; Sound insulation: 48db;Fire resistance: A grade, 240min; Durability: Freezing-melting circulation for more than five times; Building life: More than 50 years.
	Business application situation	Angola social housing projects are located in Soyo area, Cabinda, totaling 104 square meters of 64 sets of houses. They were installed and delivered completely in 2012, which have been normally used so far.
	Service conditions	Market transactions, more than 5,000 sets can be considered as factory built locally.
	Contact person of business application unit /Tel./E-mail	Poly Solar Technologies (Beijing) Co., Ltd. Yang Jianfeng 13803802566 yangiianfengl964@126.com
	Investment on equipment	RMB 30,000,000.
	Expense of operation and maintenance	RMB 1,000,000 per year.
	Investment payback period	2--3 years.
	Other earnings	Driving sale of systems for solar household.
	Technology occupancy	1%
	Market potential of technology	Compared with similar products from more than 60 enterprises, the cost performance of the product is highest, its market share is predicted to up to 10 times by 2020.
	Technical advancement	Ingenious technology makes its leading position in the international similar technologies
	Technical maturity	Simple assembly process technology, equipment and parts have the degree of integration of more than 80%.
	Technical applicability	Especially be suitable for other developing countries, especially for medium, large quantity of housing projects and the areas lacking of electricity, building materials and high labor cost in Africa.
	Technical stability	Technical stability, with minimal environmental impact.
	Technical safety	During the technology industrialization process, China is vigorously promoting it as a green energy-saving building with complete supporting facilities, a high degree of market acceptance and risk-free.
	Obstacle in achievement	None

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	transformation and promotion	
	Transfer of intellectual property rights	China has independent intellectual property rights, has five utility model patents and patents for invention and has enterprises owning the technology.
	Photo captions	

Renewable Energy Technology Achievement Declaration

QR code			
Technology provision unit	Poly Solar Technologies (Beijing) Co., Ltd.		
Contact person	Zhu Xinyu	Submission date	June 22, 2016
Technology type	Solar energy utilization technology	Specific technology	Solar energy observation station technology
Tel.	13911560970	E-mail	chengxin@polyslar.cn
Technology name	AC and DC solar energy photovoltaic household power system		
Technology provider	Poly Solar Technologies (Beijing) Co., Ltd.		
Scope of application	It applies to solve the lighting problems of families in the area without electricity, radio, television and other living demands		

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	Brief description of technology	The product is composed of one 80W solar module, one control host, six independent LED light bulbs, two light bulbs of 12v / 7w, four light bulbs of 12v / 2w with bulb connecting the host through wires and configuration with independent switches and lamp holder, and 12V / 150Ah lead acid batteries and DC12V / AC220V50HZ200w inverter are configured in the control box.
	Technical information	Power of solar cell module: 80Wp Battery type: lead acid battery Capacity of battery: 12Vl50Ah Power of light source: 12V/2w*4, 12V/7w*2AC Output power: 200w
	Business application situation	In 2005, 400 villages in Sudan northern Cort Van were provided with 600 sets of solar household systems with various specifications 科特范省
	Service conditions	Costs for market transaction, mature technology, systematic training failing to be needed, installation, use and maintenance can be ignored.
	Contact person of business application unit /Tel./E-mail	Poly Technologies Co., Ltd. Li Laixing 138100427131ilaixing@polyinc.com
	Investment on equipment	RMB 200,000 for mould opening, costs for raw materials and labor: USD
	Expense of operation and maintenance	Be ignored
	Investment payback period	1 year
	Other earnings	Be ignored
	Technology occupancy	Unknown
	Market potential of technology	It is predicted that one million sets are needed.
	Technical advancement	The mini solar household system, which has never been seen at home, integrates Charge Pal, flashlight, table lamp and others as a whole with uniqueness in the market..
	Technical maturity	GB/T19064-2003 Technical conditions and test methods of domestic solar photovoltaic power system GB/T18287-2013 Li-ion storage battery used for mobile phone and general specification for storage battery GB2099.1-2008 Part 1 for domestic plugs and sockets and others with the similar purposes: General requirements GB/T191-2008 Graphic marks for package, storage and transportation

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		GB4943.1 Part I for information technology equipment safety: General safety GB/T17626.2 Electromagnetic compatibility test and measurement technology electrostatic discharge noise immunity test YD/T1591-2009 Technical requirements and test methods of mobile communication terminal power adapter and charging/data interface UL2054 Domestic or business storage battery
	Technical applicability	The project has an easy process and can be completed with a small parts of technical works, and the raw materials are sourced widely which are influenced by regional scale, environment, investment and other factors in a little degree.
	Technical stability	1. Board-level inspection a) Detection opportunity: Fully inspect the finished products parts during production b) For normal charging indication function, the color of indicator light of charging state is red, and it is blue when the battery is charged fully; c) Inspection of circuit board: All components and parts on the circuit board are welded properly without cold solder joint and solder skips, their locations are clear and neat with three layers of paints coated evenly and completely. d) Surface outside the lens is painted evenly with the chromeplate paint with smooth surface, and surface of lens that the lights come from and the holes that the lights enter into are not contaminated.
	Technical safety	The product has been verified in the global scope introduced by American, and such verification has a higher recognition degree in Africa.
	Obstacle in achievement transformation and promotion	Almost nothing
	Transfer of intellectual property rights	The Enterprise has own intellectual property rights with completely localization and transferable technology.

TECHNOLOGY: SOLAR
COMPANY: **POLY SOLAR TECHNOLOGIES (BEIJING) CO., LTD**

	Photo captions			
	Renewable Energy Technology Achievement Declaration			
	QR code			
	Technology provision unit	Poly Solar Technologies (Beijing) Co., Ltd.		
	Contact person	Zhu Xinyu	Submission date	June 22, 2016
	Technology type	Solar energy utilization technology	Specific technology	Solar energy observation station technology
	Tel.	13911560970	E-mail	chengxin@polyslar.cn
	Technology name	10W solar household system		
	Technology provider:	Poly Solar Technologies (Beijing) Co., Ltd.		
	Scope of application	Be suitable for solving the lighting problem of one room in a house without electricity		
	Brief description of technology	The product consists of a solar cell module, a host and a LED light bulb, during daytime, LED lights will be inserted in the host to use solar energy for charging, and take the lamps to any room for lighting if necessary. There are outlets of USB for power supply in host which can be used for charging for cell phone.		
	Technical information	Power of solar cell module: 10Wp Battery type: Lithium-ion batteries In the lamp: 3.7V2200mAh×3 units Light source: 120lm×3		

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Business application situation	500 sets are put into use in Sudan
Service conditions	Costs for market transaction, mature technology, systematic training failing to be needed, installation, use and maintenance can be ignored.
Contact person of business application unit /Tel./E-mail	Poly Technologies Co., Ltd. Li Laixing 13810042713 lilaixing@polyinc.com
Investment on equipment	RMB 200,000 for mould opening, costs for raw materials and labor: USD 29
Expense of operation and maintenance	Be ignored
Investment payback period	1 year
Other earnings	Be ignored
Technology occupancy	Unknown
Market potential of technology	It is predicted that one million sets are needed.
Technical advancement	The mini solar household system, which has never been seen at home, integrates Charge Pal, flashlight, table lamp and others as a whole with uniqueness in the market.
Technical maturity	1. Product executive standards: GB/T19064-2003 Technical conditions and test methods of domestic solar photovoltaic power system GB/T18287-2013 Li-ion storage battery used for mobile phone and general specification for storage battery GB2099.1-2008 Part 1 for domestic plugs and sockets and others with the similar purposes: General requirements GB/T191-2008 Graphic marks for package, storage and transportation GB4943.1 Part I for information technology equipment safety: General safety GB/T17626.2 Electromagnetic compatibility test and measurement technology electrostatic discharge noise immunity test YD/T1591-2009 Technical requirements and test methods of mobile communication terminal power adapter and charging/data interface. UL2054 Domestic or business storage battery

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	Technical applicability	The project has an easy process and can be completed with a small parts of technical works, and the raw materials are sourced widely which are influenced by regional scale, environment, investment and other factors in a little degree.
	Technical stability	1. Board-level inspection a) Detection opportunity: Fully inspect the finished products parts during production b) For normal charging indication function, the color of indicator light of charging state is red, and it is blue when the battery is charged fully; C) Inspection of circuit board; All components and parts on the circuit board are welded properly without cold solder joint and solder skips, their locations are clear and neat with three layers of paints coated evenly and completely. d) Surface outside the lens is painted evenly with the chromeplate paint with smooth surface, and surface of lens that the lights come from and the holes that the lights enter into are not contaminated.
	Technical safety	The product has been verified in the global scope introduced by American, and such verification has a higher recognition degree in Africa.
	Obstacle in achievement transformation and promotion	Almost nothing
	Transfer of intellectual property rights	The Enterprise has own intellectual property rights with completely localization and transferable technology.
	Photo captions	

TECHNOLOGY: SOLAR
COMPANY: **BEIJING CORONA PHOTOVOLTAIC SCIENCE & TECHNOLOGY CO., LTD**

Beijing Corona Photovoltaic Science & Technology Co., Ltd	**RFP of Renewable Energy Technology Achievements**			
	QR code			
	Technology providers	Beijing Corona Science & Technology Co., Ltd.		
	Contact	Yanjiao Men	Date of Submission	2016-06-29
	Technology Type	Solar Energy Utilization	Specific Technology	distributed PV power plant technology
	TEL	13466694571	EMAIL	menyj@bjcorona.com
	Tech/Product Name	Integration technology of distributed PV power plant designation, operation & maintenance.		
	Tech/Product Provider	Beijing Corona Science & Technology Co., Ltd.		
	Application Scope	Smart grid, New energy generation, Distributed generation & Energy storage		
	Technology Debrief	Distributed PV generation system includes grid-connected, off-grid and multifunction complementary micro-electrical systems. Distributed photovoltaic system can be integrated with hydropower, wind and other clean energy sources into multifunction complementary micro-electrical systems. Integration technologies of distributed PV power plant, including pre-planning, feasibility analysis, system design, operation, maintenance and system monitoring, A number of factors such as sunlight, land use and land cover need to be considered. In case to meet safety, reliability, economic, environmental, aesthetic, easy to install and maintenance requirements.		
	Technology Information	Integration technologies of distributed PV power plant designation, operation & maintenance requires engineering equipment procurement, construction design, civil construction, equipment installation, commissioning monomer, access system programs, joint testing, commissioning and other aspects of the work of the formal application, technology or product specifications, power, operating parameters, equipment size, weight etc.		
	Typical Cases of Commercial Applications	KeZhou-LianSu 10MWp photovoltaic power generation project in Shunde, Guangdong. The project construction site located in Shunde District, Foshan City, Guangdong Province and its full use of solar energy resources in this area provide good power and economic benefits.		
	Usage Conditions	Beijing Corona Science & Technology Co., Ltd. engaged in the domestic photovoltaic systems engineering research projects since 2002, corona have multiple years of experience and technical strength. Majority of the projects use local investment and construction, the scale of construction		

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		with a total capacity of several tens of MW, including solar photovoltaic systems engineering, corresponding supporting Internet access and systematic training.
	Business contacts/TEL/Email	1. Mr. Chengwei Gao, Tibet Jiatian New Energy Investment Development Co., Ltd. Cell: +8618601904398 2. Mr. Lei Zhang, Guangdong Liansu Technology Co, Ltd. Cell: +8618611598578
	Equipment Investments	In case of 30MWp photovoltaic power plant design, if choose to install 250Wp polycrystalline PV modules, this power plant should install 120,006 solar panels, a total of 74 500kW inverters (over 4600 meters above sea level the AC rated output will be 450kW). The installation of major equipment investment will be about ￥269,800,900, the project's 25-year total power generation will be around 1,171,197,300 kWh and the annual average generating capacity of 46,847,900 kWh.
	Operation and Maintenance Costs	A PV power plant would leave only the usual production & equipment management personnel. Duties includes PV power plant overhaul, cleaning solar panels, PV module steel frame paint repair and maintenance, environment conservation, sanitary cleaning, etc. will be outsource to other service provider in case to reduce management costs and increase economic efficiency.
	Payback Period	Based on power plant pre-design construction investment budget analysis, the static investment will be RMB ￥80.0384 million, and RMB￥8000 per kW / kWh for static investment, 30% of the total investment will be self-financing by investors, and the remaining of the investment could be loans from financial institutions. After the normal operations of the power plant, equal principal and interest repayment method will be used to pay off the loans within 15 years.
	Other Income	Photovoltaic power generation is encouraged by the state's use of renewable energy projects, PV power generation process doesn`t include burning fuel consumption, and this process is pollution, dust, SO2, greenhouse gases, waste water free. And It will not contain damage that cannot be restored due to mining process. Corona`s distributed photovoltaic systems engineering and general contracting services, operation and maintenance capabilities, is currently in the upper level in the whole industry. In case of 30MWp photovoltaic power plant project, after the completion of the grid , the power plant is expected to annually supply electricity for 46,847,900 kWh, compared to a thermal power generating capacity, equivalent to annual savings of standard coal 15178.72t (average coal consumption of coal as 324g / kWh), corresponding to reduce emissions of various air pollutants annually, the PV power generation project would reduce carbon dioxide (CO2) around 39 500 t, sulfur dioxide (SO2) around 364.29t, nitrogen oxides (NOx) around 106.25t, and soot emissions around 645.1t.
	Technology Share	Corona undertakes several national 'Golden-Sun" engineering projects, supports national key scientific and technological issues, participate in develop a number of national and industry standards, work with local government in renewable energy development research and planning,

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		provide feasibility research solutions to business owners and partners, to meet customer needs in various consulting projects during the construction. According to the customer's environmental protection and green energy demand, with considering project location, resources, construction conditions, price and other policies, Corona provide services such as comprehensive project evaluation, PV system design, equipment selection, etc. The company has installed more than 300 photovoltaic power plants, and the system capacity nearly 702MWp, with market share of 15%.
	Technology Market Potential	By the end of 2020, solar power installed capacity reached 160 million kilowatts, the annual power generation reached 170 billion kwh and the total annual investment reached around RMB ￥200 billion. In construction of the project, the level of technical and technological level design is a decisive factor. To enhance the independent design capability, professional advantages, implementation of quota management, design optimization is needed to reduce the cost of the project. With using technological progress as the core, to promote key technology innovation & technological progress, follow up PV industrial upgrading and enhance competitiveness of industry would become key structure. Corona promotes various forms of technical route of industrialization, mature, and accelerates the PV production. Corona also interested in uses technology advances industry, enhance the manufacturing level, improve the conversion efficiency of solar cells, gradually reduce the cost of solar power, thus improve their market competitiveness and laid the foundation for the further large-scale development of power generation.
	Technology Advancement	Corona has abundance cases and rich experience in distributed PV power plant design and project construction. Corona also locates at the forefront of the photovoltaic renewable energy-based industries` development and promotion. Our rational process system, optimize equipment selection and configuration fulfill all reasonable backup requirements.
	Technology Maturity	With state support for distributed PV development, distributed photovoltaic technology has made amazing progress; Corona has accumulated a large number of design, construction experience in installation, operation and maintenance. Currently, photovoltaic power plant design, maintenance and operation is a mature technology, in the design process. Led the drafting of photovoltaic Station 3 standards, there's so many choices in design and integration of power plants, operation and maintenance during the program phase, switch assembly, equipment selection and proportion leading technology. In addition, the company has repeatedly commitment to more than 10 national science issues; participate in system integration, design and optimization.
	Technical Suitability	Distributed PV technology is widely used in construction and architecture combined with local rooftop photovoltaic systems, which does not occupy arable land, and it can be integrated with hydropower, wind and other clean energy sources into multifunction complementary micro-electrical systems. Like solar agricultural greenhouses and solar/ fish farming complementary

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		project, it could operate either as a stand-alone micro-grids or to be linked to the grid. From initial communication with the business owners to participation in the formation, equipment selection and program adjustments, till the construction process finishes. Power plant design institution and integration technology service provider must stick together; solve the incoming issues until the completion of the project.
	Technology Security	The advantages of distributed PV system are: 1, can achieve the nearest power supply, to avoid the long distance losses from transmission lines; 2, solar energy without fuel, low running costs; 3, no moving parts, maintenance is simple, suitable for unattended use; 4, does not produce any waste, no pollution, ideal clean energy. 5, the construction period is short, convenient and flexible, and can easily increase or decrease the load capacity of the module. These advantages make the distributed photovoltaic power generation guaranteed for safety, reliability and easily to operate. Meanwhile, the construction quality of the project depends largely on the design and integrated quality, considering the selection of equipment procurement, the level of construction technology in the design process and program optimization. These methodologies can improve the quality of project design and to ensure the quality of the entire work.
	Technical Stability	With national and local policies which solve the dilemma of distributed photovoltaic intensive introduction come up on stage, financial, inspection, insurance and other agencies quickly enter the photovoltaic industry, distributed PV system has been grow up rapidly in various forms, Building structural safety, electrical safety paramount is considered most. The stability of the system, efficient operation, and easy maintenance will also be considered. While PV power plant system integration is a mature technology, in all aspects of the design and accordance with the relevant standards, policies, construction, distributed PV system integration plays a guiding role in moving traditional grids towards to a more integrated system.
	Obstacles to the Promotion of Achievements Transformation	Distributed PV system depends on residential, commercial and industry buildings, which have high population density/equipped with precision instruments/have inflammable storage, etc. Thus, distributed PV system requires a more restrictive safety performance and it is required that mounted PV system module would not affect the original production and living functions. There would also be no security risk to personnel, production and materials. In case to follow up progress of PV systems and master the design of integrated core technologies, a further exploration with integrate technology, creativity and resources will be needed.
	Transfer of Intellectual Property Rights	In distributed PV system develop, design and construction process, In case of expanding the market of photovoltaic industry, technology innovation and improvement of the internal reserves, and promote production technologies. Internal development of intellectual property management practices have been built up, effectively regulated applicant's intellectual property rights, and make technology transfer easier and smoother.

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Achievement Declaration of Renewable Energy Technology			
QR code			
Technology providers	Beijing Corona Science & Technology Co., Ltd.		
Contact	Yanjiao Men	Date of Submission	2016-06-29
Technology Type	Solar Energy Utilization	Specific Technology	Distributed Power Plant Technology
TEL	13466694571	Email	menyj@bjcorona.com
Tech/Product Name	PV & storage Micro-grid system		
Tech/Product Provider	Beijing Corona Science & Technology Co., Ltd		
Application Scope	Smart grid, New energy generation, Distributed generation & Energy storage		
Technology Debrief	Micro-grid is a set of system unit by the distributed source, load, energy storage systems and control equipment. Depending on whether connected to the grid, the Micro-grid divided into on grid micro system and off grid micro system. Micro-grid can provide system reliability and improve the penetration of new energy. The key equipment is PCS, EMS system, Inverter and so on.		
Technology Information	·Input voltage：330-600V ·Current THD(on-grid)：≤3% ·on-grid and off-grid system within time：less than 100ms ·Input voltage：330-600V ·Size(width, height, length):810×1810×710		
Typical Cases of Commercial Applications	Micro-grid systems in remote areas(location：Lhasa).Scale:2.5kW PV system，3.3kW PCS . Operating results：be running.		
Usage Conditions	Market transactions and government construction are suitable. Corona Micro-grid Technical is top five, Mature technology. Equipment installation and be used is simple and has cost. Cost mainly includes		

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		bracket, cables and so on, while using ,the cost is replacement of battery. Maintenance costs are cleaning costs of PV modules.
	Business contacts/TEL/Email	Tibet Demonstration Center Energy Research, contacts: jinggang Ji; tel:13008980882,Email:xmb@vip.163.com
	Equipment Investments	Micro-grid system contains PV system, Energy Storage System, EMS system. PV system is RMB ￥8 /watt, Energy Storage System contain PCS and battery, PCS is RMB ￥1.5/watt, Lead-acid batteries is 0.55/watt. Hour and Lithium Battery is RMB ￥4.25/watt hour. Baoding Micro-grid project, for example, 50kW PV system is RMB ￥400 thousand, and 100kW PCS is 150 thousand, 72kW.hour Lead-acid batteries is RMB ￥40 thousand , EMS system is RMB ￥50 thousand , Project an investment RMB ￥640 thousand totally. Optical storage micro-grid projects can transform the traditional distributed photovoltaic systems, the PCS、Battery and EMS system need to add to this system.
	Operation and Maintenance Costs	Micro-grid system operation and maintenance costs include labor costs, management fees, maintenance and clean-up costs, typically an annual fee, an annual fee of 0.07 yuan / watt.
	Payback Period	8-12year
	Other Income	Micro-grid system is large-scale applications, not only driven by the rapid development of the storage industry, to promote new energy saving effect obvious.
	Technology Share	With the rapid development of new energy sources, a large area of abandoned light wind phenomenon, new energy Development of domestic sources began to load centers in the eastern part of the development, in 2014 the national energy Source Bureau issued a photovoltaic annual total 14.05 million new construction scale of millions, its Distributed eight million kilowatts, visible national attention on distributed PV. Optical storage Micro-grid PV system comprising a distributed, energy storage systems, optical storage micro-grid system To run in the grid mode can also be run in off-grid mode, profit is distributed PV Effective use of the form, the Internet is the energy carrier. 2015 is a micro optical storage In the start of network development, optical storage micro-grid demonstration at the application stage, the micro-optical storage Network systems accounted for about 5% of the total market share. But as energy Internet, new Energy demonstration city and demonstration of renewable energy technologies, photovoltaic poverty alleviation, China

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		2050 renewable energy concepts proposed optical storage system ushered in the development of micro-network Opportunity, the next five years, micro-optical storage network system will usher in the blowout development period.
	Technology Market Potential	Currently, photovoltaic power generation system has been centralized and distributed large-scale use, The market has matured. Key equipment energy storage system mainly storage batteries And the storage converter, currently used batteries on the market are mainly VRLA Acid batteries and lithium ion batteries, two battery technology is relatively mature Made large-scale use of the new battery in Zhangbei energy demonstration base such as lead-carbon battery technology is constantly evolving, storage is expected in 2020 Pool technology has achieved great breakthrough, expected to decline in terms of cost About 50%. Storage converter is the core unit of the micro-grid system, now with Standby and off-grid smooth switching, power quality control constantly break Expected 2020 storage converter can ensure long-term stable operation and micro-grid system power quality. Optical storage system in micro-grid household level, village, region are vast Early development is expected in 2020, the country built the household level micro-grid optical storage system 10000, 100 village-level micro-network system, network system 10 micro-regions, market potential Force 50 billion or more.
	Technology Advancement	Corona micro-grid system have on-grid and off-grid mode features smooth switching , New energy power fluctuations can be suppressed, guaranteed micro-grid power quality system in International and domestic leading position.
	Technology Maturity	Corona micro-grid system comprising photovoltaic modules, PCS, Inverter, battery, more devices have been mass production Mature technology. Although micro-grid system is the emerging technologies in recent years, but Corona have mastered the sophisticated design systems integration technology.
	Technical suitability.	Micro-grid system applies both to the load center is also applicable to remote areas, Photovoltaic modules, inverters, battery technology maturity exact match by Geographical scale, the environmental impact is small.
	Technical stability	Micro-grid system is stable, the external environment, technical parameters sensitive to interference Low.
	Technology Security	With the highly valued and micro-grid PV system from power quality and energy security The body continues to mature technology, optical storage micro-grid system will usher in rapid development period. Currently, micro-grid optical storage system availability, facilities have been completed, then the market By the degree of risk is small.

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Achievements Promotion	Currently, micro-grid system in the transformation and promotion process, and other industries due to The presence of cross-field part of the equipment, such as high storage costs, resulting in micro-optical storage The high cost of network systems. With the development of energy storage technology maturation and storage subsidies Soon, there will be a further decline in the price of storage space, micro-grid optical storage system is not Come will show explosive growth.	
Transfer of intellectual property rights	Corona with independent intellectual property rights in the field of domestic micro-grid, obtain the relevant special Lee seven, has a technical side to the enterprises themselves. Optical storage devices based micro-grid system all of this on domestic technology. Technology transfer of ownership in accordance with market demand enterprise strong will; technology transfer mechanism is adopt property abroad commercialization and market-based transactions, policy approaches smoothly.	

Achievement Declaration of Renewable Energy Technology			
QR code			
Technology Supply Company	Beijing Corona Science & Technology Co., Ltd.		
Contacts	Yanjiao Men	Date of Submission	2016-06-28
Technology Type	Wind Energy Utilization Technology	Specific Technology	Key components design, manufacture and installation technology of wind power generation system
TEL	13466694571	E-mail	menyj@bjcorona.com
Tech/Product Name	Complete set of electric control system for wind turbine		

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COMPANY: **BEIJING CORONA PHOTOVOLTAIC SCIENCE & TECHNOLOGY CO., LTD**

	Tech/Product Provider	Beijing Corona Science & Technology Co., Ltd., Baoding Corona Control Equipment Co., Ltd. and Corona Wind Energy Equipment (Beijing) Co., Ltd.
	Application Scope	Smart Grid, New Energy Power Generation, Distributed Generation, Energy Storage System
	Technology Debrief	The complete set of electrical control system of wind turbine consists of four components, the main controller, variable pitch controller, converter and monitoring system. Due to the complexity of the operating environment and great control difficulties, control systems have become the core components of the operation of wind turbines. The main controller realizes machine operation control; variable pitch controller can adjust the pitch angle as well as the brake, the converter can achieve power control and connection to the power grid.
	Technology Information	The complete set of electrical control system of wind turbine has two kinds of products: Full Power system and Doubly-fed system. Please refer to the attachment for the detailed technical parameters of all components.
	Typical Cases of Commercial Applications	Classic Case: Corona 2MW Full Power Wind Turbine control system operated successfully at GEOHO Hailisu Wind Farm and connected to the power grid in May, 2015. The scale of the wind farm is 50MW; the product has been stable and performed well so far.
	Usage Conditions	Wind turbine control system mainly focuses on market transactions, usually for domestic large wind farm owners or electrical power company. Corona wind power electrical control technology leads in the domestic and equipment maintenance cost is 20% lower than the peers. Before the unit is connected to the network, the staff should be trained on the remote system for the use and maintenance of the unit equipment.
	Business contacts/TEL/Email	Application Company: Huayi Wind Energy Co., Ltd. Contacts: Hua Zhang Telephone: 15167476864 E-mail: zhanghua@heag.com

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	Equipment Investments	Single complete set of electrical control system equipment and other ancillary equipment put an amount of investment of about 1.7 million, and the upgraded single set in the stock market of investment cost is about 250 thousand.
	Operation and Maintenance Costs	Due to the bad weather conditions of the wind farm, manual on-site or remote on duty is needed when electrical control system runs normally. The maintenance cost is mainly staff wages and spare parts costs on duty at the scene.
	Payback Period	5-8 Years
	Other Income	Compared with foreign products, Corona's control project products decreased the cost by more than 45% in the aspect of both economic benefit and social benefit. According to the current annual installed capacity, domestic enterprises can cut cost of nearly 10 billion Yuan, achieve saving of standard coal for about 12 million tons and reduce carbon emissions by about 32 million tons every year. In addition, Corona's intelligent wind farm operation management platform is able to achieve efficient management of wind farms and the liberation of the productive forces to achieve less people on duty, or even no one on duty for its high degree of automation and intelligent.
	Technology Share	Corona was in the early stage of the mass and the promotion of industrialization of medium power and high power grade wind power set in the control system in 2015. With a number of independent research and development experience as well as market reputation, the overall open market share accounted for 11%. Besides, the technical level has reached a leading position both domestically and internationally.

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	Technology Market Potential	In recent years, the domestic wind power field has been facing good development opportunities: the technology of wind power is relatively mature with the most large-scale commercial development conditions and a relatively low cost, which is highly emphasized by the government in all kinds of new energy sources. The domestic wind power industry is facing greater market space and good opportunities for development, with the forward trend of intelligent and large capacity direction. After years' technological research of Corona R & D team, high power and intelligent wind power electrical system of Corona are bound to achieve promising success in the domestic and international market.
	Technology Advancement	After years' technological research of Corona R & D team, Corona first developed key technology of 1.5MW double fed wind power electrical control equipment in China. Since that, Corona has continued to overcome several key technical problems, such as 2MW full power and doubly fed electrical control equipment, 3MW electrical control equipment and 5MW medium voltage converter. What is more, in the domestic first hands, Corona achieved completely independent intellectual property rights of full set of 1.5MW-3MW electrical control system technology, which has been applied at wind farms and passed many products and technology certification. As a result, Corona is the only team who can provide a full set of electrical control products and solve the programs domestically. The product performance has reached the advanced level of similar products in the international, which has an important sense to the development of China's wind power industry.

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	Technology Maturity	After more than a decade of experience, the company has basically formed a relatively complete technical process and operation system in order to guide the production process. On the other hand, Corona currently set up production bases and experimental center (covers an area of 85 Mu), completed construction of large trials with detection platform for more than 30 and purchased nearly 100 sets of advanced equipment. the main platform includes low voltage ride through experiment platform, simulation experiment platform for control system of wind turbine, 3MW full power converter ground experimental platform, 3.5MW double fed converter and generator ground test platform, 5MW variable pitch experimental platform and so on. All the mentioned above has provided a good platform and support for wind power control system research and development.
	Technical Suitability	During the promotion of industrialization process of Corona's complete sets of electrical control equipment, Corona has achieved cooperation with mainstream domestic machine manufacturers and product market share has increased year by year. The wind turbines installed Corona's control systems are distributed in more than 100 wind farms all over China, which showed great adaptation ability to high temperature, low temperature, high altitude and coastal environment. The product has a mature performance in wind field operation, and because of the reliable product quality, Corona has established a good reputation in the field.
	Technology Security	The complete electrical control system is strictly supervised during the production process from design, development, debugging to detection and commercial product quantization process. Each product has its corresponding test platform to carry out strict factory commissioning in pursuit of lowering the greatest degree of risk. At the same time, the equipment can be monitored by remote control system for real-time monitoring in order to get the maximum degree of reduction of all kinds of environmental risks.

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	Technical Stability	Since 2002, the whole set of Corona electrical control equipment has been tested on wind farm in the situation of high temperature, low temperature, high altitude, humidity, high salt spray and typhoon respectively. Under such bad condition, the field operation stays stable and Corona's production has shown a good adaptability to operating environment.
	Obstacles to the Promotion of Achievements Transformation	Domestic wind power industry started relatively late, and a number of core technology bottlenecks and foreign key technology monopoly have to be overcome in the localization process of wind power electrical control equipment. With the continuous adjustment of the industry and the standardization of market order in recent years, the situation of R & D enterprises in the field of wind power has been improved a lot by solving many obstacles encountered before, such as poor equipment operating environment, financial strain and bad junctions between upstream and downstream. Besides, the cost of has been decreasing.
	Transfer of Intellectual Property Rights	Corona has a complete independent intellectual property rights and patent in the domestic field of wind power control and such technology owner is the enterprise itself. Electrical control system of wind power is one of the domestic made technologies of wind power in China, with its relatively high stability, high cost effectiveness. In the meantime, the product can meet the needs of foreign countries such as Africa's construction of wind farms. The company's technological achievements are mainly to take domestic and international trade and market transactions, the policy path is smooth.

Achievement Declaration of Renewable Energy Technology			
QR code			
Technology providers	Beijing Corona Science & Technology Co., Ltd.		
Contact	Yanjiao Men	Date of Submission	2016-06-28

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COMPANY: **BEIJING CORONA PHOTOVOLTAIC SCIENCE & TECHNOLOGY CO., LTD**

Type of Technology	Solar Energy Utilization		Specific Technology	Household PV Power Generation Systems
TEL	13466694571		EMAIL	menyj@bjcorona.com
Tech/Product Name	Solar PV All-In-One Home Power Supply			
Tech/Product Provider	Beijing Corona Science & Technology Co., Ltd. Beijing Corona Photovoltaic Science & Technology Co., Ltd. Baoding kezhou Photovoltaic Equipment Co., Ltd.			
Application Scope	Applicable for the family in remote areas in less electricity or without electricity power supply and backup power supply			
Technology Debrief	Solar PV all-in-one home power supply is a kind of storage to convert solar energy into electricity at the core of the control equipment. It consists of charging controller, inverter and battery. The equipment can make full use of solar radiation, converting solar energy into electrical energy, with over-current protection, can adapt to all kinds of user load demand, the use of safe and reliable.			
Technology Information	Equipment size and parameters varies with the product capacity, specification will be found in attachment.			
Typical Cases of Commercial Applications	1. Since its first operation in 2012, the equipment used in Tibet 15000 sets of household system project (xigaze region), are running well. 2. Since its first operation in 2014, the equipment used in without power of Qinghai area opens with independent sets of solar PV power system project, are running well.			
Usage Conditions	The equipment is given priority to with market transactions, delivery installation. Since 2002, our company engaged in the photovoltaic power generation equipment research and development, the current equipment is KNSCI24-15-500PTS series products. Through the user manual to guide personnel use equipment.			
Business contacts/TEL/Email	1.Tibet 15000 Sets Of Household System Project Contact: LI WANG TEL:18080499995 2.Independent sets of household solar PV power system project in Haixi Mongolian and Tibetan Autonomous Prefecture, Qinghai without electricity area Contact: HE LIU TEL: 18600440531			
Equipment Investments	From the research, development, production to installation using single sets of equipment, usually invest amount about thousands of RMB. On the basis of the existing equipment to meet the need of reforming audit change material mainly circuit devices, and can transform			

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		in traditional devices, do not need new equipment, and customers can according to need to be replaced, expenses of about hundreds of RMB. Engineering scale-namely system total installed capacity, and the number of users, in remote areas. For example, about dozens of units, area residents need to install the equipment to dozens of units.
	Operation and Maintenance Costs	Solar PV all-in-one home power supply during normal operation, do not produce maintenance costs.
	Payback Period	5-8years
	Other Income	Our company is the earliest engaged in the solar PV control, the inverter technology research enterprise, continued leading in domestic solar PV control, the development direction of inverter technology and product development. Inverse control all-in-one storage has been widely used in remote areas of the country, the running effect is good, for the remote mountain areas of light at the same time, the economic benefits. If can mass popularization and application, considerable economic benefits, will amount to hundreds of millions of RMB.
	Technology Share	In recent years, solar PV industry have been adjusted. Corona's solar PV all-in-one home power supply has been applied in many different environment, the market share of about 7% of the market. Now, the products are upgrading technology.
	Technology Market Potential	Company is currently the earliest enterprises engaged in the solar PV control, inverter technology research. Continued leading in domestic solar PV control, the development direction of inverter technology and product development. Solar PV all-in-one home power supply has been widely used in remote areas of the country, the running effect is good. The equipment environmental adaptation, grid friendly characteristics significantly, if in Africa, Latin America and other regions to get promotion, market prospects will be good.
	Technology Advancement	This product uses the MPPT tracking technology for the battery charging, the efficiency is above 88%, higher than the same industry efficiency more than 3% at least, won five national patents, it is in the leading position in domestic. The product through CQC certification, TUV certification.
	Technology Maturity	Technology route is simple, the mainly steps are welding, assembly, wiring, testing and aging. In common use with other electrical equipment manufacturing enterprises. Charging and inverter technology to realize the integration, modularization, mass production has been realized.
	Technical Suitability	This product is mainly used in remote areas without electricity, less electricity, meet the family once. At ambient temperature - 20 ℃ ~ + 40 ℃, humidity is less than 90% under the condition of no condensation to work properly, in high temperature, high humidity, high

		altitude can run safely. Now This product has been passed the China quality certification center CQC certification and TUV certification. And upstream and downstream matching technology and good implementation localization, no regional restriction, can adapt to all kinds of scale production.
	Technology Security	Products have good stability, strong anti-interference ability, low failure rate, the part of the equipment safe operation has been more than 5 years. Have passed CQC certification, TUV certification.
	Technical Stability	The technology in the process of achievement transformation and industrialization of high degree of versatility, acceptable, production is only commonly used electrical equipment needed for production facilities.
	Obstacles to the Promotion of Achievements Transformation	In the process of achievement transformation and promotion, the technology without any obstacles. The supporting facilities is perfect, it has better market acceptance, the product can be widely used in family, less electricity in remote areas without electricity supply.
	Transfer of Intellectual Property Rights	In the field of domestic photovoltaic, Corona with technology and independent intellectual property rights and related patents. Solar PV all-in-one home power supply is China's bright project - either to the township of localization technology, the technology is relatively mature and stable, price advantages, at the same time conforms to the overseas, especially the application of Africa started building photovoltaic power station. To implement the technology ownership transfer according to the market demand, companies have a strong intention. Technology property right transfer mechanism mainly by commercialization and market at home and abroad, domestic policy support.

Achievement Declaration of Renewable Energy Technology			
QR code			
Technology providers	Beijing Corona Photovoltaic Science & Technology Co., Ltd.		
Contact	Yannan Zhang	Date of Submission	2016-07-20
Type of Technology	Solar Energy Utilization	Specific Technology	Household PV Power Generation Systems
TEL	15201180465	EMAIL	zhangyannan@bjcorona.com
Tech/Product Name	Bi-directional energy-storage inverter		
Tech/Product Provider	Beijing Corona Photovoltaic Science & Technology Co., Ltd.		

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COMPANY: **BEIJING CORONA PHOTOVOLTAIC SCIENCE & TECHNOLOGY CO., LTD**

	Application Scope	Applicable for the family in remote areas in less electricity or without electricity power supply and backup power supply.
	Technology Debrief	Bi-directional energy-storage inverter can realize off-grid and grid-connected power generation function, but also can realize bidirectional flow control of electric power and have the ability of automatic and manual switch working state. During the day, photovoltaic modules power by energy storage type of photovoltaic inverter to provide local load or power grid, can also be used for energy storage devices. At night, according to the need to release energy storage equipment in electric power, power grid are also can charge the battery through the inverter to energy storage devices. System integration is high, the battery charger, inverter, grid inverter, battery management system integration. Achieve the lower costs, reduce system takes up space.
	Technology Information	Equipment size and parameters varies with the product capacity, specification will be found in attachment.
	Typical Cases of Commercial Applications	Solar PV energy storage system in Lhasa Tibet autonomous region, relying on plateau cold area buildings, remote intelligent micro renewable energy grid integration project design. Since its first operation in 2013,the equipment are running well.
	Usage Conditions	Bi-directional energy-storage inverter is given priority to with market transactions, delivery installation. Micro network system consists of solar panels, battery, etc. Since 2002, our company engaged in the solar PV power generation equipment research and development. The equipment use process need a simple training, maintenance cost is low.
	Business contacts/TEL/Email	Solar PV energy storage system in Lhasa Tibet autonomous region Contact: YUFENG WANG TEL:13810710260
	Equipment Investments	Bi-directional energy-storage inverter is the main equipment of micro network system. Cooperate with solar panels, battery, such as communications equipment of micro network system. A single main equipment price of about ten thousand yuan, other form a complete set of equipment form a complete set of project. Engineering scale namely system total installed capacity, and the number of users, in remote areas, for example, a single resident a single system. Users in project area, cooperate with relevant system installation.
	Operation and Maintenance Costs	When bi-directional energy-storage inverter during normal operation, The main cost including the cost of raw materials to users, depreciation cost, cost of repair, hundreds of RMB a year.
	Payback Period	5years

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Other Income	Our company is the earliest engaged in the photovoltaic (PV) control, the inverter technology research enterprise, continued leading in domestic PV control, the development direction of inverter technology and product development. bi-directional energy-storage inverter has been widely used in remote areas of the country, the running effect is good, for the remote mountain areas of light at the same time, the economic benefits. If can mass popularization and application, considerable economic benefits, will amount to hundreds of millions of RMB.
Technology Share	In recent years, Photovoltaic industry have been adjusted. Corona's bi-directional energy-storage inverter has been applied in many different environment, the market share of about 7% of the market. Now, the products are upgrading technology.
Technology Market Potential	Company is currently the earliest enterprises engaged in the photovoltaic (PV) control, inverter technology research. Continued leading in domestic PV control, the development direction of inverter technology and product development. This product output from security, reliability, stability and efficiency is a world leading level, the structure is compact, simple to use, convenient installation, maintenance cost is low, can provide a better user experience and economy. Bi-directional energy-storage inverter has been widely used in remote areas of the country, the running effect is good. The equipment environmental adaptation, grid friendly characteristics significantly, if in Africa, Latin America and other regions to get promotion, market prospects will be good.
Technology Advancement	Equipment used MPPT tracking technology for battery charging, In the domestic leading position, the maximum efficiency reached 97.6%, more efficient than the same industry. Through the CE, VDE and other international certification.
Technology Maturity	Technology route is simple, the mainly steps are welding, assembly, wiring, testing and aging. In common use with other electrical equipment manufacturing enterprises. Charging and inverter technology to realize the integration, modularization, mass production has been realized.
Technical Suitability	This product is mainly used in remote areas without electricity, less electricity, meet the family once. At ambient temperature - 25 ℃ ~ + 45 ℃, humidity is less than 95% under the condition of no condensation to work properly, in high temperature, high humidity, high altitude can run safely. Now upstream and downstream matching technology and good implementation localization, no regional restriction, can adapt to all kinds of scale production.
Technical Stability	This product stability is a world leading level, strong anti-interference ability, low failure rate.

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Technology Security	The technology in the process of achievement transformation and industrialization of high degree of versatility, acceptable, production is only commonly used electrical equipment needed for production facilities.	
Obstacles to the Promotion of Achievements Transformation	In the process of achievement transformation and promotion, the technology without any obstacles. The supporting facilities is perfect, it has better market acceptance, the product can be widely used in family, less electricity in remote areas without electricity supply.	
Transfer of Intellectual Property Rights	In the field of domestic photovoltaic, Corona with technology and independent intellectual property rights and related patents. the technology is relatively mature and stable, price advantages, at the same time conforms to the overseas, especially the application of Africa started building solar PV power station. To implement the technology ownership transfer according to the market demand, companies have a strong intention. Technology property right transfer mechanism mainly by commercialization and market at home and abroad, domestic policy support.	

Achievement Declaration of Renewable Energy Technology			
QR code			
Technology providers	Beijing Corona Photovoltaic Science & Technology Co., Ltd.		
Contact	Yannan Zhang	Date of Submission	2016-07-20
Type of Technology	Solar Energy Utilization	Specific Technology	Grid-Connected Solar PV Technology
TEL	15201180465	EMAIL	zhangyannan@bjcorona.com
Tech/Product Name	Grid-Connected Solar PV Inverter		
Tech/Product Provider	Beijing Corona Photovoltaic Science & Technology Co., Ltd.		
Application Scope	Applicable for PV power generation system located in desert, the plateau, the Gobi, etc.		
Technology Debrief	Inverter is used to convert dc power to ac power.Inverters provided by Corona have many advantages, such as high operating efficiency, easy to installation, applicable for harsh environment (dry-hot, humid-hot, extreme cold, plateau, etc.). Corona's inverter can be used in different application scenarios.		
Technology Information	Equipment size and parameters varies with the product capacity, specification will be found in attachment.		

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	Typical Cases of Commercial Applications	1.50MWp ground-mounted PV power generation project in Shanshan Xinjiang Autonomous Region LOCATION: Xinjiang Shanshan Since its first operation in 2014, the inverters used in the project are running well. 2.40MWp PV grid-connected power mounted on an agricultural greenhouse, Bozhou LOCATION: Bozhou Anhui Province 3.200MW grid-connected solar PV power station at the 3 phase industrial park in Gonghe city, Qinghai Province Location: Qinghai Province 4.20MW grid-connected solar PV on greenhouses in agricultural science and technology power station Location: Qingdao,Shandong Province
	Usage Conditions	The equipment is given priority to with market transactions, delivery installation. Since 2002, our company engaged in the Solar PV power generation equipment research and development, the current equipment is KNGI1000-500HED series products. The equipment use process need a simple training, maintenance cost is low. Every single change sets product material need to one hundred RMB.
	Business contacts/TEL/Email	1.50MWp ground-mounted PV power generation project in Shanshan Xinjiang Autonomous Region Contact: JIANWU REN TEL: 15810638619 2.40MWp PV grid-connected power mounted on an agricultural greenhouse, Bozhou Contact: QIANG ZHOU TEL: 66895601 3.200MW grid-connected solar PV power station at the 3 phase industrial park in Gonghe city, Qinghai Province Contact: BIN GU TEL: 18297178766 4.20MW grid-connected solar PV on greenhouses in agricultural science and technology power station Contact: YANG WANG TEL: 18561786106
	Equipment Investments	For large-scale PV power plant applications, two 500 kw inverters and an sea-freight container are key equipment of one power generation unit, and its price are about two hundred thousand RMB.

TECHNOLOGY: SOLAR
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		Engineering scale-namely system total installed capacity, related to the number of MW. For a 50MWp project, it will need 100 sets 500kW inverter. The rest can be done in the same manner.
	Operation and Maintenance Costs	When the Grid-connected solar PV inverter during normal operation, The main cost including the cost of raw materials to users, depreciation cost, cost of repair, hundreds of RMB a year.
	Payback Period	5years
	Other Income	Our company is the earliest engaged in the photovoltaic (PV) control, the inverter technology research enterprise, continued leading in domestic PV control, the development direction of inverter technology and product development. The Grid-connected solar PV inverter has been widely used in domestic desert, the gobi desert plateau, power station, etc. Running effect is good. If can mass popularization and application, considerable economic benefits, will amount to hundreds of millions of RMB.
	Technology Share	In recent years, Photovoltaic industry have been adjusted. Corona's Grid-connected solar PV inverter has been applied in many different environment, the market share of about 10% of the market. Now, the products are upgrading technology.
	Technology Market Potential	Company is the earliest engaged in the photovoltaic (PV) control, the inverter technology research enterprise. In our country, we continue to lead the PV control, development direction of inverter technology and product development. Corona's Grid-connected solar PV inverter has been widely used in the barren hills, the gobi desert plateau, such as large power stations and the running effect is good. The equipment environmental adaptation, grid friendly characteristics significantly, If in Africa, Latin America and other regions to get promotion, market prospects will be good.
	Technology Advancement	This product adopts advanced MPPT control strategy, to adapt to the shade, hot spot components such as accident conditions. The design of the reactor is based on the weighted weight coefficient, to achieve optimum efficiency within the scope of full power. The technology is in the leading position in our country. The products of maximum conversion efficiency is 98.87%, the efficiency in Europe is 98.5%, the average weighted total efficiency is 98.12%. The product has passed CQC certification, TUV certification, low voltage across (zero wear) certification, etc.
	Technology Maturity	Technology route is simple, the mainly steps are welding, assembly, wiring, testing and aging. In common use with other electrical equipment manufacturing enterprises. Charging and inverter technology to realize the integration, modularization, mass production has been realized.

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	Technical Suitability	At ambient temperature - 20 ℃ ~ + 40 ℃, humidity is less than 90% under the condition of no condensation to work properly, in high temperature, high humidity, high altitude can run safely. Now this product has been passed the China quality certification center CQC certification and TUV certification. And upstream and downstream matching technology and good implementation localization, no regional restriction, can adapt to all kinds of scale production. According to our country the characteristics of different climate area, our products according to the optimization design software and hardware, in order to realize the optimal on generating in a particular area.
	Technical Stability	The product adopts the generalization and seriation and modularization design. Strong practicability, good stability, strong anti-interference ability, low failure rate, the products have been widely used. Equipment safe operation time in more than 10 years. The product has passed CQC certification, TUV certification, low voltage across (zero wear) certification, etc.
	Technology Security	The technology in the process of achievement transformation and industrialization of high degree of versatility, acceptable, production is only commonly used electrical equipment needed for production facilities.
	Obstacles to the Promotion of Achievements Transformation	The technology without any obstacles in the process of achievement transformation and promotion, product technology mature, supporting facilities, good market acceptance, the product can be widely used in grid-connected power generation system.
	Transfer of Intellectual Property Rights	In the field of domestic photovoltaic, Corona with technology and independent intellectual property rights and related patents. The product through the CQC certification, TUV certification, low voltage across (zero wear) certification, etc. The high technical maturity, the market acceptance. The product can be widely used in grid-connected power generation system. The products meet the relevant industry standards at home and abroad, also adapted to Africa and other regions started building photovoltaic power station and other applications. To implement the technology ownership transfer according to the market demand, companies have a strong intention. Technology property right transfer mechanism mainly by commercialization and market at home and abroad, domestic policy support.
	Achievement Declaration of Renewable Energy Technology	
	QR code	

TECHNOLOGY: SOLAR
COMPANY: **BEIJING CORONA PHOTOVOLTAIC SCIENCE & TECHNOLOGY CO., LTD**

Technology providers	Beijing Corona Photovoltaic Science & Technology Co., Ltd.		
Contact	Yannan Zhang	Date of Submission	2016-07-20
Type of Technology	Solar Energy Utilization	Specific Technology	Household PV Power Generation Systems
TEL	15201180465	EMAIL	zhangyannan@bjcorona.com
Tech/Product Name	Solar Photovoltaic (PV) Off-Grid System		
Tech/Product Provider	Beijing Corona Photovoltaic Science & Technology Co., Ltd.		
Application Scope	Applicable for the family in remote areas in less electricity or without electricity power supply and backup power supply		
Technology Debrief	Solar PV off-grid system consists of Solar PV all-in-one home power supply, solar panels, battery, etc. Solar PV all-in-one home power supply is a kind of storage to convert solar energy into electricity at the core of the control equipment. It consists of charging controller, inverter and battery. The equipment can make full use of solar radiation, converting solar energy into electrical energy, with over-current protection, can adapt to all kinds of user load demand, the use of safe and reliable.		
Technology Information	Equipment size and parameters varies with the product capacity, specification will be found in attachment.		
Typical Cases of Commercial Applications	1. Since its first operation in 2012, the equipment used in Tibet 15000 sets of household system project (xigaze region), are running well. 2. Since its first operation in 2014, the equipment used in without power of Qinghai area opens with independent sets of solar PV power system project, are running well.		
Usage Conditions	Solar PV off-grid system is given priority to with market transactions, delivery installation. Main equipment is Solar PV all-in-one home power supply, cooperate with solar panels, battery, etc. Since 2002, our company engaged in the solar PV power generation equipment research and development, the current equipment is KNSCI24-15-1000PTS series products. The equipment use process need a simple training, maintenance cost is low.		
Business contacts/TEL/Email	1.Tibet 15000 Sets Of Household System Project Contact: LI WANG TEL:18080499995 2.Independent sets of household solar PV power system project in Haixi Mongolian and Tibetan Autonomous Prefecture, Qinghai without electricity area Contact: HE LIU TEL: 18600440531		

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	Equipment Investments	Solar PV off-grid system consists of Solar PV all-in-one home power supply, solar panels, battery, etc. A single main equipment price of about one thousand yuan, other form a complete set of equipment form a complete set of project. Engineering scale namely system total installed capacity, and the number of users, in remote areas, for example, a single resident a single system. Users in project area, cooperate with relevant system installation.
	Operation and Maintenance Costs	When the Solar PV all-in-one home power supply during normal operation, The main cost including the cost of raw materials to users, depreciation cost, cost of repair, hundreds of RMB a year.
	Payback Period	5years
	Other Income	Our company is the earliest engaged in the solar PV control, the inverter technology research enterprise, continued leading in domestic solar PV control, the development direction of inverter technology and product development. Solar PV all-in-one home power supply has been widely used in remote areas of the country, the running effect is good, for the remote mountain areas of light at the same time, the economic benefits. If can mass popularization and application, considerable economic benefits, will amount to hundreds of millions of RMB.
	Technology Share	In recent years, solar PV industry have been adjusted. Corona's solar PV all-in-one home power supply has been applied in many different environment, the market share of about 7% of the market. Now, the products are upgrading technology.
	Technology Market Potential	Company is currently the earliest enterprises engaged in the solar PV control, inverter technology research. Continued leading in domestic solar PV control, the development direction of inverter technology and product development. Solar PV all-in-one home power supply has been widely used in remote areas of the country, the running effect is good. The equipment environmental adaptation, grid friendly characteristics significantly, if in Africa, Latin America and other regions to get promotion, market prospects will be good.
	Technology Advancement	This product uses the MPPT tracking technology for the battery charging, the efficiency is above 88%, higher than the same industry efficiency more than 3% at least, won five national patents, it is in the leading position in domestic. The product through CQC certification, TUV certification.
	Technology Maturity	Technology route is simple, the mainly steps are welding, assembly, wiring, testing and aging. In common use with other electrical equipment manufacturing enterprises. Charging and inverter technology to realize the integration, modularization, mass production has been realized.

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Technical Suitability	This product is mainly used in remote areas without electricity, less electricity, meet the family once. At ambient temperature - 20 ℃ ~ + 40 ℃, humidity is less than 90% under the condition of no condensation to work properly, in high temperature, high humidity, high altitude can run safely. Now This product has been passed the China quality certification center CQC certification and TUV certification. And upstream and downstream matching technology and good implementation localization, no regional restriction, can adapt to all kinds of scale production.
Technical Stability	The products have good stability, strong anti-interference ability, low failure rate, the part of the equipment safe operation has been more than 5 years. Have passed CQC certification, TUV certification.
Technology Security	The technology in the process of achievement transformation and industrialization of high degree of versatility, acceptable, production is only commonly used electrical equipment needed for production facilities.
Obstacles to the Promotion of Achievements Transformation	In the process of achievement transformation and promotion, the technology without any obstacles. The supporting facilities is perfect, it has better market acceptance, the product can be widely used in family, less electricity in remote areas without electricity supply.
Transfer of Intellectual Property Rights	In the field of domestic photovoltaic, Corona with technology and independent intellectual property rights and related patents. Solar PV all-in-one home power supply is China's bright project - either to the township of localization technology, the technology is relatively mature and stable, price advantages, at the same time conforms to the overseas, especially the application of Africa started building solar PV power station. To implement the technology ownership transfer according to the market demand, companies have a strong intention. Technology property right transfer mechanism mainly by commercialization and market at home and abroad, domestic policy support.

Achievement Declaration of Renewable Energy Technology			
QR code			
Technology providers	Beijing Corona Photovoltaic Science & Technology Co., Ltd.		
Contact	Yannan Zhang	Date of Submission	2016-07-20
Type of Technology	Solar Energy Utilization	Specific Technology	Distributed PV Related Technologies

TECHNOLOGY: SOLAR
COMPANY: **BEIJING CORONA PHOTOVOLTAIC SCIENCE & TECHNOLOGY CO., LTD**

TEL	15201180465	EMAIL	zhangyannan@bjcorona.com	
Tech/Product Name	String-type Solar PV Inverter			
Tech/Product Provider	Beijing Corona Photovoltaic Science & Technology Co., Ltd.			
Application Scope	Applied to the residential and small and medium-sized commercial roof, and the farm, etc.			
Technology Debrief	Professional design, effectively avoid products, failures arisen from the production, operation and transport links; Easy to install, easy to operate, easy to maintain; Beautiful appearance, complete functions, grid access friendly, reliable operation, highly cost-effective, high power-generating capacity; Be able to supply clients with more professional remote maintenance and troubleshooting functions, ensuring clients gaining maximum return to their investments.			
Technology Information	Equipment size and parameters varies with the product capacity, specification will be found in attachment.			
Typical Cases of Commercial Applications	1.30MW solar PV power generation station in Yangyi village, Damxung county of Tibet Location: Yangyi village, Damxung county of Tibet 2.20MW ground solar PV power station in the 148 regiment Location: Shihezi city xinjiang autonomous region 3.The 863 national science and technology plans project Location: Qinghai Province 4.Roof solar PV power station Location: Jinan city Shandong Province			
Usage Conditions	The product is given priority to with market transactions, delivery installation. Since 2002, our company engaged in the solar PV power generation equipment research and development, the current equipment is KNGI1000-28\33\40\50 series products. The equipment use process need a simple training, maintenance cost is low.			
Business contacts/TEL/Email	1.30MW solar PV power generation station in Yangyi village, Damxung county of Tibet Contact: MIN WU TEL: 59785997 2.20MW ground solar PV power station in the 148 regiment Contact: QING YUAN TEL: 2901468 3.The 863 national science and technology plans project Contact: HONGLING CHEN TEL:13910288050 4.Roof solar PV power station Contact: GENGYU HUANG			

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COMPANY: **BEIJING CORONA PHOTOVOLTAIC SCIENCE & TECHNOLOGY CO., LTD**

	TEL:18600750056
Equipment Investments	The equipment is widely used in solar PV power station, the installation is convenient, no other ancillary equipment. For example, 50kw inverter price is in 30000 RMB. Engineering scale namely system total installed capacity, related to the number of mw, for example, the 50MW project, 50kw inverter to 1000 units. And so on.
Operation and Maintenance Costs	When the string-type PV inverter during normal operation, The main cost including the cost of raw materials to users, depreciation cost, cost of repair, hundreds of RMB a year.
Payback Period	5years
Other Income	Our company is the earliest engaged in the photovoltaic (PV) control, the inverter technology research enterprise, continued leading in domestic PV control, the development direction of inverter technology and product development. String-type pv inverter has been widely used. The running effect is good, the economic benefits. If can mass popularization and application, considerable economic benefits, will amount to hundreds of millions of RMB.
Technology Share	In recent years, Photovoltaic industry have been adjusted. The product has been applied in many different environment, the market share of about 10% of the market. Now, the products are upgrading technology.
Technology Market Potential	Company is currently the earliest enterprises engaged in the photovoltaic (PV) control, inverter technology research. Continued leading in domestic PV control, the development direction of inverter technology and product development. String-type solar PV inverter has been widely used. The running effect is good, the economic benefits. The equipment environmental adaptation, grid friendly characteristics significantly, if in Africa, Latin America and other regions to get promotion, market prospects will be good.
Technology Advancement	This product adopts the domestic leading technology, grid access friendly, using DSP digital control. The current total harmonic distortion rate THD < 3%.Can realize two-way MPPT track, MPPT efficiency up to 99.5%.Maximum efficiency is 99%.The product has passed CQC certification, TUV certification, low voltage across (zero wear) certification, etc.
Technology Maturity	Technology route is simple, the mainly steps are welding, assembly, wiring, testing and aging. In common use with other electrical equipment manufacturing enterprises. Charging and inverter technology to realize the integration, modularization, mass production has been realized.
Technical Suitability	This product is mainly used in remote areas without electricity, less electricity, meet the family once. At ambient temperature - 25 ℃ ~ + 50 ℃, in high temperature, high humidity, high altitude can run safely. Now the product has been passed the China quality

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		certification center CQC certification and TUV certification. And upstream and downstream matching technology and good implementation localization, no regional restriction, can adapt to all kinds of scale production. According to our country the characteristics of different climate area, our products according to the optimization design software and hardware, in order to realize the optimal on generating in a particular area.	
	Technical Stability	The product adopts the generalization and seriation and modularization design. Strong practicability, good stability, strong anti-interference ability, low failure rate, the products have been widely used, reliable operation. Have passed CQC certification, TUV certification, low voltage across (zero wear) certification, etc.	
	Technology Security	The technology in the process of achievements transformation and industrialization, using generalization and seriation and modularization design. Set of string type inverter is essentially distributed heat dissipation, greatly improves the product reliability. Strong practicability, high market acceptance, production facilities is perfect.	
	Obstacles to the Promotion of Achievements Transformation	In the process of achievement transformation and promotion, the technology without any obstacles. The supporting facilities is perfect, it has better market acceptance, the product can be widely used in Photovoltaic (PV) grid power generation system.	
	Transfer of Intellectual Property Rights	In the field of domestic photovoltaic, Corona with technology and independent intellectual property rights and related patents. The product has passed CQC certification, TUV certification, low voltage across (zero wear) certification, etc. The technology is relatively mature and stable, price advantages, at the same time conforms to the overseas, especially the application of Africa started building solar PV power station. To implement the technology ownership transfer according to the market demand, companies have a strong intention. Technology property right transfer mechanism mainly by commercialization and market at home and abroad, domestic policy support.	

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COMPANY: **BEIJING KINGTECH CO., LTD**

Beijing Kingtech Co., Ltd	**Renewable Energy Technology Achievement (Applied already)**			
	Technical provision unit:	Beijing Kingtech Co., Ltd.	Submission date:	July 29, 2016
	Contact person:	Liu Xinyue	Technical type:	Others
	Tel.:	18001170851	E-mail:	liuxy@ktcn.com.cn
	Technical name:	Energy saving service solution		
	Technical provider:	Beijing Kingtech Co., Ltd.		
	Scope of application:	Environmental protection industry, suitable for high energy-consumption enterprise and energy-scarcity area		
	Brief description of technical:	Overall energy saving reformation design for the enterprise (area) through analyzing present situation of energy consumption. Achieve high energy saving rate as possible while keeping capability		
	Technical information:	Distributed energy resource of natural gas, photovoltaic distributed generation, biochar-based fertilizer poly-generation by biomass gasification power generation, energy saving of motor system, comprehensive utilization of waste heat and pressure, transformation of architectural lighting, transformation of energy saving for street lamp and management and comprehensive utilization of carbon assets		
	Business application situation:	Distributed photovoltaic power generation: Jiangsu 3.3MW Plant Roofing Power Generation Project Carbon assets management and comprehensive utilization: Carbon Assets Project of Jilin Changbai Mountain Forest Industry Group Architectural lighting energy saving transformation Energy Saving Transformation of Tianyi Shopping Mall		
	Service conditions:	Local investment and construction and mature technology.		
	Contact person of business application unit /Tel./E-mail:	Wei Xing 18001321896		
	Investment on equipment:	Our company will invest the whole earlier stage, as the case may be		
	Expense of operation maintenance:	Employees of our company will maintain for free during the contract period		
	Investment payback period:	8-10 years		
	Other earnings:	Reduce corporate energy consumption, improve corporate image and realize clean development		

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Technical occupancy:	Ranked the country's leading level, at top 10%.
Market potential of the Technical:	With the reducing of fossil energy, new energy-using mechanism and energy situation will replace the original non-renewable fossil energy gradually. New renewable and clean energy will become a mainstream gradually.
Technical advancement:	International energy structure transition is an irresistible trend, and its technology and technique takes the leading position in new energy field by unceasing improvement
Technical maturity:	Able to realize engineering approach, practical utilization and stable project operating.
Technical applicability:	Environmental protection industry, suitable for high energy-consumption enterprise and energy-scarcity area
Technical stability:	Technology in related field is mature and advances steadily
Technical safety:	At present, all projects are operating stably, and no accident has occurred
Obstacle in achievement transformation and promotion:	Change of local polity and corporate financial condition
Transfer of intellectual property:	
Photo caption:	  Tianyi Shopping Mall

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Chengdu Sanwayao Thermal Power Co., Ltd.


Photos after retransformation

Comparison between high pressure sodium lamp and LED lamp in a same road


After transformation Before transformation

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COMPANY: **BEIJING KINGTECH CO., LTD**

			 Installed capacity: 1.2MW Theoretical electric energy production for 25 years: 26,842,000KWh Theoretical standard coals saved for 25 years: 10,700t Theoretical carbon emission reductions for 25 years: 26,800t	Installed capacity: 800KW Theoretical electric energy production for 25 years: 20,210,000 KWh Theoretical standard coals saved for 25 years: 8,075t Theoretical carbon emission reductions for 25 years: 21,000t  Installed capacity: 3.3MW Theoretical electric energy production for 25 years: 70,724,300 KWh Theoretical standard coals saved for 25 years: 28,200t Theoretical carbon emission reductions for 25 years: 70,500t
			  Installed capacity: 200KW Theoretical electric energy production for 25 years: 5,050,000KWh Theoretical standard coals saved for 25 years: 2,260t Theoretical carbon emission reductions for 25 years: 5,633t	

TECHNOLOGY: SOLAR
COMPANY: **BEIJING KINGTECH CO., LTD**

Renewable Energy Technology Achievement (Applied already)			
Technical provision unit:	Beijing Kingtech Co., Ltd.	Submission date:	July 28, 2016
Contact person:	Liu Xinyue	Technical type:	Solar energy utilization technology
Tel.:	18001170851	E-mail:	liuxy@ktcn.com.cn
Technical name:	Distributed photovoltaic power generation		
Technical provider:	Beijing Kingtech Co., Ltd.		
Scope of application:	Industrial enterprise, transportation field, communication field, petroleum, ocean, meteorological field, photovoltaic power station		
Brief description of technical:	Solar photovoltaic power generation is to convert luminous energy into electric energy by using solar cell module and electronic characteristic of semiconductor materials		
Technical information:	It is composed of three major parts of solar panel (components), controller and inverter, and the major components are constituted by electronic parts and components.		
Business application situation:	Jiangsu 3.3MW Plant Roofing Photovoltaic Power Generation Project, Jiangsu Jiurong 200KW Roofing Photovoltaic Power Generation Project, Beijing Chaoyang Chuji Ceramic Market 800KW Roofing Photovoltaic Power Generation Project, Huizhou 1.2MW Plant Roofing Photovoltaic Power Generation Project		
Service conditions:	Kingtech distributed photovoltaic power generation system adopts energy management contract model ,that is, the photovoltaic power generation project will be invested, established and maintained in local after the field investigation, calculation and design by technicists of our company, and benefits will be paid back by stage after the project goes into operation. The technology has matured at present, and has demonstration projects all over the country.		
Contact person of business application unit /Tel./E-mail:	Wei Xing Contact information: 18001321896		
Investment on equipment:	About RMB 9 /W at home (including equipment and construction cost, etc.)		
Expense of operation maintenance:	Maintenance for free within contract period (excluding waterproof construction of Party A)		
Investment payback period:	8-10 years		
Other earnings:	Reduce corporate energy consumption and discharge capacity, and improve corporate image		
Technical occupancy:	The largest photoelectricity market in China is still the communication field whose market share is about 50%, including microwave relay station, satellite communication ground station, satellite TV receiving transposer system, spc telephone exchange, troop communication station, etc. Through		

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COMPANY: **BEIJING KINGTECH CO., LTD**

		endeavor during the ninth Five-Year plan and with the demonstration and promotion of various cooperative projects at home and abroad, the application field of photovoltaic power generation in remote and border areas has been enlarged further. Including photovoltaic power stations and photovoltaic power systems, its market share has been increased from about 20% to 30% and above.
	Market potential of the Technical:	Photovoltaic power generation belongs to the clean renewable energy, so that the development and wide application of photovoltaic technology plays an important part in alleviating shortage of conventional energy and reducing environmental population. Considering either from energy or environment, photovoltaic power generation will enter into electricity market as the alternative energy finally. Once the cost of photovoltaic power generation reduces below $2/W, it will be applied in larger scale and commercial demand of grid-connected power generation will come true.
	Technical advancement:	Electric-generation principle of photovoltaic power generation is to convert light into electron directly, with no middle process and mechanical motion, which means that there will be no combustion and population in the process, and it is simple to generate electricity. From this view, generating efficiency of this technology is very high.
	Technical maturity:	The relatively mature markets in China include communication field, some industrial fields, rural electrification and commercialized power supply in remote and border areas. By the end of 2000, the annual output of solar battery in China has reached up to 3MWp, and accumulated utilization to 19MWp. In the future 10 years, it will be developed greatly. It is estimated that by 2010, the annual output of solar battery in China will reach up to 30MWp, and accumulated utilization to 200MWp. The potential markets of photovoltaic power generation include roofing grid-connected generation system, large hybrid power generation system, electric car charging system, solar photovoltaic hydrogen generating system, and some special commercialized power supply.
	Technical applicability:	The application scale of distributed photovoltaic power generation: It can be built in rural area, pasturing area, mountainous area, developing cities in small, medium and large size, or nearby commercial district, to resolve the electricity demand of local users. It is unlimited by the resource distribution area, and can take advantage of building roof; for example, areas without electricity and areas with complex topography
	Technical stability:	Solar energy resource in China is very rich, and its theoretical reserve is equal to 1.7 trillion tons of standard coal annually. Development and utilization of solar energy resource has a very vast potential. Photovoltaic power generation industry of China started form 1,970s, and entered into stable development period in 1,990s. The output of solar battery and component increases steadily year by year. Through 30-year endeavors, it has ushered in a new stage of rapid development. Driven by the national programs like the pilot projects of Brightness Program, Township Electrification Program and world photovoltaic market, the photovoltaic power generation industry of China has developed rapidly.

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	Technical safety:	① Without exhaustion risk ② Safety and reliable, without noise, pollutant discharge, and public nuisance ③ It is unlimited by the resource distribution area, and can take advantage of building roof, for example, areas without electricity and areas with complex topography ④ Generate and supply power without fuel consumption and electric transmission line; ⑤ High quality of energy;
	Obstacle in achievement transformation and promotion:	Problem with profit model of photovoltaic power generation, problem with electricity price subsidies differentiation of photovoltaic power generation, problem with grid connection of photovoltaic power generation
	Transfer of intellectual property:	
	Photo caption:	 Installed capacity: 1.2MW Theoretical electric energy production for 25 years: 26,842,000 KWh Theoretical standard coals saved for 25 years: 1.07t Theoretical carbon emission reductions for 25 years: 26,800t  Installed capacity: 800KW Theoretical electric energy production for 25 years: 20,210,000 KWh Theoretical standard coals saved for 25 years: 8,075t Theoretical carbon emission reductions for 25 years: 21,000t  Installed capacity: 3.3MW Theoretical electric energy production for 25 years: 70,724,300 KWh Theoretical standard coals saved for 25 years: 28,200t Theoretical carbon emission reductions for 25 years: 70,500t

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COMPANY: **BEIJING KINGTECH CO., LTD**

			Installed capacity: 200KW Theoretical electric energy production for 25 years: 5.05million KWh Theoretical standard coals saved for 25 years: 2,260t Theoretical carbon emission reductions for 25 years: 5,633t

TECHNOLOGY: SOLAR

COMPANY: **BEIJING SUNDA SOLAR ENERGY TECHNOLOGY CO., LTD**

Beijing Sunda Solar Energy Technology Co., Ltd	**Renewable Energy Technology Achievement Declaration**			
	QR code			
	Technology provision unit	Beijing Sunda Solar Energy Technology Co., Ltd.	Submission date	July 5, 2016
	Contact person	Zhu Jiankun	Technology type	Solar energy utilization technology
	Tel.	13810302706	E-mail	zhujiankun@sundasolar.com
	Technology name	Cloud thermal solar hot water system		
	Technology provider	Beijing Sunda Solar Energy Technology Co., Ltd.		
	Scope of application	Beijing Sunda Solar Energy Technology Co., Ltd.		
	Brief description of technology	The solar hot water technology mainly targets at hot water demand of middle and high rise residential or commercial buildings with household metering, solar collectors are intensively installed on the residential building roof, and 1 buffer tank with smaller volume, realizing heat exchange with heat storage water tank with function of heat exchange installed inside for each household of the building, when it is cloudy or rainy day or heat is not sufficient, open the electric heater in the water tank to carry out auxiliary heating.		
	Technical information	Design of solar hot water system should be based on user specific heat demand and the actual conditions of the roof installation design.		
	Business application situation	Solar Hot Water Project of Beijing Meilifang Residence(project value of RMB 10.5 million, with good operation) 2) Solar Hot Water Project of Tianjin Huaming Xinjiayuan Dingxiu Xinyuan (project value of RMB 10.76 million, with good operation)		
	Service conditions	1) Solar Hot Water Project of Beijing Meilifang Residence: Wang Shuying, 15010170621; 2) Solar Hot Water Project of Tianjin Dingxiu Xinyuan: Yan Kai, 13713470319		
	Contact person of business application unit /Tel. /E-mail	Mature technology and products; Marketable products (technical support) or local investment construction projects are required to build the system, to provide design, installation and maintenance training to use.		
	Investment on equipment	Beijing Meilifang Community has 5 buildings, 2112 households, using the cloud thermal solar hot water system, the installation of roof heat pipe vacuum tube collector of 2,320.5m^2, 80 liters and 60 liters two heat exchanger pressure tank are placed indoors, this project is installed in 2010, the initial investment of RMB 10.5 million, an average of RMB 4,972 for 2,112 households;		

TECHNOLOGY: SOLAR
COMPANY: **BEIJING SUNDA SOLAR ENERGY TECHNOLOGY CO., LTD**

	Expense of operation maintenance	The project solar hot water system can run automatically, without someone on duty, operating costs of solar hot water system primarily includes circulating pump power consumption, piping thermoelectric power consumption and water replenishing treatment reagent for roofing, the total operating cost of about RMB 37,000, and annual operation cost of each household of RMB 17.5/ (household/year) for 2,112 households on average.
	Investment payback period	Compared to electric water heaters, static payback period is 4.4 years
	Other earnings	The annual saved energy of the project is 302tce, carbon dioxide emission of 650t, 19.5t sulfur dioxide, 10.7t nitrogen oxides, economic and environmental benefit is significant.
	Technology occupancy	Cloud thermal system is very suitable for middle and high rise residential, but also the direction of development of solar hot water systems in recent years, and since 2004 when Beijing Sunda Solar Energy Technology Co., Ltd. carried out promotion, it has been successfully applied to more than 20 real estate projects in Tianjin, Shanghai, Henan, Inner Mongolia, Shandong, with total construction area of 2 million square meters and total area of solar collectors of 40,000 square meters, using the company as an example, cloud integration systems account for about 5% of the hot water system installed capacity; Combined with other peer companies not mastering the technology very well, estimated cloud thermal system installation quantity accounts for less than 1% of total market share of the project, combined with the newly added photo-thermal area in 2015 of 43.5 million square meters (including engineering market share 54.7%), the installation area in 2015 is less than 200,000 square meters;
	Market potential of technology	As China's urbanization accelerates and governmental mandatory installation policy of solar hot water system in middle and high rise buildings promotes, cloud thermal systems area are used as solar installation technology designed for middle and high rise buildings with increasing acceptance of designers and users. In the 13th Five-year Plan, by 2020, added inventory of solar thermal application is 550 million square meters, the total inventory reached 800 million square meters, total annual investment of about RMB 100 billion, the new inventory is divided into national town and urban buildings and rural area with hot water of 200 million square meters for civil purpose. Heating, refrigeration and air conditioning systems and heating stations demonstration projects of 200 million square meters; 150 million square meters industrial and agricultural applications form diversified market pattern of domestic hot water, heating and cooling, industrial and agricultural applications. At present, middle and high rise buildings have three main hot water systems in the form of: 1) Heat collection of collector, central heating is used in the buildings without sub-metering and billing issues; 2) Household balcony hot water system; 3) Cloud thermal collector systems; With the lowest proportion of cloud thermal system among three systems, if using technology promotion and transfer increases proportion of application of the system in the middle and high rise construction board, assuming that it accounted for proportion of about 200 million square meters, which also means that

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		It is to reach more than 20 million square meters installation area, the average annual installation area of 4 million square meters, which will also be over 20 times as installed quantity for 2015;
	Technical advancement	Cloud thermal solar hot water system solves several major problems of the middle and high rise buildings with using solar energy: 1) The problem for using solar energy for lower rise and northern households under the circumstance of uneven sunlight for different levels and rooms caused by diversified styles of construction body 2) Limited roof area and messy installation for households; 3) Household installation management and maintenance of complex issues; 4) Costs apportion caused by uneven water use amount Beijing Sunda Solar Energy Technology Co., Ltd., as the first company carrying out this system study, after 10 years of continuous exploration, it has accumulated a wealth of design, construction and operating experience, with technical level in the country in a leading position in the solar energy industry.
	Technical maturity	All major components of cloud thermal systems (solar collectors, heat/hot water storage tank, controller, pumps, pipes) and mounting accessories are market mature products, Beijing Sunda Solar Energy Technology Co., Ltd. has the ability of providing complete equipment and programs.
	Technical applicability	Through different products configuration and design schemes, the system has a wide applicability during transfer and promotion; The processing technology of main fine products of system is mature; Rich resources in downstream and upstream The system use is not subject to constraints such as regional, scale, environment and energy constraint, suitable for different climate conditions and areas;
	Technical stability	This system and other systems are used and verified by many systems of Beijing Sunda Solar Energy Technology Co., Ltd. for many years, with mature design, reasonable configuration, reliable operation, good technical stability.
	Technical safety	Cloud thermal solar hot water system is mature in technology and product support with higher market acceptance:
	Obstacle in achievement transformation and promotion	Promotion and use of solar energy is a global consensus, and most countries has established a relatively perfect policy to encourage the application of solar technology. For examples, the taxes are refunded for the export of domestic solar energy products, and there is no tariff for the import of most oversea solar energy products; Many African countries has made training of detection of solar energy products and professionals. In African region, as long as transfer of technical results and post-period maintenance are completed.
	Transfer of intellectual property	Beijing Sunda Solar Energy Technology Co., Ltd has the independent intellectual property rights of this technology, there is no problem about patent and technology introduction of intellectual property rights.
	Photo captions	

	Renewable Energy Technology Achievement (Applied)	
	Technology provision unit	Beijing Sunda Solar Energy Technology Co., Ltd.

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COMPANY: **BEIJING SUNDA SOLAR ENERGY TECHNOLOGY CO., LTD**

	Contact person:	Zhu Jiankun	Submission date: July 29, 2016
	Technology type	Solar energy utilization technology	Specific technology: Solar hot water engineering and technology
	Tel.:	13810302706	E-mail: zhujiankun@sundasolar.com
	Technology name:	Solar Industry /Agricultural heating technology	
	Technology provider:	Beijing Sunda Solar Energy Technology Co., Ltd.	
	Scope of application:	Solar heating technology used in industrial production and agricultural processing	
	Brief description of technology:	This application mainly takes advantage of solar photo-thermal conversion technology, transforms solar energy into heat energy and transfers it to a medium flowing by using efficient solar thermal collector, and rise the water temperature to the temperature for industrial and agricultural applications of temperature (such as copper requires 65 ℃ hot water above and agricultural drying requires medium and high-temperature water, etc.), efficient thermal collector is key equipment.	
	Technical Information:	The system mainly consists of solar collectors, water tanks, control systems, pipe rack, etc., the scale can be changed (from a few hundred liters of water to millions of tons of water) according to the actual needs of the user.	
	Business application situation:	For solar heating system of Beijing Print Works, the area of thermotube and vacuum tube and collector is 776 sq. m. For solar heating system of South Africa copper mine, the area of flat plate collector is 672 sq. m.; Effects are good.	
	Service conditions:	Users can purchase products to design and construction on their own or we can provide EPC services. Solar photo-thermic technology is a mature, so users who use it for the first time with system trainings can quickly master installation, use and maintenance of the system that uses free solar energy with lower use cost.	
	Contact person of business application unit /Tel. /E-mail:	Beijing, Liu Mingliang, 13811970560, 81366405@qq.com; South Africa copper mine Henning Holm, +27(0)828090190, hholm@holmsandfriends.co.za	
	Investment on equipment:	The system is mainly composed of solar thermal collector, water tank, control system, water pump and piping rack etc., where the solar thermal collector is mainly installed the area exposed to the sun without any shield, and water tank, water pump and control cabinet can be installed in the equipment room; For the project with heating system installed, the solar system can be connected in parallel/in series to the heating system, and can use existing heating equipment as complementation when the solar energy is not sufficient For newly built system, supporting energy complementation shall be considered when the solar energy is	

		not sufficient (generally boilers or electric heating equipment). The engineering scale can be adjusted and designed in accordance with users' final heat requirements (daily water consumption, period of water consumption and water temperature etc.) with investment ranging from RMB dozens of thousands to millions.
	Expense of operation maintenance:	Solar hot-water system of the project can operate automatically without any special person on duty, and operating expense of the solar hot-water system mainly includes the expenses spent on circulating pump power consumption, control cabinet power consumption and staff and temporary patrol repairing expenses; Under reasonable design, product selection and normative system installation, annual operating expense of the system accounts for 0.5% of total investment or less. Designed service life of the system using flat-plate collector and thermotube collector is more than 10 years, without equipment repairing and replacement basically for the first 5 years.
	Investment payback period:	The African area has abundant solar energy resources, and conversion efficiency of solar photo-thermal system is higher than the above value, therefore the solar energy can be used to the maximum. If electrical heating system is considered as the example, the static payback period of the system is about 6-3 years according to the electric charge of 0.05-0.1USD/kWh;
	Other earnings:	Use of solar heating technology can reduce dependence on conventional source of energy and reduce expenses of project operation. It also can make sense in energy conservation and environmental protection and every kilowatt hour saved by the system can reduce 0.997kg of carbon dioxide emission with obvious environmental protection effect, and the countries with carbon transaction also can conduct transactions of carbon emission index.
	Technology occupancy:	China has had good solar utilization foundation, but it is dominated by living heat water, according to the description of the Report of Development of Solar Thermal Utilization Industry in 2015, total sales of national solar thermal collector and system is about 43,500,000 m2, where engineering market occupancy of 54.7%, including 61% for residence, 35% for commercial use, only 4% for industrial and agricultural use, which can say that industrial and agricultural application on solar energy just starts, and only few companies in China have actual project development experience.
	Market potential of the technology:	By the end of 2015, Chinese solar thermal utilization industry alliance is mentioned in the exposure draft of the 13th Five-year Plan of photo-thermal application submitted by National Energy Administration, and industrial and agricultural application is the key project of 13th Five-year Plan of solar thermal utilization industry; 1) Scale index: By the end of 2020, inventory of collector area of solar thermal utilization reaches 800 million sq. m (560GWth) with total annual investment amount of RMB 10 billion. 2) Structural index: By the end of 2020, it will achieve the inventory as much as 200 million of collector area of hot-water promotion project for civil purpose in national urban construction and rural areas. Inventory of supply of heat, heating, refrigeration and air conditioning system demonstration project collector area is 200 million sq. m; For 200 large-scale demonstration projects of heat supply stations, inventory of collector area is 4 million sq. m; Collector area inventory of Industrial and agricultural heating demonstration projects is 150 million sq. m; In

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		other words, of newly added 550 million sq. m collectors, the industrial and agricultural applications will account for 27%. According to statistics, with about 470,000 units of China's current coal-fired industrial boilers, the annual consumption of standard coal is about 400-million-ton accounting for about a quarter of China's total coal consumption; Carbon dioxide emission accounts for about 10% of total emissions. If national boilers can be combined with solar energy, about 40 million tons of raw coals can be saved in a year, about 80 million tons of carbon dioxide emissions are reduced, only the solar industry in China will drive new market of RMB 1.32 trillion.
	Technical advancement:	Solar heating is used in agriculture and industry, with few demonstration cased in China, and only few companies have the installation experience in this area, Beijing Sunda Solar Energy Technology Co., Ltd. has tried to use medium temperature of solar energy since 1990s, combined with special patented products (themotubes and vacuum tubes and solar thermal collector), it has undertaken solar heating system of oil pipeline of Liaohe Field, Shanghai Print Works, Beijing Print Works and other domestic projects and hot-water heating projects of 4 copper mines in South Africa, accumulating abundant project experience and talent reserve. The products and technologies used by the Company is at the advance level among peers in domestic industry.
	Technical maturity:	Solar Industrial / agricultural heating systems mainly using efficient collectors can be improved to the level of higher temperature than a conventional bath temperature range to meet application for industrial heating and drying and other aspects of agriculture, compared to low temperature hot water applications, its products performance, system design and control have put forward higher requirements, with years of practice for Beijing Sunda Solar Energy Technology Co., Ltd. ,the entire system has the production and integration of all components to provide the ability from product sales to system design and installation, operation and maintenance training and other aspects.
	Technical application:	Through different products configuration and design schemes, the system has a wide applicability during transfer and promotion; Processing technology of main components of the system is mature, with rich resources in upstream and downstream; The system use is not subject to regional, scale, environment and energy constraints, such as the use of suitable for different climate conditions and area;
	Technical stability:	The technology has been used and verified by many system of Beijing Sunda Solar Energy Technology Co., Ltd. for many years, ensuring the stable operation of the technology: 1) The company and its parent company has more than 30 years of experience in product and system development and application, and master all the advantages and disadvantages of solar energy products and systems on the market, and select the best products and systems according to the requirements of the users; 2) Company brings together a large number of technical experts, collects domestic and international numerous system operating data, masters the operation situation of system under different conditions, and prevents problems with as well as the ability to solve all kinds of unexpected situation; In addition, the solar heating system is generally independent system and has its own storage buffer device (water tank), first of all, without disturbing the surrounding grid, will not result in a power grid volatility; Secondly the existence of the water tank can

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		ensure that the original heating system will not result in a sudden impact, the system stability is very good; Once again, there is no photovoltaic storage battery and materials in solar heating system, such as silicon, without any risk of contamination of surrounding environment, and will not occur in the power system such as electric shock ignition risk, there is no need to replace the battery every 3 to 5 years, completely using non-pollution water as energy carrier.
	Technical safety:	The solar energy heating technology is applied to the industrial and agricultural situation, obtaining the government's consistent approval at home and abroad, and many companies also has carried on the attempt to this aspect, with many years of application for Beijing Sunda Solar Energy Technology Co., Ltd. , it also has the ability to manufacture and integrate and design the technology integration for this technology, and system design capability, fully having transformation and industrialization ability of technology achievements and ability to accept the challenge of market risk.
	Obstacle in achievement transformation and promotion:	Promotion and use of solar energy is a global consensus, most countries has established a relatively perfect policy to encourage the application of solar technology. For examples, the taxes are refunded for the export of domestic solar products, and there is no tariff for the import of most oversea solar products; Many African countries made the detection of solar energy products, and professional talent training: In terms of technology, it can be said that the promotion of the technology has no problem, as long as the transfer of technology achievements and the late maintenance training is done; But as a result of solar heating system in the high cost investment in the earlier stage and low cost operation project in the later stage, promotion of the project in African area may greatly be restricted by the resources and capital.
	Transfer of intellectual property:	Beijing Sunda Solar Energy Technology Co., Ltd. has the technology and products of independent intellectual property rights, there is no patent and technology introduction of intellectual property rights.

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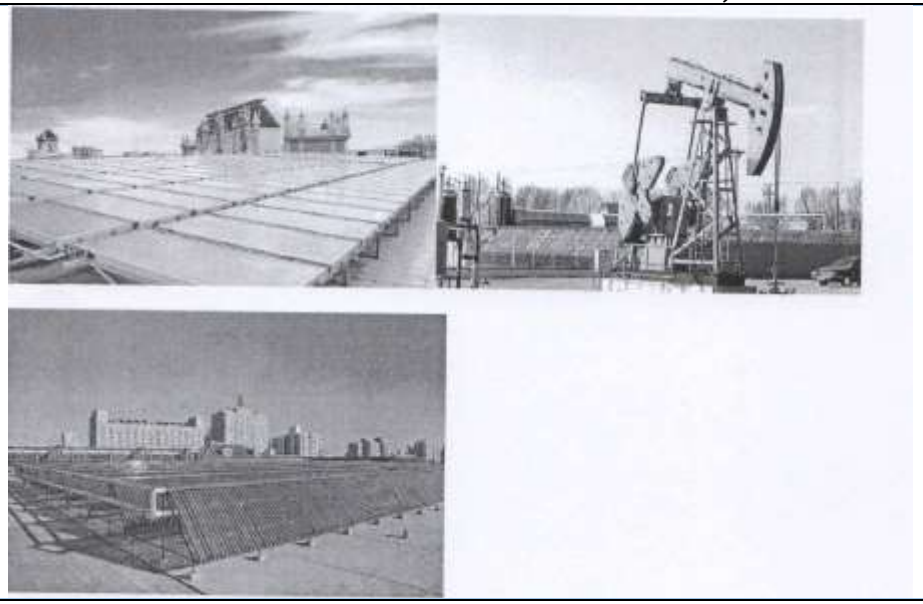
	Photo caption:	

TECHNOLOGY: SOLAR
COMPANY: **HANERGY HOLDING GROUP CO., LTD**

Hanergy Holding Group Co., Ltd	Renewable energy technology achievements			
	Technical Providing company:		Hanergy Holding Group Co., Ltd	
	Contact person:	Xin Ke	**Date of submission:**	2016-06-27
	Technical type:	Solar energy utilization technology	**Specific description:**	Distributed photovoltaic related technology
	Mobile phone:	18611127598	**Email:**	xinke@hanergy.com
	Technology name:		Hanergy Solibro CIGS thin film solar cell production line	
	Technology provider:		Hanergy Holding Group Co., Ltd	
	Applicable fields:		Ground-mounted solar power station, Roof-top solar power station, Household solar power systems, BIPV	
	Technical briefing:		Hanergy Solibro CIGS thin film solar panel production line's technology includes equipments, process and raw materials etc., and it adopts world's leading CIGS co-evaporation equipments to deposit CIGS thin film solar cell on 1580*1190mm^2 sized glass substrate through multiple point sources co-evaporating method, and then solar cells are encapsulated into 1190*789.5mm^2 panels. 16.5% of average mass production conversion efficiency is also in world leading position.	
	Technology info.:		Hanergy Solibro CIGS modules' technical information: -Average conversion efficiency of mass production is 16.5% -Module power is 155Wp -Temperature coefficient is -0.37%/K -Length of core co-evaporation equipment is 34 meters; its height is 3 meters, and its total weight is 100 tons.	
	Business applications:		Installed capacity 535kWp, Halle-Saale, Germany, 2011; Installed capacity 880kWp, Frankfurt airport, Germany, 2010; Installed capacity 955kWp, Thalheim, Germany, 2011; Installed capacity 7.8kWp, Landsberg, Germany, 2014.	
	Usage condition:		Upon the rules of market transactions, Industrialization process of this technology which means to build up 300MW new CIGS factory will be achieved combined with local investment and factory construction, for example providing construction land of the aforesaid factory.	

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	The aforesaid factory's operation and maintenance personnel need systemic training. The aforesaid factory needs 7*24 full-time running and regular maintenance, and it has low installation, operation and maintenance costs.
Contact person of business application company/Tel/Email：	Contact information of the power station in Frankfurt airport, Germany is +49 (0) 180 - 6 372 4636
Equipment investment：	The investment amount of 300MW CIGS production line including all process equipments and other auxiliary equipments is $0.87 per watt, i.e. $261,000,000 for the total line.
Operation and maintenance costs：	Regular operation and maintenance costs of solar modules in 300MW CIGS production line ($/Wp), totally $0.35/Wp: -$0.17 for raw material; -$0.02 for water, electricity and gas utilization; -$0.04 for operation and management staff(manpower cost); -$0.08 for depreciation of equipment; -$0.02 for maintenance cost; -$0.02 for management cost
Payback period：	Static investment recovery period of 300MW CIGS production line project is 5 years
Other benefits：	The annual output value of 300MW CIGS production line is about $1,500,000,000, and it increases 700 new job opportunities, and brings annual taxation of $1,000,000,000 to local government. Carbon gains: annual CO2 emission reductions of 300MW CIGS production line achieves 1,200,000,000 tons
Technical occupation ratio:	In 2015, Hanergy Solibro provided a new generation of CIGS product with low cost and high efficiency, and achieved good sales performance in the domestic market. In the mean time other CIGS competitors didn't push any comparable products to the domestic market.
Technical market potential：	As Hanergy Solibro Sweden R&D center continuously achieves breakthroughs and transfers its achievements to mass production, Hanergy Solibro product efficiency and reliability have been continuously improved, and Hanergy Solibro has also developed new products such as flexible modules and see-through BIPV modules. In the mean time, as continuously perfection and deeply excavation of raw material supply chain. Hanergy Solibro will continuously improve product efficiency and reliability, decrease production and maintenance cost, and develop multi-types differential products to meet the

		requirements of segment market in the next few years. Market potential of Hanergy Solibro products and technology is infinite in the future.
	Technical advancement：	The technical level of Hanergy Solibro CIGS production line's equipments and process is world's leading, and the research and development capabilities is also world's leading. Hanergy Solibro is now holding two world records till Oct. 2015 in CIGS field: 21% efficiency 1 cm2 lab cell, and 5x5cm2 18.7% mini-modules efficiency. The photoelectric conversion efficiency of full-sized CIGS modules is 16.5%. According to third party Australia Alice Spring PV testing center data, Solibro module ranked No. 1 in the kWh/kWp evaluation from 2014.3-2015.2, which surpass modules from First Solar and Sanyo HIT.
	Technical maturity：	Hanergy Solibro CIGS production line's equipments and process have highly technical maturity. It has advanced equipment performance, highly systematic integration, highly automatic level, and complete information of the product process. It equipped advanced on-line and off-line metrology equipments to ensure high quality of products. Its produced products have passed many certificates such as IEC and UL, and have had high market recognition and perfect after-sales services.
	Technical applicability：	The technology has strong applicability during the entire process of technical transfer and promotion. There are no technical restrictions among upstream and downstream industries, and also no restrictions of environment, scale, location, or resources, and it only needs the requirements of domestic water and electricity.
	Technical stability：	The technology is very stable during operation, and it is insensitive to environment and technical parameters.
	Safety of technology：	The technology has no systematic risks during the entire industrialization process, and also has perfect auxiliary facilities, and high market acceptance.
	Achievements promotion barriers：	The technology has no restrictions of technology, policy, resource or capital during the industrialization process, and the technical provider will be responsible for all required personnel training which can meets all the requirements of the entire industrialization process including operation, equipments, process, maintenance, facility build-up, management and after-sales service etc.
	Assignment of Intellectual Property：	The technical provider possesses complete intellectual properties and patents which are required by the entire industrialization process, and owns domestic independent intellectual properties. The provider has intentions to technology

		transfer, and agrees to authorize local factories to produce the patented products, and there are no policy barriers.

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Inner Mongolia Hua De New Technology Limited Company	Technological achievements declaration of renewable energy sources			
	Two-dimension code	Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)		
	Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
	Contact	Li Lingrui	Technology types	Solar energy utilization technology
	Telephone	18698447832	E-mail	iadz9238@163.com
	Technology name	Centralized photo-voltaic power generation system (**20KWp**)		
	Technology provider	Inner Mongolia Hua De New Technology Limited Company		
	Scope of application	Inner Mongolia Hua De New Technology Limited Company		
	Technology briefing	Centralized photo-voltaic power generation system consists of **20KWp** photo-voltaic cell, photo-voltaic controller, inverter and storage battery. The photovoltaic cell can change the solar energy into electric energy,which can be stored in the storage battery through the photovoltaic controller. The inversion controller can change the electric energy of the storage battery into the alternating current energy of **220V** and **50 Hz**.		
	Technical Information	System configuration is: **20KWp** photo-voltaic cell, **220V** system voltage Optimize the specific configuration according to the local solar energy sources and electricity load situation.		
	Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5 MW**. The system is under normal operation.		
	Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number: **0471-6947872**		

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	Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install the main equipments of the system, which have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, the cost of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipment required for the new Centralized photo-voltaic power generation system is: **20KWp** photo-voltaic cell, photo-voltaic controller, inverter and storage battery; the system also consists of system accessories such as wire, cable and standard component, etc. The investment for the system device is about RMB **11,69,400**. Carry out the specific measurement for the investment requirements of the specific equipments according the local solar sources and user load situation.
	Operation and maintenance fees	The Centralized Photovoltaic System does not consume water, electricity or any raw materials during normal operation. The main equipments of system have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.
	Payback period of investment	The static payback period of the Centralized Photovoltaic System is **4** ~ **5** years.
	Other benefits	The Centralized Photovoltaic System can cut emission by about **0.997kg** carbon dioxide per kilowatt hour, which will save about **344g** of standard coal
	Technology share	Technology share is 15% in 2015
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc., the 11th Five-year Plan, the 12th Five-year Plan and the national environment protection plan have established the target of energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For Centralized photo-voltaic power generation system, it is the clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next few years, the market capacity will

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		be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	Technical innovations in the Centralized Photovoltaic System include: 1、 Improve and optimize the trace function of the maximum power for photovoltaic controller. Improve the energy utilization ratio of solar energy system obviously. 2. Improve and optimize the various protection functions of the photovoltaic controller, which further improves the stability of the system. 3、 Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Make Centralized photo-voltaic power generation system locate in the higher technology level at home and abroad through the above technology innovation.
	Technology maturity	The Centralized Photovoltaic System performs system configuration according to the local solar energy resource and the total electricity load of the users. Consisting of **10kWp** photovoltaic cells, photovoltaic controller, inverter and battery, the matching parameters of the devices are optimized and the system integration is improved after optimization design.
	Technology applicability	The Centralized Photovoltaic System is suitable for the residents of the non-electricity area with better solar energy resources and users of enterprises and institutions away from the power grid. The system is configured according to the total power of the solar energy resource and the user's electricity load.
	Technology stability	The Centralized Photovoltaic System can keep stable in the operation process. The photovoltaic battery is installed outdoors, and its stable working environment temperature is - 40°C ~ 60°C C with stable operation in the dust, cold and hot environment. Install the photovoltaic controller, the inversion controller and the storage battery in doors. The stable working environment temperature is -15°C～40°C. The system has the lower sensitivity to interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The Centralized photo-voltaic power generation system has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, It has the higher market acceptance without pollution and discharge in the process of running.

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	Obstacles of results transformation promotion	The government needs to provide the corresponding policy guarantee and financial support for the household photovoltaic generating system in the process of results transformation and promotion. Establish the good market order gradually to make the industry in the good development state.
	Intellectual property transfer	The household photovoltaic generating system has the domestic proprietary intellectual property rights. The relevant technology has obtained the patent. The technology owner is enterprise.
	Picture description	
	Technological achievements declaration of renewable energy sources	

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Two-dimension code	 Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)			
Technology providing unit		Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact		Li Lingrui	Technology types	Wind energy utilization technology
Telephone		**18698447832**	E-mail	iadz9238@163.com
Technology name	Centralized Wind-photovoltaic Hybrid Generation System (**2kW** wind + **8kWp** light)			
Technology provider	Inner Mongolia Hua De New Technology Limited Company			
Scope of application	Inner Mongolia Hua De New Technology Limited Company			
Technology briefing	Centralized Wind-photovoltaic Hybrid Generation System consists of **2kW** wind driven generator, **8kWp** photo-voltaic cell, inverter controller and storage battery. Wind turbine and photovoltaic cell respectively change the wind energy and solar energy into electric energy,which can be stored in the storage battery through the inversion controller. The inversion controller changes the electric energy of the storage cell into the electric energy of alternating current of **220V** and **50 Hz**.			
Technical Information	System configuration is: **2kW** wind driven generator + **8kWp** photo-voltaic cell, and **220V** system voltage. Optimize the specific configuration according to the local wind and solar energy and electricity load situation.			
Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5MW**. The system is under normal operation.			
Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number: **0471-6947872**			

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	Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install the main equipments of the system, which have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, the cost of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipments required for the new established Centralized Wind-photovoltaic Hybrid Generation System are: **2kW** wind driven generator, 8kWp photo-voltaic cell, inverter controller and storage battery; the system also includes the system accessories such as wire, cable and standard component, etc. Investment for the system device is about RMB **822,500.**Carry out the specific measurement according to the local wind and solar sources and user load situation.
	Operation and maintenance fees	The centralized Wind-photovoltaic Hybrid Generation System under normal operation will not consume water, electricity and any raw materials. The main equipments of system have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.
	Payback period of investment	It is **4-5** years for the payback period of the static investment of the Centralized Wind-photovoltaic Hybrid Generation System
	Other benefits	It can reduce about **0.997kg** carbon dioxide emission per watt of generating electricity for the Centralized Wind-photovoltaic Hybrid Generation System. Meanwhile, it can save about **344g** standard coal.
	Technology share	Technology share is 15% in 2015
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc. **&ldguo**, the 11th Five-year Plan **&rdguo**; **&ldquo**, the 12th Five-year Plan **&rdguo** and the national environment protection plan have established the target of energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For Centralized Wind-photovoltaic Hybrid Generation System, it is the clean energy generating system having the mature technology. With the gradual

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		realization of the target of energy conservation and emission reduction of our country in the next few years, the market capacity will be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	The technology innovation of the Centralized Wind-photovoltaic Hybrid Generation System includes: 1、 Improve and optimize the tail of the wind turbine and yaw structure. Improve the stable running of the wind turbine. 2、 Improve and optimize the electromagnetic brake, mechanical brake and unloading load institution of the wind turbine. Improve the running safety of the wind turbine. 3、Improve and optimize the trace function of the maximum power for photovoltaic control module. Obviously improve the energy utilization ratio of solar energy system. 4、Improve and optimize the protection function of the photovoltaic control module to improve the stability of the system further. 5、Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Make Centralized Wind-photovoltaic Hybrid Generation System locate in the higher technology level at home and abroad through the above technology innovation.
	Technology maturity	Centralized Wind-photovoltaic Hybrid Generation System performs the system configuration according to the local wind and light source and the valley amount of the electricity load for the user, consisting of **2KW** wind driven generator, 8KWp photo-voltaic cell, inverter controller and storage battery; the matching parameter of each device is optimal after optimization design; the perfect degree for system generation is relatively high.
	Technology applicability	The Centralized Wind-photovoltaic Hybrid Generation System applies to the residents of the areas without electricity having the better wind and solar energy resources and the users of enterprises and institutions off the grid. Carry out the system configuration according to the local wind and solar resources and capacity of electricity load for users.
	Technology stability	The Centralized Wind-photovoltaic Hybrid Generation System can keep stable in the process of running for the project. Install the photovoltaic battery in the outdoor. The stable working environment temperature is -40°C～60°C. It can keep stable running under severe cold and hot environment with the dust. Install the inversion controller and the storage battery in the indoor.

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		The stable working environment temperature is -15°C～40°C. The system has the lower sensitivity to the interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The Centralized Wind-photovoltaic Hybrid Generation System has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, It has the higher market acceptance without pollution and discharge in the process of running.
	Obstacles of results transformation and promotion	In the process of achievement transformation and promotion, the Centralized Wind-photovoltaic Hybrid Generation System needs the relevant policy support and financial support of the government, and gradually establishes a good market order to make sure that the industry is in a state of healthy development.
	Intellectual property transfer	The Centralized Wind-photovoltaic Hybrid Generation System has the domestic independent intellectual property right, and the related technology, which is owned by the enterprise, has also obtained the patent.

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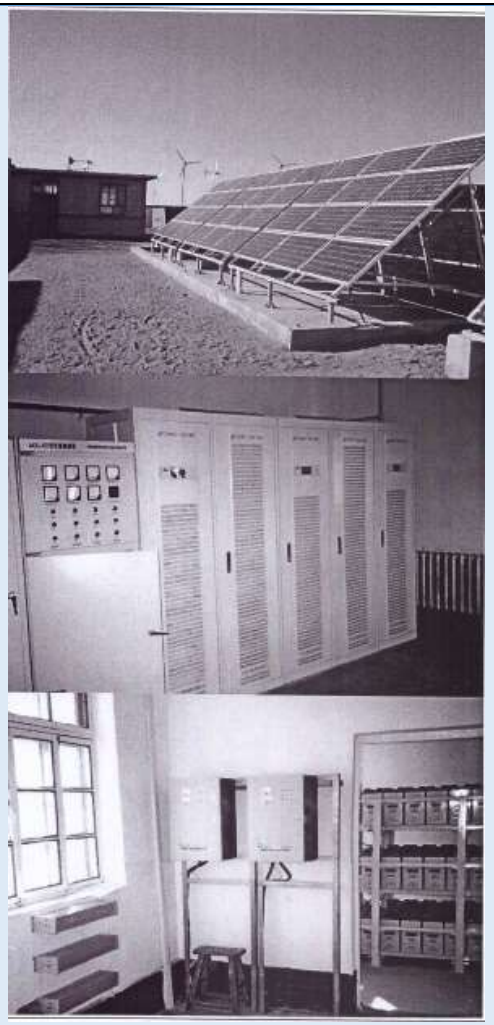
Picture description	

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Technological achievements declaration of renewable energy sources			
Two-dimension code	Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)		
Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact	Li Lingrui	Technology types	Solar energy utilization technology
Telephone	18698447832	E-mail	iadz9238@163.com
Technology name	Centralized Wind-photovoltaic Hybrid Generation System (**10kWp**)		
Technology provider	Inner Mongolia Hua De New Technology Limited Company		
Scope of application	Inner Mongolia Hua De New Technology Limited Company		
Technology briefing	The Centralized Wind-photovoltaic Hybrid Generation System consists of **10kWp** photo-voltaic cell, photo-voltaic controller, inverter and storage battery. The photovoltaic cell can change the solar energy into electric energy,which can be stored in the storage battery through the photovoltaic controller. The inversion controller can change the electric energy of the storage battery into the alternating current energy of **220V** and **50 Hz**.		
Technical Information	System configuration is: **10KWp** photo-voltaic cell, **220V** system voltage Optimize the specific configuration according to the local solar energy sources and electricity load situation.		
Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5MW.** The system is under normal operation.		
Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number: **0471-6947872**		

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	Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install the main equipments of the system, which have the functions of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, the cost of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipment required for the new Centralized Photovoltaic System is: **10kWp** photo-voltaic cell, photo-voltaic controller, inverter and storage battery; the system also consists of system accessories such as wire, cable and standard component, etc. Investment for the system device is about RMB **839,400**.Carry out the specific measurement for the investment requirements of the specific equipments according the local solar sources and user load situation.
	Operation and maintenance fees	The Centralized Photovoltaic System does not consume water, electricity or any raw materials during normal operation. The main equipments of system have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.
	Payback period of investment	The static payback period of the Centralized Photovoltaic System is 4 ~ 5 years.
	Other benefits	The Centralized Photovoltaic System can cut emission by about **0.997kg** carbon dioxide per kilowatt hour, which will save about **344g** of standard coal
	Technology share	Technology share is 15% in 2015
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc. **&ldguo**, the 11th Five-year Plan **&rdguo**; **&ldquo**, the 12th Five-year Plan **&rdguo** and the national environment protection plan have established the target of energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For Centralized Wind-photovoltaic Hybrid Generation System, it is the clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next

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		few years, the market capacity will be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	Technical innovations in the Centralized Photovoltaic System include: 1、 Improve and optimize the trace function of the maximum power for photovoltaic controller. Obviously improve the energy utilization ratio of solar energy system. 2. Improve and optimize the various protection functions of the photovoltaic controller, which further improves the stability of the system. 3、 Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Through the above technological innovation, the user angle type of Wind-photovoltaic Hybrid Generation System is still in a high technology level both at home and abroad.
	Technology maturity	The Centralized Photovoltaic System performs system configuration according to the local solar energy resource and the total electricity load of the users. Consisting of **10kWp** photovoltaic cells, photovoltaic controller, inverter and battery, the matching parameters of the devices are optimized and the system integration is improved after optimization design.
	Technology applicability	The Centralized Photovoltaic System is suitable for residents of non-electricity areas with better solar energy resources and users of enterprises and institutions away from the power grid. The system is configured according to the total power of the solar energy resource and the user's electricity load.
	Technology stability	The Centralized Photovoltaic System can keep stable in the operation process. The photovoltaic battery is installed outdoors, and its stable working environment temperature is - 40°C ~ 60°C with stable operation in the dust, cold and hot environment. Install the photovoltaic controller, the inversion controller and the storage battery in doors. The stable working environment temperature is -15°C～40°C. The system has the lower sensitivity to the interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The Centralized Photovoltaic System has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, It has the higher market acceptance without pollution and discharge in the process of running.

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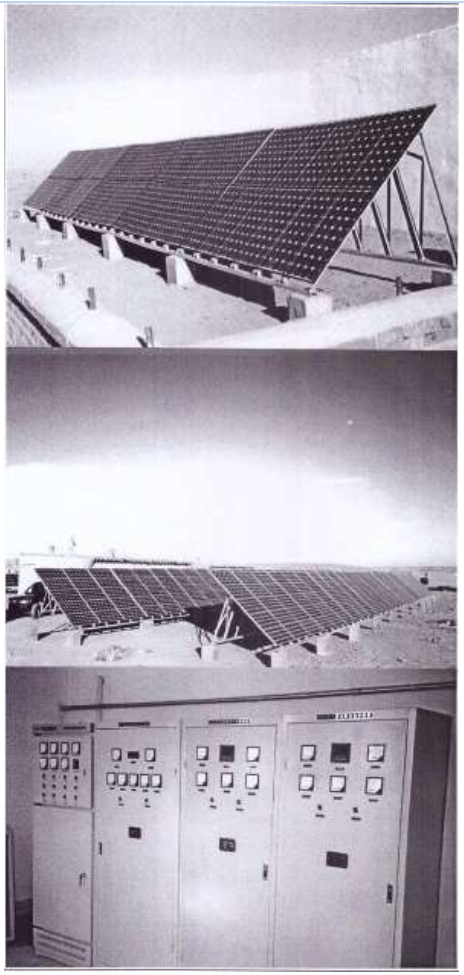
	Obstacles of results transformation and promotion	The government needs to provide the corresponding policy guarantee and financial support for the Centralized Photovoltaic System in the process of results transformation and promotion. Establish the good market order gradually to make the industry in the good development state.
	Intellectual property transfer	The Centralized Photovoltaic System has the domestic proprietary intellectual property rights. The relevant technology has obtained the patent. The technology owner is enterprise.
	Picture description	

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Technological achievements declaration of renewable energy sources			
Two-dimension code	 Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)		
Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact	Li Lingrui	Technology types	Wind energy utilization technology
Telephone	**18698447832**	E-mail	iadz9238@163.com
Technology name	Centralized Wind-photovoltaic Hybrid Generation System (**kW** wind + **kWp** light)		
Technology provider	Inner Mongolia Hua De New Technology Limited Company		
Scope of application	Inner Mongolia Hua De New Technology Limited Company		
Technology briefing	Centralized Wind-photovoltaic Hybrid Generation System consists of **4kW** wind driven generator, **16kWp** photo-voltaic cell, inverter controller and storage battery. Wind turbine and photovoltaic cell respectively change the wind energy and solar energy into electric energy,which can be stored in the storage battery through the inversion controller. The inversion controller changes the electric energy of the storage cell into the electric energy of alternating current of **220V** and **50 Hz**.		
Technical Information	System configuration is: **4kW** wind driven generator + **16kWp** photo-voltaic cell, and **220V** system voltage. Optimize the specific configuration according to the local wind and solar energy and electricity load situation.		
Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5MW**. The system is under normal operation.		

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	Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number: **0471-6947872**
	Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install the main equipments of the system, which have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, the cost of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipments required for the new established Centralized Wind-photovoltaic Hybrid Generation System are: **4kW** wind driven generator, **16kWp** photo-voltaic cell, inverter controller and storage battery; the system also includes the system accessories such as wire, cable and standard component, etc. Investment for the system device is about RMB **11, 656, 0.00.Carry** out the specific measurement according to the local wind and solar sources and user load situation.
	Operation and maintenance fees	Centralized Wind-photovoltaic Hybrid Generation System under normal operation will not consume water, electricity and any raw materials. The main equipments of system have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.
	Payback period of investment	It is **4-5** years for the payback period of the static investment of the Centralized Wind-photovoltaic Hybrid Generation System
	Other benefits	It can reduce about **0.997kg** carbon dioxide emission per watt of generating electricity for the Centralized Wind-photovoltaic Hybrid Generation System. Meanwhile, it can save about **344g** standard coal.
	Technology share	Technology share is 15% in 2015
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc. **&ldguo**, the 11th Five-year Plan **&rdguo**; **&ldquo**, the 12th Five-year Plan **&rdguo** and the national environment protection plan have established the target of energy conservation and emission reduction. These policies have promoted the application

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		of technology innovation in all fields. For Centralized Wind-photovoltaic Hybrid Generation System, it is the clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next few years, the market capacity will be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	The technology innovation of Centralized Wind-photovoltaic Hybrid Generation System includes: 1. Improve and optimize the tail of the wind turbine and yaw structure. Improve the stable running of the wind turbine. 2. Improve and optimize the electromagnetic brake, mechanical brake and unloading load institution of the wind turbine. Improve the running safety of the wind turbine. 3. Improve and optimize the trace function of the maximum power for photovoltaic control module. Obviously improve the energy utilization ratio of solar energy system. 4. Improve and optimize the protection functions of the photovoltaic control module to improve the stability of the system further. 5. Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Make Centralized Wind-photovoltaic Hybrid Generation System locate in the higher technology level at home and abroad through the above technology innovation.
	Technology maturity	Centralized Wind-photovoltaic Hybrid Generation System performs the system configuration according to the local wind and light source and the valley amount of the electricity load for the user, consisting of **4KW** wind driven generator, **16KWp** photo-voltaic cell, inverter controller and storage battery; the matching parameter of each device is optimal after optimization design; the perfect degree for system generation is relatively high.
	Technology applicability	The Centralized Wind-photovoltaic Hybrid Generation System applies to residents of areas without electricity having the better wind and solar energy resources and users of enterprises and institutions off the grid. Carry out the system configuration according to the local wind and solar resources and capacity of electricity load for users.
	Technology stability	The Centralized Wind-photovoltaic Hybrid Generation System can keep stable in the process of running for the project. Install the photovoltaic battery outdoors. The stable working environment temperature is -40°C～60°C. It can keep stable running under severe cold and hot environment

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		with the dust. Install the inversion controller and the storage battery in doors. The stable working environment temperature is -15°C～40°C. The system has the lower sensitivity to interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The Centralized Wind-photovoltaic Hybrid Generation System has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, It has the higher market acceptance without pollution and discharge in the process of running.
	Obstacles of results transformation and promotion	In the process of achievement transformation and promotion, the Centralized Wind-photovoltaic Hybrid Generation System needs the relevant policy support and financial support of the government, and gradually establishes a good market order to make sure that the industry is in a state of healthy development.
	Intellectual property transfer	The Centralized Wind-photovoltaic Hybrid Generation System has the domestic independent intellectual property right, and the related technology, which is owned by the enterprise, has also obtained the patent.

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Picture description		

Technological achievements declaration of renewable energy sources			
Two-dimension code	Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)		
Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact	Li Lingrui	Technology types	Technology for using the solar energy
Telephone	**18698447832**	E-mail	iadz9238@163.com

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	Technology name	Household photo-voltaic power generation system **(1kWp**)
	Technology provider	Inner Mongolia Hua De New Technology Limited Company
	Scope of application	Inner Mongolia Hua De New Technology Limited Company
	Technical briefing	Household photo-voltaic power generation system consists of **1kWp** photo-voltaic cell, photo-voltaic controller, inverter and storage battery. The photovoltaic cell can change the solar energy into electric energy,which can be stored in the storage battery through the photovoltaic controller. The inversion controller can change the electric energy of the storage battery into the alternating current energy of **220V** and **50 Hz**.
	Technical Information	System configuration is: **1kWp** photo-voltaic cell, **48V** system voltage Optimize the specific configuration according to the local solar energy sources and electricity load situation.
	Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5MW**. The system is under normal operation.
	Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number:**0471-6947872**
	Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install the main equipments of the system, which have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, the cost of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipments required for the new established household photovoltaic generating system are: **1kWp** photo-voltaic cell, photo-voltaic controller, inverter and storage battery; the system also consists of system accessories such as wire, cable and standard component, etc. The investment for the system device is about RMB **48,000** Carry out the specific measurement for the investment requirements of the specific equipments according to the local solar sources and user load situation.
	Operation and maintenance fees	The household photovoltaic generating system under normal operation will not consume water, electricity and any raw materials. The main equipments of system have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.

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	Payback period of investment	It is **4-5** years for the payback period of the static investment of the household photovoltaic generating system.
	Other benefits	It can reduce about **0.997kg** carbon dioxide emission per watt of generating electricity for the household photovoltaic generating system. Meanwhile, it can save about **344g** standard coal.
	Technology share	Technology share is 15% in **2015**
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc. **&ldguo**, the 11th Five-year Plan **&rdguo**; **&ldquo**, the 12th Five-year Plan **&rdguo** and the national environment protection plan have established the target of energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For household wind and light hybrid power system, it is the clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next few years, the market capacity will be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	The technology innovation of the household photovoltaic generating system includes 1、 Improve and optimize the trace function of the maximum power for photovoltaic controller. Obviously improve the energy utilization ratio of solar energy system. 2、 Improve and optimize the protection function of the photovoltaic controller to improve the stability of the system further. 3、 Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Make the complementary generating system of the household wind and solar locate in the higher technology level at home and abroad through the above technology innovation.
	Technology maturity	Household photo-voltaic power generation system performs the syatem configuration according to the local wind and light source and the valley amount of the electricity load for the user, consisting of **1KWp** photo-voltaic cell, photovoltaic controller, inverter controller and storage battery; the

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		matching parameters of each device is optimal after optimization design; the perfect degree for system generation is relatively high.
	Technology applicability	The household photovoltaic generating system applies to residents of areas without electricity having the better solar energy sources and users of enterprises and institutions off the grid. Carry out the system configuration according to the local solar sources and capacity of electricity load for users.
	Technology stability	The household photovoltaic generating system can keep stable in the process of running for the project. Install the photovoltaic cell outdoors. The stable working environment temperature is -40°C～60°C. It can keep stable running under severe cold and hot environment with the dust. Install the photovoltaic controller, the inversion controller and the storage battery in doors. The stable working environment temperature is -15°C～40°C. The system has the lower sensitivity to interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The household photovoltaic generating system has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, It has the higher market acceptance without pollution and discharge in the process of running.
	Obstacles of results transformation and promotion	The government needs to provide the corresponding policy guarantee and financial support for the household photovoltaic generating system in the process of results transformation and promotion. Establish the good market order gradually to make the industry in the good development state.
	Intellectual property transfer	The household photovoltaic generating system has the domestic proprietary intellectual property rights. The relevant technology has obtained the patent. The technology owner is enterprise.

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COMPANY: INNER MONGOLIA HUA DE NEW TECHNOLOGY LIMITED COMPANY

	Picture description	
	Technological achievements declaration of renewable energy sources	
	Two-dimension code	Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)

TECHNOLOGY: SOLAR
COMPANY: INNER MONGOLIA HUA DE NEW TECHNOLOGY LIMITED COMPANY

Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact	Li Lingrui	Technology types	Solar energy utilization technology
Telephone	**18698447832**	E-mail	iadz9238@163.com

Technology name	Household photo-voltaic power generation system (**3kWp**)
Technology provider	Inner Mongolia Hua De New Technology Limited Company
Scope of application	Inner Mongolia Hua De New Technology Limited Company
Technology briefing	Household photo-voltaic power generation system consists of **3kWp** photo-voltaic cell, photo-voltaic controller, inverter and storage battery. The photovoltaic cell can change the solar energy into electric energy,which can be stored in the storage battery through the photovoltaic controller. The inversion controller can change the electric energy of the storage battery into the alternating current energy of **220V** and **50 Hz**.
Technical Information	System configuration is: **3kWp** photo-voltaic cell, **48V** system voltage Optimize the specific configuration according to the local solar energy sources and electricity load situation.
Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5MW**. The system is under normal operation.
Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number: **0471-6947872**
Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install the main equipments of the system, which have the function of automatic operation and protection.

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		Meanwhile, they have the stable performance. Therefore, the cost of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipments required for the new established household photovoltaic generating system are: **3KWp** to-voltaic cell, photo-voltaic controller, inverter and storage battery; the system also consists of system accessories such as wire, cable and standard component, etc. The investment of the system equipments is about RMB **67,000**.Carry out the specific measurement for the investment requirements of the specific equipments according the local solar sources and user load situation.
	Operation and maintenance fees	The household photovoltaic generating system under normal operation will not consume water, electricity and any raw materials. The main equipments of system have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.
	Payback period of investment	It is **4-5** years for the payback period of the static investment of the household photovoltaic generating system.
	Other benefits	It can reduce about **0.997kg** carbon dioxide emission per watt of generating electricity for the household photovoltaic generating system. Meanwhile, it can save about **344g** standard coal.
	Technology share	Technology share is 15% in 2015
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc. **&ldguo**, the 11th Five-year Plan **&rdguo**; **&ldquo**, the 12th Five-year Plan **&rdguo** and the national environment protection plan have established the target of

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		energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For household wind and light hybrid power system, it is the clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next few years, the market capacity will be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	The technology innovation of the household photovoltaic generating system includes 1、 Improve and optimize the trace function of the maximum power for photovoltaic controller. Obviously improve the energy utilization ratio of solar energy system obviously. 2、 Improve and optimize the protection function of the photovoltaic controller to improve the stability of the system further. 3、 Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Make the complementary generating system of the household wind and solar locate in the higher technology level at home and abroad through the above technology innovation.
	Technology maturity	Household type photo-voltaic power generation system performs the system configuration according to the local wind and light source and the valley amount of the electricity load for the user, consisting of **3KWp** photo-voltaic cell, Photovoltaic controller, inverter controller and storage battery; the matching parameters of each device is optimal after optimization design; the perfect degree for system generation is relatively high.
	Technology applicability	The household photovoltaic generating system applies to residents of areas without electricity having the better solar energy sources and users of enterprises and institutions off the grid. Carry out the system

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		configuration according to the local solar sources and capacity of electricity load for users.
	Technology stability	The household photovoltaic generating system can keep stable in the process of running for the project. Install the photovoltaic cell outdoors. The stable working environment temperature is -40°C～60°C. It can keep stable running under severe cold and hot environment with the dust. Install the photovoltaic controller, the inversion controller and the storage battery in doors. The stable working environment temperature is -15°C～40°C. The system has the lower sensitivity to interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The household photovoltaic generating system has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, It has the higher market acceptance without pollution and discharge in the process of running.
	Obstacles of results transformation and promotion	The government needs to provide the corresponding policy guarantee and financial support for the household photovoltaic generating system in the process of results transformation and promotion. Establish the good market order gradually to make the industry in the good development state.
	Intellectual property transfer	The household photovoltaic generating system has the domestic proprietary intellectual property rights. The relevant technology has obtained the patent. The technology owner is enterprise.

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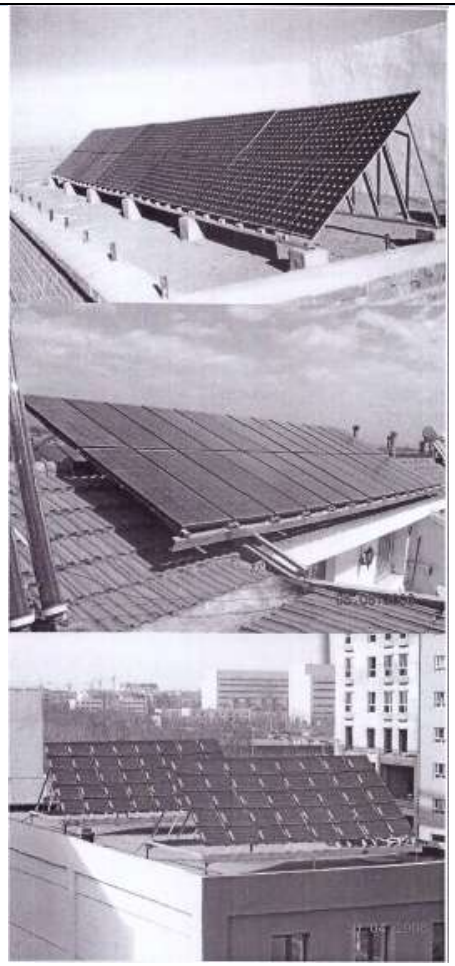
	Picture description		

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Technological achievements declaration of renewable energy sources			
Two-dimension code	Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)		
Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact	Li Lingrui	Technology types	Solar energy utilization technology
Telephone	**18698447832**	E-mail	iadz9238@163.com
Technology name	Household type photo-voltaic power generation system (**2kWp**)		
Technology provider	Inner Mongolia Hua De New Technology Limited Company		
Scope of application	Inner Mongolia Hua De New Technology Limited Company		
Technology briefing	Household photo-voltaic power generation system consists of **2kWp** photo-voltaic cell, photo-voltaic controller, inverter and storage battery. The photovoltaic cell can change the solar energy into electric energy,which can be stored in the storage battery through the photovoltaic controller. The inversion controller can change the electric energy of the storage battery into the alternating current energy of **220V** and **50 Hz**.		
Technical Information	System configuration is: **2kWp** photo-voltaic cell, **48V** system voltage Optimize the specific configuration according to the local solar energy sources and electricity load situation.		
Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5MW**. The system is under normal operation.		
Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number: **0471-6947872**		

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	Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install the main equipments of the system, which have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, the cost of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipments required for the new established household photovoltaic generating system are: **2KWp** to-voltaic cell, photo-voltaic controller, inverter and storage battery; the system also consists of system accessories such as wire, cable and standard component, etc. The investment of the system equipments is about RMB **56,000**.Carry out the specific measurement for the investment requirements of the specific equipments according to the local solar sources and user load situation.
	Operation and maintenance fees	The household photovoltaic generating system under normal operation will not consume water, electricity and any raw materials. The main equipments of system have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.
	Payback period of investment	It is **4-5** years for the payback period of the static investment of the household photovoltaic generating system.
	Other benefits	It can reduce about **0.997kg** carbon dioxide emission per watt of generating electricity for the household photovoltaic generating system. Meanwhile, it can save about **344g** standard coal.
	Technology share	Technology share is 15% in **2015**
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc., the 11th Five-year Plan, the 12th Five-year Plan **&rdguo** and the national environment protection plan have established the target of energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For household wind and light hybrid power system, it is the clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next few years, the market

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		capacity will be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	The technology innovation of the household photovoltaic generating system includes 1、 Improve and optimize the trace function of the maximum power for photovoltaic controller. Obviously improve the energy utilization ratio of solar energy system. 2、 Improve and optimize the protection function of the photovoltaic controller to improve the stability of the system further. 3、 Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Make the complementary generating system of the household wind and solar locate in the higher technology level at home and abroad through the above technology innovation.
	Technology maturity	Household photo-voltaic power generation system performs the syatem configuration according to the local wind and light source and the valley amount of the electricity load for the user, consisting of **2KWp** photo-voltaic cell, photovoltaic controller, inverter controller and storage battery; the matching parameters of each device is optimal after optimization design; the perfect degree for system generation is relatively high.
	Technology applicability	Household photo-voltaic power generation system is suitable for the residence with relatively good solar energy but without power, and the enterprise or unit away from the power grid. Carry out the system configuration according to the local solar sources and capacity of electricity load for users.
	Technology stability	The household photovoltaic generating system can keep stable in the process of running for the project. Install the photovoltaic cell outdoors. The stable working environment temperature is **40°C～60°C**. It can keep stable running under severe cold and hot environment with the dust. Install the photovoltaic controller, the inversion controller and the storage battery in doors. The stable working environment temperature is **-15°C～40°C**. The system has the lower sensitivity to interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The household photovoltaic generating system has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, It has the higher market acceptance without pollution and discharge in the process of running.

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	Obstacles of results transformation and promotion	The government needs to provide the corresponding policy guarantee and financial support for the household photovoltaic generating system in the process of results transformation and promotion. Establish the good market order gradually to make the industry in the good development state.
	Intellectual property transfer	The household photovoltaic generating system has the domestic proprietary intellectual property rights. The relevant technology has obtained the patent. The technology owner is enterprise.
	Picture description	

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Technological achievements declaration of renewable energy sources			
Two-dimension code	 Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)		
Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact	Li Lingrui	Technology types	Wind energy utilization technology
Telephone	**18698447832**	E-mail	iadz9238@163.com
Technology name	Household wind and light hybrid power system (**300W** wind + **300Wp** light)		
Technology provider	Inner Mongolia Hua De New Technology Limited Company		
Scope of application	Inner Mongolia Hua De New Technology Limited Company		
Technical briefing	The household wind and light hybrid power system consists of **300W** wind driven generator, **300Wp** photo-voltaic cell, inverter controller and storage battery. Wind turbine and photovoltaic cell change the wind energy and solar energy into electric energy respectively,which can be stored in the storage battery through the inversion controller. The inversion controller changes the electric energy of the storage cell into the electric energy of alternating current of **220V** and **50Hz**.		
Technical Information	System configuration is: **300W** wind driven generator + **300Wp** photo-voltaic cell, **24V** system voltage. Optimize the specific configuration according to the local wind and solar energy and electricity load situation.		
Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5 MW**. The system is under normal operation.		
Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number: **0471-6947872**		

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	Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install for the main equipments of the system, which have the functions of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, the costs of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipments required for the new established household wind and light hybrid power system are: **300W** wind driven generator, **300Wp** photo-voltaic cell, inverter controller and storage battery; the system also includes the system accessories such as wire, cable and standard component, etc. The investment for the system device is about RMB **16,200**.Carry out the specific measurement according to the local wind and solar sources and user load situation.
	Operation and maintenance fees	Household wind and light hybrid power system under normal operation will not consume water, electricity and any raw materials. The main equipments of system have the functions of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.
	Payback period of investment	It is **4-5** years for the payback period of the static investment of household wind and light hybrid power system.
	Other benefits	It can reduce about **0.997kg** carbon dioxide emission per watt of generating electricity for household wind and light hybrid power system. Meanwhile, it can save about **344g** standard coal.
	Technology share	Technology share is 15% in **2015**
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment condition that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc, the 11th Five-year Plan, the 12th Five-year Plan and the national environment protection plan have established the target of energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For household wind and light hybrid power system, it is the clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next few years, the market capacity will be enlarged

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		further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	The technology innovation of the household wind and light hybrid power system includes: 1、 Improve and optimize the tail of the wind turbine and yaw structure. Improve the stable running of the wind turbine. 2、 Improve and optimize the electromagnetic brake, mechanical brake and unloading load institution of the wind turbine. Improve the running safety of the wind turbine. 3、 Improve and optimize the trace function of the maximum power for photovoltaic control module. Obviously improve the energy utilization ratio of solar energy system. 4、 Improve and optimize the protection function of the photovoltaic control module to improve the stability of the system further. 5、 Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Make the complementary generating system of the household wind and solar locate in the higher technology level at home and abroad through the above technology innovation.
	Technology maturity	The household wind and light hybrid power system performs the system configuration according to the local wind and light source and the valley amount of the electricity load for the user, consisting of 300W wind driven generator, 300Wp photo-voltaic cell, inverter controller and storage battery; the matching parameter of each device is optimal after optimization design; the perfect degree for system generation is relatively high.
	Technology applicability	The household wind and light hybrid power system applies to residents of areas without electricity having the better wind energy and solar energy resources and users of enterprises and institutions off the grid. Carry out the system configuration according to the local wind and solar resources and capacity of electricity load for users.
	Technology stability	The household wind and light hybrid power system can keep stable in the process of running for the project. Install the wind turbine and photovoltaic battery outdoors. The stable working environment temperature is -40°C～60°C. They can keep stable running under severe cold and hot environment with the dust. Install the inversion controller and the storage battery in doors. The stable working environment temperature is -15°C～40°C. The system has the lower sensitivity to

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		interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The household wind and light hybrid power system has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, It has the higher market acceptance without pollution and discharge in the process of running.
	Obstacles of results transformation and promotion	The government needs to provide the corresponding policy guarantee and financial support for the household wind and light hybrid power system in the process of results transformation and promotion. Establish the good market order gradually to make the industry in the good development state.
	Intellectual property transfer	The household wind and light hybrid power system has the domestic proprietary intellectual property rights. The relevant technology has obtained the patent. The technology owner is enterprise.
	Picture description	

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Technological achievements declaration of renewable energy sources			
Two-dimension code	Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)		
Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact	Li Lingrui	Technology types	Wind energy utilization technology
Telephone	**18698447832**	E-mail	iadz9238@163.com
Technology name	Household wind and light hybrid power system (**500W** wind + **1.5kWp** light)		
Technology provider	Inner Mongolia Hua De New Technology Limited Company		
Scope of application	Inner Mongolia Hua De New Technology Limited Company		
Technology Briefing	Household wind and light hybrid power system consists of **500W** wind driven generator, **1.5KWp** photo-voltaic cell, inverter controller and storage battery. Wind turbine and photovoltaic cell respectively change the wind energy and solar energy into electric energy,which can be stored in		

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		the storage battery through the inversion controller. The inversion controller changes the electric energy of the storage cell into the electric energy of alternating current of **220V** and **50 Hz.**
	Technical Information	System configuration is: **500w** wind driven generator + **1.5KWp** photo-voltaic cell, **48V** system voltage. Optimize the specific configuration according to the local wind and solar energy and electricity load situation.
	Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5MW**. The system is under normal operation.
	Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number: **0471-6947872**
	Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install the main equipments of the system, which have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, the cost of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipments required for the new established household wind and light hybrid power system are: **500W** wind driven generator, **1.5KWp** photo-voltaic cell, inverter controller and storage battery; the system also includes the system accessories such as wire, cable and standard component, etc. The investment for the system device is about RMB **56,000**.Carry out the specific measurement according to the local wind and solar sources and user load situation.
	Operation and maintenance fees	The household wind and light hybrid power system under normal operation will not consume water, electricity and any raw materials. The main equipments of system have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.
	Payback period of investment	It is **4-5** years for the payback period of the static investment of household wind and light hybrid power system.
	Other benefits	It can reduce about **0.997kg** carbon dioxide emission per watt of generating electricity for the household wind and light hybrid power system. Meanwhile, it can save about **344g** standard coal.
	Technology share	Technology share is **15**% in **2015**

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	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc, the 11th Five-year Plan, the 12th Five-year Plan and the national environment protection plan have established the target of energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For the household wind and light hybrid power system, it is the clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next few years, the market capacity will be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	The technology innovation of the household wind and light hybrid power system includes: 1、 Improve and optimize the tail of the wind turbine and yaw structure. Improve the stable running of the wind turbine. 2、Improve and optimize the electromagnetic brake, mechanical brake and unloading load institution of the wind turbine. Improve the running safety of the wind turbine. 3、Improve and optimize the trace function of the maximum power for photovoltaic control module. Obviously improve the energy utilization ratio of solar energy system. 4、Improve and optimize the protection function of the photovoltaic control module to improve the stability of the system further. 5、Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Make the complementary generating system of the household wind and solar locate in the higher technology level at home and abroad through the above technology innovation.
	Technology maturity	Household wind and light hybrid power system performs the system configuration according to the local wind and light source and the valley amount of the electricity load for the user, consisting of wind driven generator, photo-voltaic cell, inverter controller and storage battery; the matching

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		parameter of each device is optimal after the optimization design; the perfect degree for system generation is relatively high.
	Technology applicability	The household wind and light hybrid power system applies to residents of areas without electricity having the better wind energy and solar energy resources and users of enterprises and institutions off the grid. Carry out the system configuration according to the local wind and solar resources and capacity of electricity load for users.
	Technology stability	The household wind and light hybrid power system can keep stable in the process of running for the project. Install the wind turbine and photovoltaic battery outdoors. The stable working environment temperature is -40°C～60°C. They can keep stable running under severe cold and hot environment with the dust. Install the inversion controller and the storage battery in doors. The stable working environment temperature is -15°C～40°C. The system has the lower sensitivity to interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The household wind and light hybrid power system has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, It has the higher market acceptance without pollution and discharge in the process of running.
	Obstacles of results transformation and promotion	The government needs to provide the corresponding policy guarantee and financial support for the household wind and light hybrid power system in the process of results transformation and promotion. Establish the good market order gradually to make the industry in the good development state.
	Intellectual property transfer	The household wind and light hybrid power system has the domestic proprietary intellectual property rights. The relevant technology has obtained the patent. The technology owner is enterprise.

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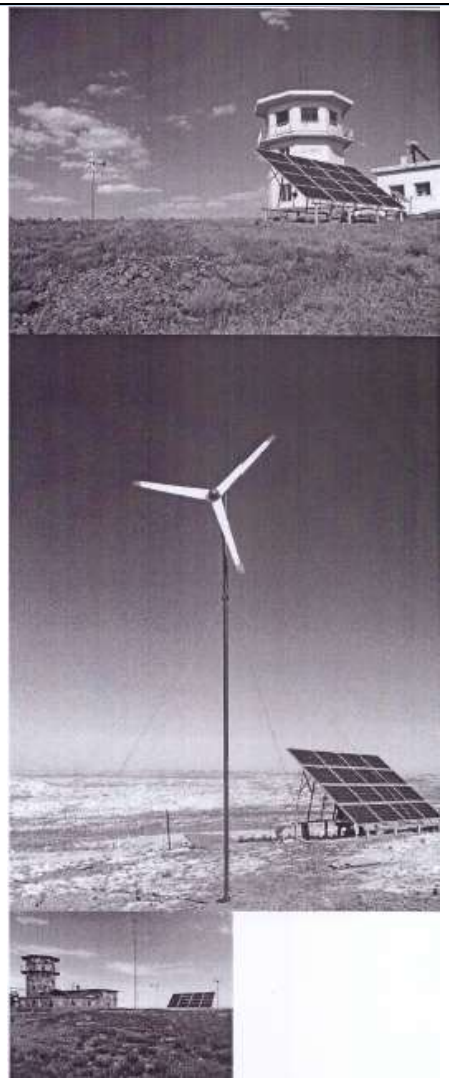
	Picture description		

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Technological achievements declaration of renewable energy sources			
Two-dimension code	Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)		
Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact	Li Lingrui	Technology types	Wind energy utilization technology
Telephone	**18698447832**	E-mail	iadz9238@163.com
Technology name	Household wind and light hybrid power system (**500W** wind + **500Wp** light)		
Technology provider	Inner Mongolia Hua De New Technology Limited Company		
Scope of application	Inner Mongolia Hua De New Technology Limited Company		
Technology briefing	Household wind and light hybrid power system consists of 500W wind driven generator, **500Wp** photo-voltaic cell, inverter controller and storage battery. Wind turbine and photovoltaic cell respectively change the wind energy and solar energy into electric energy,which can be stored in the storage battery through the inversion controller. The inversion controller changes the electric energy of the storage cell into the electric energy of alternating current of **220V** and **50 Hz**.		
Technical Information	System configuration is: **500W** wind driven generator + **500Wp** photo-voltaic cell, **48V** system voltage. Optimize the specific configuration according to the local wind and solar energy and electricity load situation.		
Business application conditions	The construction place of the energized engineering of Inner Mongolia new energy is located in the league cities of Inner Mongolia. The total capacity of construction system reaches **27.5 MW**. The system is under normal operation.		

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	Service conditions	Application unit: Inner Mongolia Power (Group) Co., Ltd, Contact number: **0471-6947872**
	Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; It is easy to install the main equipments of the system, which have the functions of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, the cost of installation, usage and maintenance are relatively low.
	Equipment investment	The main equipments required for the new established household wind and light hybrid power system are: **500W** wind driven generator, **500Wp** photo-voltaic cell, inverter controller and storage battery; the system also includes the system accessories such as wire, cable and standard component, etc. The investment for the system device is about RMB **27,000**.Carry out the specific measurement according to the local wind and solar sources and user load situation.
	Operation and maintenance fees	The household wind and light hybrid power system under normal operation will not consume water, electricity and any raw materials. The main equipments of system have the function of automatic operation and protection. Meanwhile, they have the stable performance. Therefore, labor cost, repair charge and administration expenses consumed for the system maintenance are relatively low.
	Payback period of investment	It is **4-5** years for the payback period of the static investment of household wind and light hybrid power system.
	Other benefits	It can reduce about **0.997kg** carbon dioxide emission per watt of generating electricity for the household wind and light hybrid power system. Meanwhile, it can save about **344g** standard coal.
	Technology share	Technology share is **15**% in **2015**
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc. **&ldguo**, the 11th Five-year Plan **&rdguo**; **&ldquo**, the 12th Five-year Plan **&rdguo** and the national environment protection plan have established the target of energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For household wind and light hybrid power system, it is the

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		clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next few years, the market capacity will be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	The technology innovation of the household wind and light hybrid power system includes: 1、 Improve and optimize the tail of the wind turbine and yaw structure. Improve the stable running of the wind turbine. 2、Improve and optimize the electromagnetic brake, mechanical brake and unloading load institution of the wind turbine. Improve the running safety of the wind turbine. 3、Improve and optimize the trace function of the maximum power for photovoltaic control module. Obviously Improve the energy utilization ratio of solar energy system. 4、 Improve and optimize the protection function of the photovoltaic control module to improve the stability of the system further. 5、 Improve and optimize three-way MPPT of strong charging, equalization charging and floating charging to ensure that the storage battery is in the optimal state to extend the service life of the storage battery. Make the complementary generating system of the household wind and solar locate in the higher technology level at home and abroad through the above technology innovation.
	Technology maturity	Household wind and light hybrid power system performs the system configuration according to the local wind and light source and the valley amount of the electricity load for the user, consisting of 500W wind driven generator, 500Wp photo-voltaic cell, inverter controller and storage battery; the matching parameter of each device is optimal after the optimization design; the perfect degree for system generation is relatively high.
	Technology applicability	The household wind and light hybrid power system applies to residents of areas without electricity having the better wind energy and solar energy resources and users of enterprises and institutions off the grid. Carry out the system configuration according to the local wind and solar resources and capacity of electricity load for users.
	Technology stability	The household wind and light hybrid power system can keep stable in the process of running for the project. Install the wind turbine and photovoltaic battery outdoors. The stable working environment temperature is -40°C～60°C. They can keep stable running under severe cold and hot environment with the dust. Install the inversion controller and the storage battery in doors. The

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		stable working environment temperature is -15°C～40°C. The system has the lower sensitivity to interference factors including environment and technology parameters. It can keep higher stability in the process of running.
	Technology security	The household wind and light hybrid power system has the stronger practicability in the process of results transformation and industrialization. Meanwhile, it has the complete supporting facilities. Due to the easy installation, operation and maintenance, it has the higher market acceptance without pollution and discharge in the process of running.
	Obstacles of results transformation and promotion	The government needs to provide the corresponding policy guarantee and financial support for the household wind and light hybrid power system in the process of results transformation and promotion. Establish the good market order gradually to make the industry in the good development state.
	Intellectual property transfer	The household wind and light hybrid power system has the domestic proprietary intellectual property rights. The relevant technology has obtained the patent. The technology owner is enterprise.
	Picture description	

Technological achievements declaration of renewable energy sources			
Two-dimension code	Inner Mongolia Hua De New Technology Limited Company 1501050076872 (Seal)		
Technology providing unit	Inner Mongolia Hua De New Technology Limited Company	Submission date	On June 15, 2016
Contact	Li Lingrui	Technology types	Solar energy utilization technology
Telephone	18698447832	E-mail	iadz9238@163.com

TECHNOLOGY: SOLAR
COMPANY: INNER MONGOLIA HUA DE NEW TECHNOLOGY LIMITED COMPANY

Technology name	Solar street lamp
Technology provider	Inner Mongolia Hua De New Technology Limited Company
Scope of application	Inner Mongolia Hua De New Technology Limited Company
Technology briefing	The solar street lamp consists of the photo-voltaic cell, controller, LED lamp cap, lamp pole and storage battery. The photo-voltaic cell converts the solar energy to the electric energy,which can be stored the storage battery via the controller. The LEC light source in the lamp cap is brightened via the electric energy in the storage battery through the controller.
Technical Information	Photo-voltaic cell **240Wp**, storage battery **100Ah/2**, LED lamp **80W**, controller 2**4V/10A** and lamp pole **10m**.
Business application conditions	With regard to the wind and light supplement street light project executed by BEIJING ZHONGLI HEFENG COMPANY, **610** wind and light supplement street lights are constructed totally, and the system is operated normally.
Service conditions	Application unit: BEIJING ZHONGLI HEFENG INVESTMENT CO, LTD, contact number: **010-64842839**
Business application unit contact/telephone/E-mail	The local established projects; It is mature technology; Require the system training. Its content includes the fundamental principles, usage and maintenance methods; The cost of installation, use and maintenance is determined according to the project size.
Equipment investment	Main parts constituting the solar energy street light are: Photo-voltaic cell, controller, **LED** lamp cap, lamp pole and storage battery; the lamp also comprises the power cabinet, embedded part, wire and foundation, etc. The expense for one solar energy street light is about RMB **11,700**, including the construction and installation expense.
Operation and maintenance fees	Under the normal operation, the solar energy street lamp doesn't consume any water, power and raw material. The main equipment of system features automatic operation and protection, stable performance, so the labor cost, repair cost, management and depreciation cost for system maintenance, depend on the project size. Normally the main components of solar street lamp have automatic protection function, with low failure rate, so the system maintenance cost is low.
Payback period of investment	The static investment payback period of Solar street light project is 4 ~ 5 years.

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	Other benefits	Solar street lamps use clean energy for road lighting, reducing the power supply cost compared with traditional street lamp lighting, saving energy, reducing carbon emissions. The implementation of this project can achieve good economic and social benefits.
	Technology share	Technology share is 15% in 2015
	Technology market potential	In recent years, the improvement speed of resource efficiency of our country has slowed down, which made resource environment conditions that our country will face in the future become more serious. At present, we have the rough economic growth mode. Under this premise, the potential of energy conservation and emission reduction is very large occurred by management innovation and strengthening the institutional constraints. Our country has enacted the relevant policies of improving the resource efficiency, such as *Cleaner Production Promotion Law*, *Circular Economy Promotion Law* and *Renewable Energy Law* etc., the 11th Five-year Plan, the 12th Five-year Plan and the national environment protection plan have established the targets of energy conservation and emission reduction. These policies have promoted the application of technology innovation in all fields. For household wind and light hybrid power system, it is the clean energy generating system having the mature technology. With the gradual realization of the target of energy conservation and emission reduction of our country in the next few years, the market capacity will be enlarged further. The technology will have the large market potential in industry or promotion in the field until 2020.
	Technology advancement	the solar energy technology innovation includes: 1、 Improvement and optimization of the maximum power tracking controller function significantly improves the system energy utilization. 2. Improvement and optimization of the controller light control function make the intelligent lighting control function of the system further improved. Through the above technological innovation, the solar street light is at a higher technology level at home and abroad.
	Technology maturity	With system configuration, according to the needs of road lighting ,solar street lamp is composed of photovoltaic cells, **LED** lamp holder, light pole, controller and battery. After optimization design ,the equipment achieves the optimal matching parameters, with perfect system integration.
	Technology applicability	Solar street lamps are suitable for cities with good solar energy resources

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	Technology stability	Solar street lamps can remain stable in the process of project operation. Its stable working environment temperature is **-20 °~40 ° C**. The system has low sensitiveness to interference factors such as environment, technical parameters, and it can maintain high stability in the running process.
	Technology security	Solar street lamp has stronger practicability in the process of achievements transformation and industrialization, with perfect supporting facilities. It has high market acceptance because of its easy installation, operation ,simple maintenance, no pollution and emissions in the process of operation.
	Obstacles of results transformation and promotion	The government should provide corresponding policy support and financial support for solar street lamps in the process of achievements transformation and promotion, to gradually establish a good market order and realized good development of the industry.
	Intellectual property transfer	Solar street lamps enjoy domestic proprietary intellectual property right. The patent for the related technology owned by the enterprise has been obtained.

TECHNOLOGY: SOLAR
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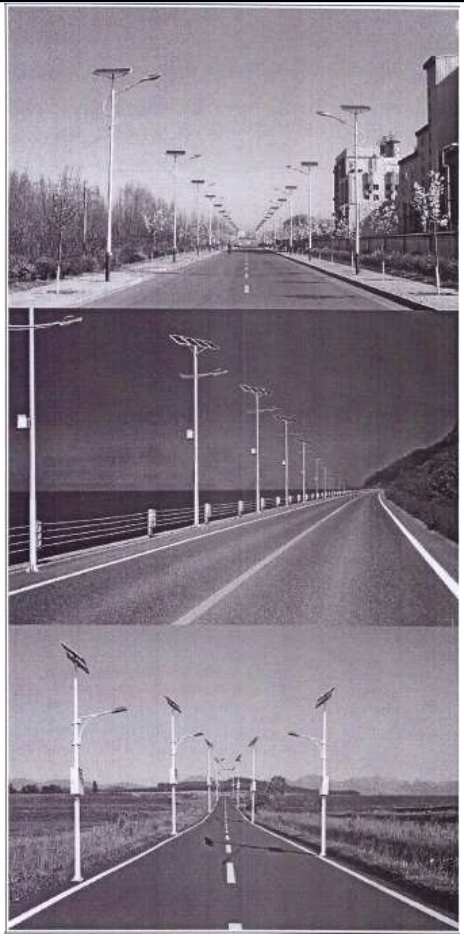
	Picture description		

TECHNOLOGY: SOLAR
COMPANY: YUNNAN ZHUOYE ENERGY CO., LTD

Yunnan Zhuoye Energy Co., Ltd - solar water pump	**Renewable Energy Technology Achievement Declaration**			
	QR code			
	Technology provision unit	Yunnan Zhuoye Energy Co., Ltd.	Submission date	August 3, 2016
	Contact person	Liu Zuming	Technology type	Other solar energy utilization technology
	Tel.	13608875405	E-mail	zmliupv@126.com
	Technology name	Photovoltaic pump system technology		
	Technology provider	The photovoltaic pump system technology that Yunnan Zhuoye Energy Co., Ltd owns independent intellectual property has stronger design, customization equipment manufacture and engineering construction capacity.		
	Scope of application	The photovoltaic pump technology is used for water lifting situation with water source without power grid.		
	Brief description of technology	Adopt photovoltaic power generation to directly supply power to water pump, and apply frequency conversion technology to regulate and control working condition of pump to adapt the change of sunlight. The photovoltaic pump system can be generally used for various water lifting situations, completely automatic operation, and is the cost-optimal water lifting technology. The key equipment is the controller inverter of photovoltaic pump, and the support equipment includes conventional photovoltaic modules, AC water pump, pipeline and valve.		
	Technical information	System lift, pipeline distance, daily amount of water lifting, power of water pump, power of water pump controller inverter and power of photovoltaic array. The volume of water pump is in direct proportion to the power of water pump, greater power, greater volume		
	Business application situation	1. Shangri-La development zone water pump of 74kW. 2. Chijiu Town in Fumin County, water pump of 7.5kW. 3. Deju Town in Midu County, water pump of 48.5kW. 4. Tacheng Town in Weixi County, water pump of 82kW.		
	Service conditions	Combine the market transactions with local investment. The photovoltaic pump system technology is comparative maturity, though the improvement space is still large; Currently, the technology is mature and safe. It needs system training to satisfy system installation requirements. Compare to new erection of power grid, the cost of installation, use and maintenance is lower.		

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	Contact person of business application unit /Tel. /E-mail	1. Shangri-la Li Xuezhong, 13988709970. 2. Fumin County Yan Daokui, 13529239897. 3. Midu County Liu Jiqiang, 13987274708. 4. Weixi County Li Weiguo, 13988749866.
	Investment on equipment	Investment of the newly increased equipment and other accessory equipment necessary to reform the existing engineering. Indicate engineering scale (within 500 words) The investment scale of photovoltaic pump system depends on system scale. For equipment investment, generally, the investment amount for 1kW photovoltaic module system is 10,000-13,000 Yuan, and changes of pipeline and pool machine are great, specifically depends on construction conditions and scale. Small scale system only needs several ten thousand Yuan, general scale system needs over one hundred thousand Yuan, and large scale system needs over ten million Yuan. The new system needs to include water pump, photovoltaic pump controller inverter, photovoltaic array, machine room, pipeline, pool, etc.. Reforming of existing pump station usually needs to input water pump, photovoltaic pump controller inverter, photovoltaic array and other original facilities available.
	Operation maintenance cost	Once the photovoltaic pump system established, there will be no electric charges, completely automatic operation. The operation maintenance cost is the minimum. Only need one person to manage, but the workload is only equivalent to work one day a week, and the wage level depends on local wage level. The main task is to clean the surface of photovoltaic module (if necessary) or array site, and check whether the water pump, valve, etc. work normally. Equipment depreciation cost, repair cost, management cost, etc.; The service life of water pump depends on the type, and the service life of common immersible pump is 3-5 years, routine non-immersible multiple-stage centrifugal pump is 20-30 years, and change blade when necessary; The design of water pump configuration is very important, and it needs to design a technical scheme with minimum subsequent operation and maintenance costs. The service life of photovoltaic pump controller inverter is 10 years, and the electrolytic capacitor needs to be changed; Sometimes, there may be some minor flaws, and the maintenance cost is very low. The service life of qualified photovoltaic module is over 25 years, without repair costs, in addition to damage.
	Investment payback period	Compared to conventional power grid water pump system, if costs for erection of power grid exceed the investment of photovoltaic power, then there is no payback period. Generally, the power grid erection costs plus electric costs for 3-6 years will exceed the investment in photovoltaic power, and specific circumstances depend on electricity price and costs of power grid erection. Compared to conventional diesel pump, it has overwhelming advantages, and usually it can withdraw the investment within 3 years. If consider economic benefits of planting and breeding, usually it can withdraw the investment within 1-2 years. The photovoltaic pump, with remarkable economical benefits, is the key technological means to overcome poverty and achieve prosperity in rural area.

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	Other earnings	The photovoltaic pump uses renewable energy power to generate electricity, which reduce carbon emission, not only with the benefit of power generation to save cost, but also with irrigation guarantee due to generation of water; Obviously increase the output value of agricultural and sideline products, enhance the value of land, promote local employment and development of local agricultural and sideline products processing industry, accelerate increase of local revenue, and it is a good technology to promote local comprehensive development.
	Technology occupancy	Currently, there are about over 120 photovoltaic pump systems has been established in Yunnan, among which, 75 systems are established by Yunnan Zhuoye Energy Co., Ltd., market occupancy in Yunnan about 60%, in domestic market about 40%. It is the enterprise that completes most actual engineering at present, and compared to counterparts at home and abroad, it possesses stronger design capacity, equipment customized production and construction capacity, with international advanced level of core control technology.
	Technology market potential	The output value of photovoltaic pump system of Yunnan Zhuoye Energy Co., Ltd was over 3 million Yuan in 2014, 10 million Yuan in 2015, and may exceed 20 million Yuan in this year. It can be seen for rapid development. As the above scale is obtained only under the development of Yunnan market, it will rapidly develop and expects that the output value in 2020 is to be up to 0.2b Yuan above in the event of development of overseas market.
	Technology advancement	Having to tail after the changes of the sun and maximize the efficiency therein is the core to control of photovoltaic pump. (1) It can realize perfect design and manufacturing equipment in customization for actual system. (2) It is higher for the efficiency of maximum dynamic power tracing 20% than that of the routine variable voltage tracing at home and abroad. (3) It has a higher capability to answer the sun cataclysm, significantly reducing the danger to water hammer effect. (4) Intelligent control technology for multi-pump: It is in variable frequency operation by switching single pump, double pump or multi-pump in the light of light intensity, significantly increase the system efficiency. (5) Remote monitoring technology (6) The application of more types of pump is carried out in the photovoltaic pump system, and creatively solves the issues on certain special pumps to be applied therein. High-pressure plunger pump with high power is, first at home and abroad, applied in photovoltaic pump system. (7) It has realized the photocrosslinking parallel for photovoltaic pump first at home and abroad. The paper issued by the Company was rated as excellent in the 13th China Photovoltaic Conference in September 2013, as key new product of Yunnan in 2013, and as the top 10 progresses of science and technology of Yunnan in 2013 by Yunnan Provincial Science and Technology Department and Yunnan Branch Office of Xinhua News Agency in February 2014. In June 2014, it got the “2014 Leading Technology Bluesky Award with Most Investment Value in the Global Renewable Energy” issued by UNIDO.

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	Technology maturity	The most advanced method is to first determine whether the local solar energy resources are abundant, water sources are suitable, requiring in no way dry up in dry season; net lift (elevation difference); Pipeline distance daily water demand; is there any place to install photovoltaic array in the vicinity of water source? (No sun shield); the local conditions to construct high-level pool, stable geology or not, etc. Obtaining the above parameters is available to design a complete technical scheme, thus manufacturing equipment in customization, according to the scheme, then installing and commissioning equipment as part of the whole works. It can also sell standardized products, and the users can complete the design and installation and commissioning of equipment and supporting facilities. However, as the design capacity is important, it will waste the investment for large designed system; and fail to meet the application and pump water possibly for small designed system. Yunnan Zhuoye Energy Co., Ltd. has been in capability to production and R&D of key units for photovoltaic components and photovoltaic pump control inverter, as the one is unique in photovoltaic pump manufacturing enterprises at home and abroad. The photovoltaic pump is as a mature technology although having the space to technology development. The development in the combination of pump and photovoltaic power generation, all as mature technology, has been for 20 years internationally and 11 years in China. Our country has started to research and develop the technology since 2011, obtained a series of breakthrough in the core control technology, and still been in progress. It currently has built 75 actual engineering systems, repeatedly refreshes the world records of pump lift and scale for photovoltaic pump, with the advanced world level in technology, which make the foreign experts impressed upon their field visit in good effect on actual system operation.
	Technology applicability	The photovoltaic pump applies to the areas with good solar energy resources, water source while higher extension costs in water lifting, no electricity or power grid. The restricted conditions seeing from this are: solar energy resources, water source and power grid condition. Additionally, it is required to construct the site of photovoltaic array in the vicinity of water source point. Construction can be carried out after meeting these conditions. As the scale has an effect on the investment benefits, it is good generally to the benefit of small scale, and the greater distance required for the larger scale, the better economic benefit. The upstream and downstream technologies have no significantly effect on photovoltaic pump.
	Technology stability	In running, photovoltaic pump technologies are stable, not sensitive to the environment, technical parameters and other interferences. Of course, it is required that the systems must be constructed in the areas with stable geology when carrying out site selection for construction.
	Technology safety	The photovoltaic pump technologies are very practical, safe and the most economical water lifting technology on the premise of power grid erecting as required currently. The supporting water conservancy facilities are routine technologies, and the various regions have been in good capability to construct, perfectly. The multiplicative output value of Yunnan Zhuoye Energy Co., Ltd. in Yunnan market in the recent two years is obtained from the spontaneous market environment without special government support, which fully describes the good market acceptability with small risks. Multiple photovoltaic pump systems currently built

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		in Sichuan adjacent to Yunnan do not meet the acceptance standards due to the limits in their design level and manufacturing capacity, which is under suspicions of customers. This attributes to technical level rather than market risk. For the booming market demands of Yunnan, it fully describes the maturity and smaller market risk of this technology.
	Obstacle in achievement transformation and promotion	The promotion of photovoltaic pump technology is mainly limited by fund and people's awareness. Generally, the one-off investment of photovoltaic pump is slightly large but economic under the conditions of greater distance from the power grid, paying for electricity upon its completion and having lower operation and maintenance cost. One important limitation for the Owner with financial strain is the higher funds. In the awareness, people are concerned if photovoltaic pump as the high technology is reliable and not mature; has a higher operation and maintenance cost, etc. For another limitation, photovoltaic pump has a special design with a certain difference from the routine pump. It seems not to involve how to design a qualified photovoltaic pump system for both current domestic and foreign standards, and such knowledge is obtained gradually from the practices in continuous 6 years and not yet universal, thus the talent cultivation is essential as well. As more constructions of actual photovoltaic pump systems, people's cognition will be gradually improved. The people in Yunnan currently start to request actively for construction of photovoltaic pump, but in misunderstanding and even rejection when we promoted, absolutely different from 3 years ago. They find us actively and hope to construct photovoltaic pump systems as soon as possible with our assistance.
	Transfer of intellectual property	Yunnan Zhuoye Energy Co., Ltd. has the proprietary intellectual property in photovoltaic pump technologies, currently having a utility model patent, applying for two invention patents, and having 6 technical know-hows. All the technologies are own and equipment is domestic. At present, it mainly carries out product sales but not technical transformation.

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COMPANY: YUNNAN ZHUOYE ENERGY CO., LTD

	Photo Caption	  

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

CCE Oasis Technology Corporation	**可再生能源技**术成果申报 Declaration of renewable energy technology achievement			
	二维码 QR code			
	技术提供单位 Unit provided technology	**中清能**绿洲科技股份有限公司 CCE Oasis Technology Corporation	**提交日期** Submit date	2016-07-29
	联系人 Contact person	**任美**洁 Ren Meijie	**技**术类型 Technology type	**太阳能利用技**术 Solar energy utilization technology
	电话 Telephone	18910177397	邮箱 Mail box	Renmeijie@cecsolar.com
	技术名称 Technology name	**光伏**农业大棚技术 Photovoltaic agricultural greenhouse technology		
	技术提供方 Technology provider	**中清能**绿洲科技股份有限公司 CCE Oasis Technology Corporation		
	适用范围 Scope of application	**中清能**绿洲科技股份有限公司 CCE Oasis Technology Corporation		

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	技术简要说明 Brief description of technology	农业光伏连栋玻璃温室技术，将光伏技术与农业技术相结合，温室顶部铺设太阳能光板，下部空间从事农业生产。在不改变原有土地农业属性的前提下，进行土地综合利用。 The multi-span glass greenhouse technology of photovoltaic agriculture combines the photovoltaic technology with the agricultural technology, with the top greenhouse laying solar panels, and the lower part space engaging in agricultural production. Under the premise of without changing the original agricultural land property, realize the comprehensive utilization of land.
	技术信息 Technology information	四周檐高4.0米，跨度9.6米*4跨=38.4米，间距4米*8间=32米，面积：1228.8平米 The eaves height all around is 4.0 m, with the span of 9.6 m × 4 spans = 38.4 m, the spacing 4 m × 8 rooms = 32 m, the area:1228.8 m²
	商业应用情况 Situation of business application	山东省聊城莘县20兆瓦农业科技示范园，地址：山东省聊城市莘县王家庄镇，建设面积937平米，经济效益与社会效益显著 20MW agricultural science and technology demonstration garden in Shen County, Liaocheng, Shandong, and address: Wangjiazhuang Town, Shen County, Liaocheng, Shandong, with the construction area of 937 m², and the economic benefit and social benefit is remarkable.
	使用条件 Service conditions	中清能农业投资股份有限公司/马志强/18910177390/mazhiqiang@ccesolar.com.cn CCE Agricultural Investment Limited Liability Company/Ma Zhiqiang/18910177390/mazhiqiang@ccesolar.com.cn
	商业应用单位联系人/电话/邮箱 The contact person/telephone/ mail box of business application unit	使用范围广泛，日照充足地区均可使用。确定一片地势平坦土地，按照施工建设图纸进行建设，本技术已广泛用于中国大部分地区，无需系统培训，安装建设成本1000元/平米，使用和维护成本低，200元/平米。 It can be used in areas with a wide using range and abundant sunshine. Determine a flat land and build according to the construction drawings; this technology has been widely used in most areas of China, without system training, with the installation construction cost of 1000 Yuan/m²; the use and maintenance cost is low, 200 Yuan/m².
	设备投资	安装建设成本1000元/平米，使用和维护成本低，200元/平米

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	Equipment investment	Installation and construction cost is 1000 Yuan/m², and the use and maintenance cost is low, 200 Yuan/m²
	运行维护费用 Operating maintenance charge	设备正常进行维护费用一年20万元。 The cost for normal equipment maintenance is 200,000 Yuan/year.
	投资回收期 Investment recovery period	投资回收期8年 The investment recovery period is 8 years.
	其它收益 Other revenues	农业观光旅游可以作为额外经济收益，包含养老、保健、素质拓展、农业观光、农业培训和高科技展示等 Agricultural tourism can be used as additional economic benefits, which includes pension, health care, quality development, agricultural tourism, agricultural training, and high-tech display and so on.
	技术占有率 Occupancy of technology	光伏农业同行业使用占有总市场份额的10% Photovoltaic agriculture employ occupies 10% of the total market share of the same industry
	技术市场潜力 Technology market potential	该项技术，从10年前已经开始使用，并逐步走向成熟，市场的占有率逐年增长，技术的应用越发广泛，具有引领同行十年以上的优势 The technology has been started to use from 10 years ago, and gradually mature, the market share increases year after year, the technology is more widely used, with the leading peer advantage of more than ten years
	技术先进性 Technology advancement	由于我国是农业大国，光伏与农业相结合，与玻璃温室相结合，已成为我国独特的光伏发展模式，并已具有很广阔的市场前景，并在国内发电行业处于领跑者地位。 Since China is a large agricultural country, the combinations of photovoltaic and agriculture, photovoltaic and glass greenhouse have has become our unique photovoltaic development mode, has a very broad market prospects, and is in the leader position of the domestic power generation industry

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	技术成熟度 Technology maturity	**光伏**发电行业技术已经趋于完善，农业温室大棚技术也获得广泛应用，二者技术结合在一起已经有十年时间，共同使用技术趋于完善。 Photovoltaic power generation industry technology has become more and more complete, agricultural greenhouse technology has also been widely used, the combination of the two technologies has been for ten years, and the common use of technology approached perfection.
	技术适用性 Technology applicability	该技术在国内，转化成实用技术已经成功，推广面越来越大，几乎涵盖中国所有省份，工艺技术可以满足大部分**地区的要求**，**只需地**势平坦，光照条件好的**地区均可使用**。 The transformation into practical technology of this technology has made a success in domestic, the promotion area is getting more and more large, almost covering all provinces in China, the process technology can meet the requirements of the most areas, as long as the land is flat, the light condition is good, it can be used.
	技术稳定性 Technology stability	**此技**术在工程运行过程中基本保持稳定状态，**此技**术**自身属于一套成熟的系**统，基本不会因外界的**干**扰破坏系统架构。 This technology can basically keep stable state in the process of project operation; this technology itself belongs to a set of mature system, which won't basically damage the system architecture because of outside interference.
	技术安全性 Technology security	**本技**术在国内已经实现产业化，无需再转化，得到市场广泛认可和使用。 This technology has realized industrial in domestic, needs not to be transform, to be widely recognized and used in the market.
	成果转化推广障碍 Obstacle on achievement transformation and promotion	该项技术对于在国内表现**来年**，对于个人来说，投资成**本高**，**效益回收期**长是最大**障碍**。 Based on the domestic performance of this technology, high investment cost and long payback period for individuals is the biggest obstacle.
	知识产权转让	**无国内自主知**识产权，全部实现国产化，无技术产权转让风险。 No domestic independent intellectual property rights, all to achieve domestication, without transfer risk of technical property.

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

	Transfer of intellectual property			
	可再生能源技术成果申报 Declaration of renewable energy technology achievement			
	二维码 QR code			
	技术提供单位 Unit provided technology	**中清能绿洲科技股份有限公司** CCE Oasis Technology Corporation	**提交日期** Submit date	2016-07-29
	联系人 Contact person	**任美洁** Ren Meijie	**技术类型** Technology type	**太阳能利用技术** Solar energy utilization technology
	电话 Telephone	18910177397	**邮箱** Mail box	Renmeijie@cecsolar.com
	技术名称 Technology name	**光柴互补发电系统** Solar-diesel complementary power supply system		
	技术提供方 Technology provider	**中清能绿洲科技股份有限公司** CCE Oasis Technology Corporation		
	适用范围 Scope of application	**中清能绿洲科技股份有限公司** CCE Oasis Technology Corporation		

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

	技术简要说明 Brief description of technology	光柴系统由三部分组成：光伏发电部分，柴油机组和微电网智能控制系统。光伏电站和1柴油发电机组联合供电，采用先进的智能化复合能源供给控制系统实时动态调节太阳能光伏系统和柴油机同步输出，支持光伏发电优先输出，最大能解决能源供给问题。 The photovoltaic diesel system consists of three parts: Photovoltaic power parts, diesel engine set and micro-grid intelligent control system. Power is supplied by photovoltaic power station together with diesel generating set 1. Use advanced and intelligent multiple energy sources supply and control system to real-timely and dynamically adjust the sync output of solar photovoltaic system and diesel engine, which supports PV power's preferential output to better solve energy problem.
	技术信息 Technology information	1MW项目占地约20亩，1快光伏电池电压36V，电流8A. 1 MW project covers an area of 20 mu, with one photovoltaic battery voltage of 36 V, current of 8 A.
	商业应用情况 Situation of business application	马尔代夫Thinadhoo岛558kW光柴互补微网示范工程 Maldives Thinadhoo Island 558kW solar-diesel complementary micro-grid project
	使用条件 Service conditions	
	商业应用单位联系人/电话/邮箱 The contact person/telephone/ mail box of business application unit	项目条件为当地投建，建设周期短、建设难度低、&ldquo寿命&rdquo；长，此技术成果属于国内领先，使用者需要简单的培训，维护成本低。 Project conditions are local investment and construction with short construction period, less construction difficulty and long "operating life", this technological achievement is the leader in domestic, users need a simple training, low maintenance costs.
	设备投资 Equipment investment	单瓦造价约为RMB18元 Single watt costs about RMB 18 Yuan
	运行维护费用	后期运维费用约占总投资额的1.5%

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

	Operating and maintenance charge	The late operation and maintenance cost accounts for about 1.5% of the total investment amount.
	投资回收期 Investment recovery period	投资回收期6年 The investment recovery period is 6 years.
	其它收益 Other revenues	此项目技术针对降低碳排放、当地节能减排指标及碳交易都起到相当重要的作用。 The project technology has played a quite important role in reducing carbon emission, local energy conservation and emission reduction indexes as well as the carbon trading.
	技术占有率 Occupancy of technology	在国内行业同类技术市场占有率50% Accounting 50% of the similar technology in domestic industry
	技术市场潜力 Technology market potential	海岛等远离大电网地区普遍采用柴油发电机组供电的方式，然而油价日趋走高，外加其运输成本，使得越来越多经济性更好的供电方式被考虑加入其中来减少燃油成本。尤其以光伏发电为代表的供电方式，因其具有可分布式安装的特点，而且设备成本日趋下降，近年越来越多的太阳能发电系统通过并网到岛屿电网的方式提供部分电能。 Diesel generating sets are widely used for power supply in places which is far away from bulk power systems area, such as island. But with oil prices going high besides its transportation cost, more and more economical power supply mode are being considered about to reduce fuel cost. Especially the power supply method which is takes photovoltaic power generation as the representative. Because of it feature of distributed installation and gradually decreasing equipment cost, in recent years, more and more solar power systems can provide part of power by connecting to island distribution network.
	技术先进性 Technology advancement	在实际示范工程中，依靠扎实的工程实践经验设计光柴互补系统。在国内外我们有多处示范项目，处于国内领先水平. In the actual demonstration project, design the light and diesel complementary power generation system based on solid engineering practical experiences. We have a number of demonstration projects in domestic and foreign country, and in the leading position.

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

	技术成熟度 Technology maturity	光柴系统由三部分组成：光伏发电部分，柴油机组和微电网智能控制系统。光伏电站和I柴油发电机组联合供电，采用先进的智能化复合能源供给控制系统实时动态调节太阳能光伏系统和柴油机同步输出，支持光伏发电优先输出，最大能解决能源供给问题。现阶段项目技术已经非常成熟。 The photovoltaic diesel system consists of three parts: Photovoltaic power parts, diesel engine set and micro-grid intelligent control system. Power is supplied by photovoltaic power station together with diesel generating set 1. Use advanced and intelligent multiple energy sources supply and control system to real-timely and dynamically adjust the sync output of solar photovoltaic system and diesel engine, which supports PV power's preferential output to better solve energy problem. The project technology is very mature at the present stage.
	技术适用性 Technology applicability	该技术推广过程中适用于远离电网、用电量需求大及能源匮乏的地域。基本不受地域、规模、环境等因素限制。 This technology is suitable to areas that are far away from the power grid, with large demand for power consumption and lack of energy promotion in the process of promotion. Basically free of territory, scale, environment and other factors.
	技术稳定性 Technology stability	此技术在工程运行过程中基本保持稳定状态，此技术自身属于一套成熟的系统，基本不会因外界的干扰破坏系统架构。 This technology can basically keep stable state in the process of project operation; this technology itself belongs to a set of mature system, which won't basically damage the system architecture because of outside interference.
	技术安全性 Technology security	近三年，此项技术运用在不同国家、不同地区、不同环境内，都带来了良好社会效益、经济效益。现阶段项目技术成熟、配套设施完善、市场反响良好。 In recent three years, the technology has been used in different countries, different regions and different environment, which has brought good social benefits and economic benefits. At this stage, the project technology is mature, supporting facilities are perfect and market response is good.
	成果转化推广障碍 Obstacle on achievement	1. 项目实施地政府时候有财政补贴 2. 前期投资额度较大 1. The government has financial subsidies when the project implements. 2. Larger early investment quota

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

	transformation and promotion	
	知识产权转让 Transfer of intellectual property	有相关知识产权，可以通过合作模式进行项目实施 With the related intellectual property, the cooperation pattern can be adopted for the project implementation.
	图片说明 Photo caption	
	技术先进性: **Technology advancement :**	**在实际示范工程中，依靠扎实的工程实践经验设计水光储互补发电系统。在国内外我们有多处示范项目，处于国内领先水平。** **In the actual demonstration project, design the water and light storage complementary power generation system based on solid engineering practical experiences. We have a number of demonstration projects in domestic and in the leading position.**
	技术成熟度: **Technology maturity:**	**水光储互补系统的电池组连接双向储能逆变器，光伏方阵通过光伏并网逆变器连接在储能逆变器的交流母线上，实现系统的交流母接。在储能逆变器（储能变流器）正常工作，输出交流频率与电压，建立交流电网后，光伏阵列所产生的能量将通过光伏并网逆变器输送到交流 电网上，或为蓄电池组充电或为系统负载供应电能。光伏储能电站与水力电站联网并接，实现水光互补电站的并网运行。光伏电站与水电站均可独立运行，亦可并网运行。实行并网后，通过系统EMS能源管理系统的控制，可以合理地发电、储电及负荷管理。** **The battery set of water and light storage complementary system connected with bidirectional energy storage inverter, the photovoltaic array connected with AC bus of energy storage inverter through photovoltaic grid-connected inverter to realize the system bus connection. After the energy storage inverter (energy storage converter) works normally, exports AC frequency and voltage, establishes AC network, the energy produced by the photovoltaic array will be transported to AC network through photovoltaic grid-connected inverter, or charge the storage battery or supply power for the system load. The photovoltaic energy storage power station and hydraulic power station can interconnect and merge with each other, which can realize the parallel operation of water-optical complementary power**

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		station. The photovoltaic power station and hydropower station can operate independently, and can be parallel operation as well. After the implementation of grid connection, it can reasonably generate power, storage power and manage load through the control of the system EMS energy management system.
	技术适用性： **Technology applicability:**	**该技术推广过程中适用于远离电网、用电量需求大及能源匮乏的地域。基本不受地域、规模、环境等因素限制。** **This technology is suitable to areas that are far away from the power grid, with large demand for power consumption and lack of energy promotion in the process of promotion. Basically free of territory, scale, environment and other factors.**
	技术稳定性： **Technology stability:**	**此技术在工程运行过程中基本保持稳定状态，此技术自身属于一套成熟的系统，基本不会因外界的干扰破坏系统架构。** **This technology can basically keep stable state in the process of project operation; this technology itself belongs to a set of mature system, which won't basically damage the system architecture because of outside interference.**
	技术安全性： **Technology security:**	**近三年，此项技术运用在不同国家、不同地区、不同环境内，都带来了良好社会效益、经济效益。现阶段项目技术成熟、配套设施完善、市场反响良好。** **In recent three years, the technology has been used in different countries, different regions and different environment, which has brought good social benefits and economic benefits. At this stage, the project technology is mature, supporting facilities are perfect and market response is good.**
	成果转化推广障碍: **Promotion obstacles of achievements transformation:**	**1. 项目实施地政府时候有财政补贴 2. 前期投资额度较大** **1. The government has financial subsidies when the project implements. 2. Larger early investment quota**
	知识产权转让： **Transfer of intellectual property**	**有相关知识产权，可以通过合作模式进行项目实施** **With the related intellectual property, the cooperation pattern can be adopted for the project implementation.**

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COMPANY: CCE OASIS TECHNOLOGY CORPORATION

	图片说明： Photo caption:	
	上传附件： Uploading appendix:	项目实施
	技术提供单位： Technology supply unit:	中清能绿洲科技股份有限公司 CCE Oasis Technology Corporation
	联系人： Contact person:	任美洁 提交日期：2016-07-29 Ren Meijie Submission date: July 29, 2016
	技术类型： Technology type:	太阳能利用技术 具体技术：分布式光伏相关技术 Solar energy utilization technology Specific technology :Distributed photovoltaic related technologies
	电话： Telephone:	18910177397 邮箱：renmeijie@cecsolar.com 18910177397 Email:renmeijie@cecsolar.com
	技术名称： Name of technology :	水/光/储多能互补发电系统 Water / light / storage multi energy complementary power generation system
	技术提供方： Technology provider:	中清能绿洲科技股份有限公司 CCE Oasis Technology Corporation
	适用范围： Range of application:	光伏发电领域 Photovoltaic power generation sector
	技术简要说明： Brief description of technology:	光伏储能电站与水力电站联网并接，实现水光互补电站的并网运行。光伏电站与水电站均可独立运行，亦可并网运行。实行并网后，通过系统EMS能源管理系统的控制，可以合理地发电、储电及负荷管理

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COMPANY: CCE OASIS TECHNOLOGY CORPORATION

		The photovoltaic energy storage power station and hydraulic power station can interconnect and merge with each other, which can realize the parallel operation of water-optical complementary power station. The photovoltaic power station and hydropower station can operate independently, and can be parallel operation as well. After the implementation of connecting, it can reasonably generate power, storage power and manage load through the control of the system EMS energy management system.
	技术信息： **Technology information:**	**1MW项目占地约20亩，1快光伏电池电压36V，电流8A.** **1 MW project covers an area of 20 mu, with one photovoltaic battery voltage of 36 V, current of 8 A.**
	商业应用情况： **Commercial application:**	**青海玉树治多2.4MW水/光/储多能互补微网示范工程** **2.4MW water / light / storage multi energy complementary microgrid demonstration project (Zhiduo, Yushu, Qinghai)**
	使用条件： **Use conditions:**	项目条件为当地投建，建设周期短、建设难度低、“寿命”长，此技术成果属于国内领先，使用者需要简单的培训，维护成本低。 **Project conditions are local investment and construction, short construction period, less construction difficulty and long “operating life”, this technology is the leader in domestic, users need a simple training, low maintenance costs.**
	商业应用单位联系人/电话/邮箱： **Business application unit contact / phone / email:**	
	设备投资： **Equipment investment:**	单瓦造价约为RMB 18元 **Single watt costs about RMB 18 Yuan**
	运行维护费用： **Operating and maintenance charge:**	**后期运维费用约占总投资额的1.5%** **The late operation and maintenance cost accounts for about 1.5% of the total investment amount.**

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

	投资回收期： **Investment recovery period:**	**投资回收期6年** **The investment recovery period is 6 years.**
	其它收益： **Other earnings:**	**此项目技术针对降低碳排放、当地节能减排指标及碳交易都起到相当重要的作用。** **The project technology has played a quite important role in reducing carbon emission, local energy conservation and emission reduction indexes as well as the carbon trading.**
	技术占有率： **Technology share:**	**在国内行业同类技术占有率40%** **Accounting 40% of the similar technology in domestic industry**
	技术市场潜力： **Technology market potential:**	**以光伏发电为代表的供电方式，因其具有可分布式安装的特点，而且设备成本日趋下降，近年越来越多的太阳能发电系统通过并网到岛屿电网的方式提供部分电能。** **Use photovoltaic power generation to supply power. Because of it feature of distributed installation and gradually decreasing equipment cost, in recent years, more and more solar power systems can provide part of power by connecting to island distribution network.**

企业供给信息　注：带*的为必填项 **Enterprise supply information　note: With * is**	
供应技术名称： **Supplied technology name:**	*水/光/储多能互补发电系统
供应技术名称(英文)： **Supplied technology name (English):**	* Water / light / storage multi energy compl tem
所属领域： **Subordinate territory:**	*新能源与节能技术
所属领域(英文)： **Subordinate territory (English):**	*New energy and energy-saving technology

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

研发方式： **Research and development approaches:**	*自主研发 Independent research and development
知识产权状态： **State of the intellectual property**	申请或获得的专利名称 *一种基于光储逆变器的家庭能效管理系统及方法 Applied or obtained patent name *A family energy efficiency management system and method based on optical record inverter.
合作方式： **Ways of cooperation:**	合作研究 * Cooperative study *
技术产品描述： **Description of technology product:**	建设光伏储能电站，建成后联合水电站一起为缺电地区供电，解决该地区的生活用电不足问题。在电网覆盖后该系统还将继续并入电网。
技术产品描述(英文)： **Description of technology product (English):**	Build a photovoltaic energy storage power station. After its completion, it will supply power-deficient regions with hydropower station to solve their electricity-lacking problem. The system will be continually connected to power grid after the grid is covered.
简要说明： **Brief description:**	光伏电站系统采用智能监控设计，以满足光伏电站与水电站通过EMS能源管理平台进行互补联网供电的模式，系统通过智能电网建设，进行负载分级，根据电站的发电情况及储能情况，可以分级控制各支路的电力供应，保证关键负载的长时间运行，将有效地解决缺电地区的电力供应紧张的局面。
简要说明(英文)：	Intelligent monitoring is used in photovoltaic power station system to meet complementary interconnected power supply mode of photovoltaic power station and hydropower station through EMS energy management platform. Smart power grids are built for step load, the system can control the power supply of every branch according to generation and storage condition to effectively improve the tense situation of power lacking.
企业供给信息　注：带*的为必填项 **Enterprise supply information　note: With * is required**	

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

	供应技术名称： **Supplied technology name:**	*光柴互补发电系统
	供应技术名称(英文)： **Supplied technology name (English):**	* Solar-diesel complementary power supply system
	所属领域： **Subordinate territory:**	*新能源与节能技术
	所属领域(英文)： **Subordinate territory (English):**	* New energy and energy-saving technology
	研发方式： **Research and development approaches:**	*自主研发 Independent research and development
	知识产权状态： **State of the intellectual property**	申请或获得的专利名称 *一种微网型光伏柴油混合供电系统的运行调度方法 Applied or obtained patent name * Operation of a micro-grid photovoltaic diesel power generation station
	合作方式： **Ways of cooperation:**	合作研究 * Cooperative study *
	技术产品描述： **Description of technology product:**	光柴系统由三部分组成：光伏发电部分，柴油机组和微电网智能控制系统。
	技术产品描述(英文)： **Description of technology product (English):**	The photovoltaic diesel system consists of three parts: Photovoltaic power parts, diesel engine set and micro-grid intelligent control system.

TECHNOLOGY: SOLAR
COMPANY: CCE OASIS TECHNOLOGY CORPORATION

	简要说明： **Brief description:**	**光柴互**补微网整体架构为交流母线设计，光伏发电部分每个单元分别配备一台光伏输出功率控制器，用于控制光伏端的逆变器输出功率，同时每个地点的光伏单元、柴油发电机单元配备一个数据采集器，用于采集各个发电单元的实时功率、电压频率和相位等参数，最后将数据汇总于微电网中央控制器处，微电网中央控制器将汇总的信息按照特定逻辑计算出结果后将所发指令反馈至光伏输出功**率控制器**，**光伏**输出功率控制器对逆变器进行调节，从而达到保证微电网稳定和延长柴油机组寿命前提下最大化减小柴油的消耗量。
	简要说明(英文)： **Brief description (English):**	The overall structure of solar-diesel complementary micro-grid is AC bus. Equip every unit of photovoltaic power generation with a photovoltaic output power controller to control inverter's output power on photovoltaic end; at the same time equip PV cells and diesel generator cells of every place with a data acquisition unit to collect the parameters such as real-time power, voltage frequency and phase position of every generation unit and gather those data at micro-grid central control unit; micro-grid central control unit will calculate the gathered information and get a result and feedback the command to photovoltaic output power controller to adjust the inverter. In this way, diesel consumption is minimized on the premise of ensuring stability of micro-grid and prolonging the life of diesel engine set.

TECHNOLOGY: SOLAR
COMPANY: RAYSPOWER ENERGY GROUP CO., LTD

Rayspower Energy Group Co., Ltd	`Renewable energy technological achievement declaration			
	Two-dimensional code			
	Company provided	Rayspower Energy Group Co., Ltd.	Submitted date	June 28, 2016
	Contact	Fu lu	Type of technology	Solar energy utilization
	Tel.	13439901118	Email	lucia.fu@rayspower.com
	Name of technology	Large-scale photovoltaic power generation technology		
	Company provided technology	Rayspower Energy Group Co., Ltd.		
	Application	Rayspower Energy Group Co., Ltd.		
	Brief introduction of technology	The photovoltaic power generation technology used solar batteries to directly transform solar energy to electric energy. The photovoltaic power generation system mainly consists of solar panel (component), controller and inverter. These three parts are made up of electric components and no mechanical parts are involved. Therefore, the photovoltaic power generation equipment is truely concise, reliable, stable and of long work life & easy installation and maintenance.		
	Technology information	The 1MW photovoltaic power station, covering an area of 40 mu (=0.0667 hectares), needs 25,152 photovoltaic modules; after completion, its annual power generation will be 1,523,060 kwh.		

TECHNOLOGY: SOLAR
COMPANY: RAYSPOWER ENERGY GROUP CO., LTD

	Business application status	The project has been put into service and has received general consent from clients. 1. CECEP Leping 20 MWP Photovoltaic Agricultural Science Greenhouse Power Station Project; 2. CECEP Dunhuang 50 MWP Grid Connection Photovoltaic Power Generation Project.
	Working conditions	CECEP (Leping) Photovoltaic Agricultural Science Co, Ltd.: 010-62277153; CECEP Solar Energy (Jiuquan) Power Generation Co., Ltd.: 010-62277153;
	Business application company contact person/tel./em	The cooperation is made through market transaction, in which this company supplies technology, equipment, construction support and later maintenance; the whole service system has mature technology; system training needs to be done for power station management personnel after construction; installation of 1MWP needs 1.3-1.5million yuan, while cost of use and of simple cleaning and maintenance takes up 1%-3% of the total investment.
	Equipment investment	When applying this technology to build a new project: if the total installed capacity of grid connection power generation project is 1MW, the total investment is around 9.8-11.2 million yuan, among which the one-off investment amount of main equipment and other auxiliary equipment takes up 6.06-6.93 million yuan. The detailed analysis is listed as below: The photovoltaic power station investment is made up of five parts, i.e., constructional engineering cost (19%), equipment procurement cost (62%), installation work cost (13%) and other costs (6%). 1. Equipment procurement cost The equipment procurement cost mainly covers expenses for polycrystalline silicon battery pack, DC bus equipment, inverter, above-grounding engineering equipment, cables, transformer, substation equipment, communication & control equipment and other power generation equipment. 2. Constructional engineering cost The constructional engineering is mainly determined by factors such as local building material price, geology, terrain and ease of construction. 3. Installation work cost Mainly aims at installation cost for purchased equipment. 4. Other costs Other costs include survey design cost (20%), commissioning and operation cost (15%), spare parts cost (4%), construction period interest (16%) and circulating found (45%). From above analysis, we can conclude that the largest investment of photovoltaic power station is equipment procurement cost, in which polycrystalline silicon battery pack takes the highest ratio.

TECHNOLOGY: SOLAR
COMPANY: RAYSPOWER ENERGY GROUP CO., LTD

	Operation & maintenance cost	Operation & maintenance of large scale photovoltaic grid connection power generation station mainly aims at routine inspection of mechanical installation and electrical connection, cleaning of photovoltaic parts and replacement of some parts. The annual operation & maintenance cost of the power station takes up 2% of the total investment.
	Pay back period	The total installed capacity of the photovoltaic grid connection power generation station project is 1MW, and its expected annual average line capacity in operation period is 15,230,600 kwh. With the line electricity price of 1 yuan, the direct economic benefit will be 1.5 million yuan. And the total investment of 1MW project is around 9.8-11.2 million yuan. Therefore it is concluded that the investment cost can be recovered in 7-8 years. Calculated by the 25-year operation period of the photovoltaic project, there will be 15-17 years of benefit period.
	Other benefits	Solar energy is both primary energy and renewable energy. With rich resource, it can be used free of charge and no transmission is needed. Moreover, photovoltaic power generation, as a clean energy, does not consume resource and does not discharge pollutants, waste material or greenhouse gas which damages atmosphere environment, nor create problems like waste residue stacking or waste water discharge, which is beneficial to protection of surrounding environment and improvement of ecotope. To complete the 1MW photovoltaic power station with this technology, around 397.912t standard coal is saved every year, which means discharge for several types of air pollutants is lessened, in which discharge of SO2 discharge is reduced by 15.3t, nitric oxide (calculated by NO2) by 3.28t, CO2 by 1260t, fume dust (calculated by PM10) by 0.5t and ash residue by around 138.72t.
	Technology occupation rate	Rayspower is the EPC leading role in photovoltaic power station, and will, based on development tendency of this industry, focus on expanding distributed field while keeping its advantage in above-ground power station in the future. The company has an overriding advantage in photovoltaic EPC industry and a leading comprehensive energy efficiency in power station. Moreover, it keeps stable cooperation with large state owned companies such as CECEP. Up to the end of 2015, the installed capacity of solar energy grid connection and offline power station which the company had an EPC contract or participated in construction has been around 1,200 MWP, taking up 10% of market share. It has been among the top ten of photovoltaic EPC in China from 2012 to 2015, and has become a leading role in national photovoltaic EPC field. Its projects have covered over ten areas such as Beijing, Zhejiang, Shandong, Fujian, Anhui, Yunnan, Xinjiang, Inner Mongolia and Guangxi.

TECHNOLOGY: SOLAR
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	Potential for technical market	According to the scale development indicators provided by National Energy Administration, it is expected for solar energy, by the end of 2020 the installed capacity will be 0.16 billion kw, the annual power generation will be 170 billion kw, and in the 0.16 billion kw installed capacity, the total installed capacity of photovoltaic power generation covers 0.15 billion kw, taking up 94% of installed capacity of solar energy power station. That proves the photovoltaic power generation has a huge market potential. Current clients of Rayspower include China Energy Conservation and Environment Protection Group Solar Energy Company, China Three Gorges New Energy Co., Ltd., China Power Investment Corporation, China Huaneng Corporation, China Datang Corporation New Energy Co, Ltd. and CGN Solar Energy Development Co., Ltd. These clients have good cooperation with the company. In the future, the target market is to further develop new clients based on current clients, and to make photovoltaic power generation cover the whole country in order to increase its market share. It is expected that by 2020, our installed capacity will increase from 10% in market share to 15%.
	Technical advancement	Technical innovation: Its course transitions from traditional centralization to group pattern, accumulating data and innovation development experience for large scale photovoltaic power station. Adopt wireless base station communication management advantage as well as intelligent UAV inspection on photovoltaic power station; Adopt centralized control management system scheme, which is capable of adapting to various poor working conditions in different power grids all over the world, and of improving the gird connection performance of photovoltaic power station and of better safety and stability. Position and level: In terms of photovoltaic power station construction, Rayspower has a leading role in the same industry at home and abroad. Rayspower has been the 10th in "Top 20 of Photovoltaic Power Station in China in 2014", and has been awarded with honorary titles such as "Photovoltaic Power Station with China characteristics in 2014". In the ranking list presentation of global photovoltaic power stations in 2016 which was just finished, Rayspower was among the list of "Top 20 of China's Photovoltaic Power Station EPC Enterprise in 2016".

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	Technical maturity	Rayspower has its own sophisticated system integration solution in terms of large scale photovoltaic grid connection power generation station construction: Firstly, its course transitions from traditional concentration to group pattern. In power station construction, there is a professional design team, who designs power station based on natural conditions of construction site and client requirements, and achieves expected construction result through computer simulation. Secondly, fine management is adopted during power station construction. No matter it is power station scheme design or construction, the fine management can reduce as many as possible problems which may damage the power station after occurring in power station construction. And these factors also guarantee Rayspower's leading position in system integration field in the industry. Lastly, adopt wireless base station communication management advantage as well as intelligent UAV inspection on photovoltaic power station; In the mean time better apply centralized control management system scheme to the power station, which is capable of adapting to various poor working conditions in different power grids all over the world, and of improving the gird connection performance of photovoltaic power station and of better safety and stability. In a sum, the technology support system and fine service system which the company has together build the perfect power station solution, providing solutions which satisfy clients' needs.
	Technical applicability	The large scale photovoltaic grid connection power generation station technology from Rayspower is widely applicable to power station construction in various environments. Currently the upstream and downstream of process technology it related to has formed a complete industrial chain, providing powerful technical support for power station construction. The promotion of large scale photovoltaic grid connection power generation station construction are mainly influenced by climate conditions, policy and grid connection condition of the power station construction place. The climate condition in construction place determines whether the power station has construction value, which affects quantity of future power generations and amount of power station benefit; policy effect mainly reflects on support and planning which the government has for photovoltaic power station and a complete set of policy support and long term strategic planning is the guarantee of power station construction and operation; grid connection conditions mainly refer to maturity of local power system. The unstable power system makes solar energy power generation unable to connect to the grid. Therefore the electric energy transformed from solar energy cannot be made use of and the constructed power station cannot be fully utilized.

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	Technical stability	Rayspower is a professional leading enterprise in domestic solar energy power generation system integration service with mature construction service system in large scale photovoltaic grid connection power generation station. The large scale photovoltaic above-ground power stations it contracted to build cover various geological landforms such as karst landform, mud flat, desert and uncultured mountains. The distributed generation has covered business types such as photovoltaic agricultural greenhouse, combination of fishing and solar energy power generation and photo-electricity building integration . By the end of 2015, the accumulated installed capacity has been over 1,200 MW. For power stations which have been built, Rayspower is the first to build a photovoltaic power station in a tributary of Yangtze river. It contracts to construct the CECEP Jiaxing 30 MW photovoltaic power generation "common treatment of five waters" comprehensive demonstration project, which is the first case in China. The "CGN Shanxi Datong 100 MW pphotovoltaic power generation project" the company constructed is the first planned project of "national advanced technology photovoltaic demonstration base photovoltaic pacemaker in mining subsidence area"; the photovoltaic power station project the company invested in Gaoyou is in stable operation with good power generation and has achieved grid connection generation and electricity charge income. The company also created the construction record of 30 MW large scale photovoltaic mud flat above-ground power station completed in 30 days. Its high-class power station performance and generation amount beyond expectation are well and unanimously received by clients such as CECEP, CGN, China Power Investment Group and Three Gorges New Energy. In the incoming cooperation, Rayspower large scale photovoltaic grid connection generation technology will keep its current stability and play its advantage in future power station construction.
	Technical safety	1. Technical risk It is mainly related to grid connection difficulty, system complexity and numerous procedures during photovoltaic power station construction. To control risks in the largest extent, the enterprise has designed backup schemes to be adopted. In the mean time, the company has development experience of many years and has established extensive scientific research cooperation with powerful expert support team. These advantages have lowered technical development risks for new product development. 2. Technical application and market risk The overseas photovoltaic product producing companies and suppliers enter China market more frequently and lower cost and product price through industrial chain management strategy, which has a bad influence on profit rate of the whole photovoltaic industry. In the mean time, this also means fiercer competition for Rayspower when further expanding market share. 3. Other risks 1) Management risk This project has a higher requirement in needed technical personnel. Therefore, there is certain risk in intellectual property and talent management. Thus, the company built a special leading group, and hired specialized project management personnel and patent management personnel to conduct full life circle management for project implementation.

		2) Policy risk The photovoltaic product development which the project is related to belongs to the development research field the state fully supports, and the technology chiefly comes from self-dependent innovation from the enterprise. The project construction is in accordance with relevant policies in our new energy industry and is in favor of improving China's photovoltaic industry technology research level and is in compliance with national self-dependent innovation development strategy. Therefore, there is no policy risk.
	Achievement application & promotion obstacles	Main problems China face in photovoltaic development are listed as below: 1. There is no national authoritative research institute and no long-term development strategy and planning, and relevant policies and specific measures are missing. 2. Lack of scientific research talents and engineering technology talents, poor and scattered research strength and poor experiment conditions; 3. The photovoltaic physics subject is in poor development, and photovoltaic material & appliances, key production equipment and testing machine rely on exporting. In order to solve above-mentioned problems effectively, on one hand, capital input and policy support needs to be enhanced, and on the other hand, develop and innovate technology actively is the key of our photovoltaic industry development, for example, focusing on developing "the third generation" photovoltaic power generation technology to lower photovoltaic system cost. But the main obstacles directly affect comprehensive application of photovoltaic technology are low transformation rate from light to electricity of solar energy batteries and high cost of system manufacturing. Therefore, the key issue for current photovoltaic technology is to improve battery efficiency and to lower cost.
	Transfer of intellectual property	Rayspower Energy Co, Ltd. has proprietary intellectual property right in China and has obtained 265 patents with another 37 in application process. Around 60 in these patents are core patent technologies such as solar energy power station DCS and these patents have provided powerful technical support for construction of photovoltaic grid connection power generation station.

Technology achievement application of renewable energy resource			
Two dimension code			
Technology provide company	Rayspower Energy Group Co., Ltd.	Submittal date	**2016-06-28**

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Contact person	Fu Lu	Technology type	**Solar energy utilization technology**	
Telephone	13439901118	Email	**lucia.fu@rayspower.com**	
Technology name	**Trough solar energy power generation technology**			
Technology supplier	**Rayspower Energy Group**			
Applicable scope	**Rayspower Energy Group**			
Brief technology description	**Take advantage of the parabolic trough mirror with spotlight characteristic to collect heat, select the device which can automatically trace the sun to receive solar energy, apply the heat tube type vacuum heat collection pipe to transmit the absorbed heat, and complete the process of solar energy power generation. The system consists of the spotlight and heat collection system, the heat transmission system, the heat storage and heat exchange system etc. Main equipments include the heat collector, the evaporator, the condenser and the cooling tower etc.**			
Technology information	**Trace control accuracy of the system is ±0.1° the whole optical efficiency of the beam condenser is ≥78%, the conversion efficiency from solar energy to heat is 50%, the conversion efficiency from heat to electricity is 10-15%**			
Commercial application condition	**Demonstration effect is obvious. 1. Research and demonstration project of state class 863 solar energy trough type heat collection and power generation technology 2. Research and demonstration project of Tianjin university “ focusing solar energy distribution type composition power supply system**			
Application conditions	**None**			
Contact person/telephone/e mail of commercial application company	**This technology is mainly realized through trading in the market; the whole service system owns the mature technology; the management person of the power station shall be systematically trained after establishment; installation of 50MWP power station shares about 10% total investment, annual operation and maintenance cost is about 26.80 million Yuan.**			
Equipment investment	**When total installation capacity of the power generation project is 50MW, the total investment is about 0.1456 billion Yuan, one time investment amount of all necessary main equipments and other auxiliary equipments share 90% of the total investment, i.e., 0.131 billion Yuan. Proportion of every part in total investment as following: cost of the heat collection field shares 50%, the heat storage system and the heat transmission oil system share 22%. Engineering design and construction cost share about 10%. The turbo-generator and other power section share about 4% of the total cost.**			
Operation and maintenance cost	**Operation and maintenance of the power generation system mainly include cost under normal condition and unforseen operation and maintenance cost within one year, including replacement of the reflection mirror and the HCE tube, cost of nature gas for pre-heating of the**			

		HTF system, insurance cost of the power station and cleaning cost of the reflection mirror etc. Annual operation and maintenance cost of a 50MW power station is about 26.80 million Yuan. Following calculation takes 50MW as an example, annual operation and maintenance fee is： 1. Water: 25 thousand Yuan. 2. Nature gas: 8.208 million Yuan; 3. Labor cost: 5.40 million Yuan; 4. Material cost: 7.00 million Yuan; 5. Unforeseen cost: 1.80 million Yuan; 6. Others: 4.142 million Yuan.	
	Investment payback period	If total installation capacity of the synchronization and power generation project is 50MW, the annual average on-grid electricity during operation period is forecasted as 138.70 million kwh, price of on-grid electricity is 1 Yuan/kwh, direct economical benefit is 138.70 million Yuan. Total investment of the 50MW power station is about 0.145600 billion Yuan, investment cost can be paid back within 10 to 11 years. If operation period is calculated as 25 years, it can realize benefit period of 14-15 years.	
	Other benefit	Solar energy is not only one time energy source but also renewable energy source. Its resource is rich. It can be used free of charge, and it is not necessary to transport. As one clean energy source, photovoltaic power generation not only doesn't consume resource but also doesn't release pollutant and waste, it will not generate greenhouse gas to destroy atmosphere environment, it will not generate waste slag stacking, waste water drainage etc issues, it is beneficial for protection of the surroundings and improvement of ecological environment. For the 1MW trough type solar energy power station, this project can save standard coal about 397.912t each year, emission of several atmosphere pollutants are reduced correspondingly every year, in which emission of SO2 is reduced 15.3 t, nitrogen oxide (calculated as NO2) is reduced 3.28t, carbon dioxide is reduced 1.26 thousand tons, sooty (calculated as PM10) is reduced 0.5t, slag discharge is also reduced about 138.72t.	

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	Technology occupation rate	**In the integration field of the solar energy trough solar thermal power station system, the large trough type solar thermal power station project which is put into operation has not built up until now, Rayspower Energy Group as the system integration company has participated in the constructions of several trough type solar heat power station demonstration projects, such as research and demonstration project of national class 863 solar energy trough type heat collection power generation technology, first solar energy solar thermal power generation comprehensive power station project in Xinjiang area, Tianjin Binhai university testing project, test project of Institute of Engineering Thermophysical, Chinese Academy of Sciences etc, which has accumulated rich construction experience and built up solid market basement for the coming national class large solar and thermal power station demonstration project. It will occupy great share during continuous development in future.**
	Market potential of technology	**According to scale development index provided by National Energy Administration of China, total installation capacity for solar energy power generation will reach 10 million kwh by end of 2020, Holding capacity of solar energy heat utilization and heat collection area will reach 0.8 billion square meter, in which share of the trough type installation capacity will share more than 80% of total heat power generation installation capacity. Construction of the trough type power station is at demonstration and popularization phase at present, several small demonstration projects have been built up, a part of scale commercial projects are also under construction.** **Rayspower Energy Group as the system integration company has participated into constructions of several trough type solar heat power station test projects, such as research and demonstration project of national class 863 solar energy trough type heat collection power generation technology, first solar energy solar heat power generation comprehensive power station project in Xinjiang area, Tianjin Binhai university testing project, test project of Institute of Engineering Thermophysical, Chinese Academy of Sciences etc, which has accumulated rich construction experience and built up solid market basement for the coming national class large solar and heat power station demonstration project.** **It is forecasted that market share of installation capacity of the trough type power station of our company will reach 15% by 2020.**
	Technology advantage	**Innovation：** **Apply the unique flexible reflection mirror of Rayspower, with the first class profile, reflection rate and endurance.** **Molten salt is applied as heat transmission and heat storage working medium, working temperature can reach 560℃. It can generate power stably for long time, which has low cost, long life and good heat exchange performance etc advantages.**

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		The automatic sun tracing device is applied, which can trace direction of the sun accurately, and improve utilization rate of sunlight. **The HCE tube applies the direct melt sealing connection way between metal and glass, which is equipped with the internal reflection shield protection sealing interface, and ensure life of the vacuum heat collection tube.** **Position and level:** **When no large trough solar thermal power station project has not been built up in the country, Rayspower Energy Group as the system integration company has participated into constructions of several trough type solar thermal power station test projects, which has accumulated rich construction experience during construction, its trough type power station technology has reached leading level in the similar technology in the country.**
	Technology mature	**Perfect process route:** **The trough type solar energy thermal power generation system mainly consists of the spotlight and heat collection system, the heat transmission system, the heat accumulation and heat exchange system, the power generation system and the auxiliary energy source systems etc.** **The trough type heat collector can heat up heat transmission liquid to about 400 ℃, heat transmission liquid heat up water to steam about 300℃ through the heat exchanger, water steam drives the steam turbine to rotate and drives the generator to generate electricity, water drained from the steam turbine is converted into water through the condenser, and then deliver to the heat exchanger via the water pump, it generates steam and drives the steam turbine again.** **Possess own production line：** **The company has established the unique production line in Asia, which can manufacture the trough type RP1 to RP4 whole series flexible solar energy spotlight heat power generation reflection mirror; its product performance and technical parameters have reached international advanced technology level, which has been successfully applied in the domestic and foreign solar thermal power station projects.** **Perfectness degree of system integration:** **Rayspower Energy Group can provide system service for construction of the trough type power station, including design, construction and commissioning works of the power station; its wholly owned subsidiary company Sundhy(Chengdu) can provide equipment supply and series solution scheme of the trough type reflection mirror (solar heat power station and solar heat middle temperature and high temperature utilization system) and the spotlight photovoltaic reflection mirror.** **On basis of continuous innovation and accumulation of technology and demonstration projects, Rayspower Energy Group has system integration capability of the trough type solar heat power station, which can provide high quality system integration service to the customer.**
	Technology	**Technology application scope:**

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	adaptability	**Rayspower Energy Group popularizes and develops solar energy power generation technology in China and the world market. The company can provide whole set of solution plan of the solar energy heat power generation technology to the customer according to different demand of the customer, including system design, supply of the key equipment and engineering construction etc, it also provides operation and maintenance, technical training and other technical services.** **Development limitation conditions:** **At present, construction of the trough type power station shall consider several factors. First is sunlight resource; second is grounding condition, including geological condition, flatness degree of land, terrain condition etc; third is grid condition; fourth is water source condition; fifth is construction investment condition, including nationality issue, policy issue of local government etc.**
	Technology stability	**Through continuous validation of demonstration process, operation of the trough type power station technology of Rayspower Energy Group is stable, anti-interference capability is strong, which can realize expected effect and obtains consistent affirmation in the industry.**
	Technology safety	**1. Technology risk** **It mainly relates to difficult synchronization, enormous system, complicated procedure etc technical risks during construction process of the power station. In order to control risk at maximum degree, the enterprise has designed the optional plan for selection. At the same time, the company possesses development experience for several years, established brand science and research cooperation relationship, which has strong and forced expert support team. These will reduce technology development risk for research and development of the new product.** **2. Technology application and market risk** **Speed of the foreign product manufacturing enterprise and manufacturer entering into Chinese market is continuously sped up, cost and product price are reduced through the industry chain management policy, which creates certain negative influence on the whole profit rate of the industry; at same time, it makes the company face more intense competition during further market share expansion.** **3. other risks** **1）Management risk** **This project has high requirement on comprehensive capability of the technician, therefore there are certain risk at intellectual right and talent management. Therefore the company establishes the special leading team, and establishes the special project management person and patent management person, who will carry out whole life period management during implementation of the project.** **2）Policy risk** **The solar heat power generation technology related in this project belongs to research direction which is supported by the country as the key. Research and development technology mainly**

		come from own innovation of the company, construction of the project complies with relevant policies of the new energy source industry of our country, which is beneficial to improve research level of the photovoltaic industry in our country. It is in accordance with own innovation development strategy of our country, and there is no policy risk.
	Achievement conversion and popularization obstacle	**Popularization mainly faces two problems at present: technology and environment advantage of solar heat power generation shall be furtherly popularized; secondly electricity price, solar heat power generation has no cost advantage when it is compared to traditional fossil fired power generation, it needs supports from the industry and the government etc aspects, each party shall cooperate mutually and interact mutually.**
	Transfer of intellectual property right	**Intellectual property right system:** **As the professional solar energy power station supplier, Rayspower Energy Group inhibits the green energy source technology idea, always strives to research, development and market application of the solar energy heat power generation technology. The company possesses several patent technology of the solar energy heat power generation system with large scale heat storage function, and master the solar energy heat power generation core technology and intellectual property right. This technology has applied 44 patents at present, in which 16 inventions and 28 utility models.** **Talent team construction:** **The company possesses many professional technician talents in the heat power generation field, which has established strategic cooperation relationship with the world famous science and research institute, the excellent enterprise. On basis of the excellent technology and talent advantage, Rayspower Energy Group is becoming one of the enterprise with influence force in the solar heat power generation field in China.** **Export of advanced equipment:** **The company has established the unique production line in Asia which can manufacture the trough type RP1 to RP4 whole series flexible solar energy spotlight heat power generation reflection mirror; its product performance and technical parameters have reached international advanced level, they are successfully applied in the domestic and foreign solar heat power station project; furthermore, the first domestic solar energy solar heat power generation and heat collection system assembly and detection line has entered into final testing phase.** **Total localization degree of the equipment has reached 90%.**
	Figure description	

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COMPANY: POLY NEW ENERGY TECHNOLOGIES (BEIJING) CO., LTD.

Poly New Energy Technologies (Beijing) Co., Ltd.	**Renewable Energy Technology Achievement Declaration**			
	QR code			
	Technical provision unit	Poly New Energy Technologies (Beijing) Co., Ltd.		
	Contact person	Zhu Xinyu	Submission date	June 30, 2016
	Technical type	Solar energy utilization technology	Specific technology	Solar energy observation station technology
	Tel.	13911560970	E-mail	chengxin@polysolar.cn
	Technical name	Solar traffic light		
	Technical provider	Poly New Energy Technologies (Beijing) Co., Ltd.		
	Scope of application	Applicable to urban, rural and residential district roads as well as the illumination in parks and squares..		
	Brief description of Technology	The product is comprised of solar cell panel, storage battery, solar controller (including constant current stabilizer), traffic signal controller, wireless communication module, and LED indicator lights. In the daytime, the solar cell panel converts illumination received to electric energy and reserves it in battery through controller, and meanwhile, the electric energy reserved in battery provides power for traffic signal lights.		
	Technical information	Capacity of battery: Plumbic acid battery 600Wh-2,880Wh, lithium-ion battery: 250Wh-1,200Wh, light source: 12W-60W, road surface illumination: 10-15lux (meet the secondary main road lighting standard)		
	Business application situation	dfsaff		
	Service conditions	agdd		
	Contact person of business application unit /Tel./E-mail	agdf		

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Investment on equipment	agdL
Expense of operation maintenance	adggfdag
Investment payback period	gfsdfgewr
Other earnings	ewrewr
Technical share	erdfvddv
Market potential of the Technology	devwrd
Technical advancement	edraw
Technical maturity	ewrwrwrwrfgds
Technical applicability	sdgsewwgf
Technical stability	sdfgegrh
Technical safety	dgaergwe
Obstacle in achievement transformation and promotion	aefaweg
Transfer of intellectual property	awergaweg
Photo caption	

Renewable Energy Technology Achievement Declaration	
QR code	

TECHNOLOGY: SOLAR
COMPANY: POLY NEW ENERGY TECHNOLOGIES (BEIJING) CO., LTD.

Technical provision unit	Poly New Energy Technologies (Beijing) Co., Ltd.			
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Technical type	Solar energy utilization technology	Specific technology	Solar energy observation station technology	
Tel.	13911560970	E-mail	chengxin@polysolar.cn	
Technical name	Solar traffic light			
Technical provider	Poly New Energy Technologies (Beijing) Co., Ltd.			
Scope of application	Suitable for command and control of traffic intersection			
Brief description of Technology	The product is comprised of solar cell panel, storage battery, solar controller (including constant current stabilizer), traffic signal controller, wireless communication module and LED indicator lights. In daytime, the solar cell panel converts illumination received to electric energy and reserves it in battery through controller, and meanwhile, the electric energy reserved in battery provides power for traffic signal lights.			
Technical information	Applicable intersections: Crossroads, complex intersection; Signal type: Round signal lamp, straight / turn / combined arrow lamp, pedestrian and non-motor vehicle indicator light, countdown board: Power of solar cell module: 75WD-320WD			
Business application situation	According to the solar traffic lights project to aid Nigeria , 300 solar traffic lights are supplied and installed at 74 intersections in Abuja, capital of Nigeria, and they are currently running well.			
Service conditions				
Contact person of business application unit /Tel./E-mail				
Investment on equipment				
Expense of operation maintenance				
Investment payback period				
Other earnings				
Technical share				
Market potential of the Technology				
Technical advancement				
Technical maturity				

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	Technical applicability	
	Technical stability	
	Technical safety	
	Obstacle in achievement transformation and promotion	
	Transfer of intellectual property	
	Photo caption	

TECHNOLOGY: SOLAR
COMPANY: CHENGDU XUSHUANG SOLAR TECHNOLOGY.

Chengdu Xushuang Solar Technology	**Technological Achievements Declaration Of The Reproducible Energy**			
	QR code 			
	Provide unit of technolog	Cheng Du Xu Shuang solar technology Co.,ltd	**Submit date**	29th, July, 2016
	Contacts	Huang Yuan	**technologic al type**	usage of solar technology
	cellphone	8615828365553	**Email**	605871523@qq.com
	Technology name	The solar battery of high light type building amorphous silicon thin film can produce 10MW a year.		
		Our comany now has 58 ones associated with the technology patents,		
	Technology provider	including 10 invention patents, and 48 utility model patents. We have our own department of construction and design . What's more, we can undertake assignments in design, construction and installation.		
	Scope	New energy,Building integrated glass curtain wall,Agricaultural greenhouses,Small system.		
	Brief introduction of technology	Our battery's positive and negative electrode use the TCO, whose average light transmittance can research to 85% in visible light scope.		
	Technological information	1. size of product:1300mm*1100mm*8mm 2. conversion rate(after attenuation)≥ 6% 3. light transmittance:10-30%		
	Commercial usage	88.32kw photovoltaic curtain wall grid project of Mudan Jiang 4. University. The address: No 60, West Di Ming street, Ai Ming aera of Mudan Jiang.		

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	Use conditions	Market trade; mature technology; It also needs training and guidance in design, installation, debugging and production trials on site. After the technical side accepts training, they maintain it by themselves, and the maintenance should be under professional engineer's guidance.
	Contact of the unit of commercial usage	Jin Wu, vice president of Mudan Jiang University. Tel:0453--6598053
	Investment of equipment	The reconstruction of the equipment of this project should be in original factory, and it has a new laser system and a vacuum coating system, whose total investment reaches to 60,000,000yuan. It will build a new 1100*1300high light amorphous silicon thin film production line to produce the solar battery modules, which is expected to produce 10MW a year.
	Operational maitenance expense	The normal operation of the system is analyzed by all transmittance products materials: raw material 2.96 yuan/w; hydropower fee 0.05yuan/w; wage and benifit 0.15yuan/w; depreciation and amortization and factory overhead 0.4yuan/w; unit costs 3.56yuan/w; management and repairment fee and the sharing of other products of one kind fee 0.1yuan/w.
	Payback time	It's estimated that the annual sales revenue of this product can reach to 45,000,000yuan, the annual selling cost is 38,250,000 yuan, the annual total profit is 6,750,000 yuan, the annual net profit is 5,062,500yuan, the annual average net rate of invenstment is 33.75%, the average net profit rate of selling is 15% and the static payback period is 2.22years.
	Other profits	1.This project conforms to our country's industrial policy and local development plan, and the implementation of it has positive effect on the development of local economy. 2.Through the implementation of it, it will stimulate the technological reform of enterprise,reduce the cost and it conforms to the trend of saving energy and developing low carbon economy. 3. It has positive effect on stimulating employment. It has obvious finance and tax effect and will enhance the income oflocal finance and tax.
	Technological share	With our group's industrial experience and accumulation in technology, we employ hundreds of experts from home and abroad to set up solar battery research institute. Meanwhile, we unites many advanced enterprises of this industry to make a deep research on manufacturing

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		technology of thin film and whole equipment technology of production line. We have mature manufacturing technology to produce solar battery, and we are in the leading role. In 2015, global output of them reaches to 144MW and its global market reaches to 0.7%.
	Potential of technological market	Compared with other photovoltaic battery, amorphous silicon has advantages as follows: its technology is mature, low cost, less pollution etc. But its photovoltaic conversion efficiency is low and has stable attenuation effect. Therefore, so many solar modules which are worse than monocrystalline&multicrystalline silicon lead to the limitation even bankruptcy of a number of companies from home and abroad. Under this circumstances, our company chooses photovoltaic architectual glass curtain wall and conducts a series of technological reform, whic lead to the breakthrough of this kind of solar battery. Because of this market segment, the amorphous silicon solar battery components are better than other types. EPIA has prediction of photovoltaic power generation, that is, in 2020, the worldwide annual production of photovoltaic modules will reach to 40GWP, the total PV generation installed capacity will be 195GWP, and total generation capacity will be 2747W/h,and the cost of the components of solar battery will decrease to $1/wp; in 2040, PV generation capacity can reach to 7368w/h, whic holds 21%of the world's.
	Technological advance	1. By using device structure and improvement of materials, we can realize the high light transmittance and high power density of the components of photovoltaic architectual glass curtain wall. What's more, they are better than traditional products. The latter ones sacrifice device's effective area to ge compents' transmittance, it also use means of laser scribing to get ride of some areas of the battery. So the compents' power density is low and its technique is complicated and it has high cost. 2. The 1300mm*1100mm photovoltaic architectual glass curtain wall researched, designed and made by ourselves is the pioneer in our country. We haven't seen such reports of this kind of product with same area and efficiency.

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COMPANY: CHENGDU XUSHUANG SOLAR TECHNOLOGY.

	Technical maturity	Our products' industrialization relys on their advanced manufacturing equipment, integration of the materials researched by ourselves and improvement of technique of the components. We establish a largescale independent intellectual property production line. And we develope products' large-scale production and marketing stage by stage. After the technique is widely admitted by the market, we manufatue the product in a large scale and enhance their diversity.
	Technical applicability	There's strong lights and long sunshine in African areas, and it has drought and less rain all the year round. So it's suitable for application of photovoltaic cells. They have less effect on environment and can save electricity power,generate electricity by themselves,and form wind solar hybrid system which will not affect archetetures and give supply to electricity.
	Technical stability	Cheng Du Xu Shuang solar technology Co.,ltd has a production line which can make 60MW amorphous sillicon thin film solar cells. High-transparency materials are the main products of this company, they have mature technique, stable production and their quality meets TUV certification. And their architecture uses are forced to use CCC
	Technical security	Using solar power will not reduce the source of our earth and will not have pollution. And solar power industry is obviously a millennium one. Our country has so many natural disasters, eg, earthquakes, typhoons, etc. Therefore, the photovoltaic system which is made of by solar battery has better safe reliability and mature technique should give priority to develope solar technique.
	Obstacles in commercialization and achievements	Technical barrier is how to enhance the photoelectric conversion efficiency. As photovoltaic industry is a comprehensive subject of optics, electromagnetism, semiconductor, vacuum, chemical, machinery and so on, it has high requirements of product, design and professional quality of the managers. Each university from home and abroad doesn't have relative courses, and the explosive growth photovoltaic industry is far more then the speed of talent development. So seeking professional talent becomes one of the difficulties faced by new enterprises of this industry.

TECHNOLOGY: SOLAR
COMPANY: CHENGDU XUSHUANG SOLAR TECHNOLOGY.

	Transfer of intellectual property rights	Our company has 10 invention patents, using 48 utility model patents, and these patents belong to our only permission. We introduce key technical role as meteorological precipitation and vacuum coating. And our equipments are from famous domestic manufactures. We have strong willing of technology transfer and the way is a paid monetization deal. By real docking negotiations transfer between enterprise and enterprise, or between enterprise and government, we make technical transfer promotion according to *the China's Afica policy documents* which was published in Johannesburg in Dec,2015
	图片说明：	 

TECHNOLOGY: SOLAR
COMPANY: BEIJING WARMLAND ENERGY SERVICE CO., LTD.

BEIJING WARMLAND ENERGY SERVICE CO., LTD

Renewable energy technology achievement declaration			
Technology providers	Beijing Warmland Energy Service Co., Ltd.	Date of submission	2016-07-07
contact	Annie Hou	Technology type	Solar energy utilization
Tel.	（+86）13520646735	Email	annie@ti-solar.com
Technical name	Solar water heating systems based on energy-saving intelligent control platform		
Technology providers	Beijing Warmland Energy Service Co., Ltd.		
Application scope	Architecture (hotels, schools, hospitals, etc.)		
Technology Brief description	1、 using dry type solar energy to collect solar heat and heat water, to put hot water into the water tank thermostat 2、 using air source heat pump to heat water in the water tank thermostat 3、 using electric auxiliary heat system as emergency standby heater 4、using Intelligent remote management and control platform for the management		
Technical Information	1、 per unit of hot water to reduce energy consumption by more than 50% 2、 energy efficiency management platform for public service capacity to reach 1000 sets of capacity 3、 the system failure rate to maintain a low level, the average failure rate of less than 3 times / year		
Commercial applications	all over the country more than 30 cities hundreds of projects,such as holiday inn express Beijing shangdi, transforming energy saving 75%; Holiday inn express dongzhimen, the original wash bath for gas heating, transforming energy saving 70%;		

TECHNOLOGY: SOLAR
COMPANY: BEIJING WARMLAND ENERGY SERVICE CO., LTD.

	Using Condition	The project provides hot water energy-saving outsourcing services to clients instead of the traditional hot water production mode; This project not only provides a full set of hot water production equipment, but also provides longterm, real-time operation and management services and run the management; the clients only in accordance with the agreement to pay the company to pay the service fee.
	Commercial applications unit contacts /phone/email	holiday inn express Beijing shangdi,sam Li,82709999，13701281344 Home Inn group Xueqing Road Hotel,mr Zhao, 13811801271
	Equipment investment	350,000 yuan (including solar collectors, air source heat pumps, water tanks, pumps, control systems, etc.), all provided by Technology provider- Warmland, With the clients zero investment
	Run maintenance cost	Run maintenance cost is provided by the technology provider, without additional cost during the contract period
	Payback	38 months

TECHNOLOGY: SOLAR
COMPANY: CHENGDU XUSHUANG SOLAR TECHNOLOGY

申请专利的权利委任状

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[发明专利内容]

发明名称		燃烧器装置	
国际申请号	PCT/KR2013/007614	PCT申请日	2013. 8. 26
中国申请号码	201380047674.0	申请公布日	2015. 5. 20

[委托人（委托者)]

委任人	FLINT股份有限公司	英文名称	Flint Lab Inc.
代表人	YUN HYOUK JIN	企业号	134-87-32387
国籍	大韩民国	电话号	82)1072883857
地址	首尔西大门区统一路484新知识产业中心302号		
业务负责人	YUN SEONG WAN	电话号	86)18718720501

[授权人(受委任人]

授权人	广州海勋生物技术有限公司	英文名	GUANGZHOU HAIXUN BIOTECH CO.,LTD
代表人	李京浩	企业注册号	440126000523483
国籍	中国	电话	136-0977-4016
地址	广州市番禺区大石镇上濑大新商务广场512		
委托人之间的关系	技术合作关系。		

TECHNOLOGY: SOLAR
COMPANY: CHENGDU XUSHUANG SOLAR TECHNOLOGY

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委	任	人	FLINT LAB 股份有限公司
签		名	
签	名	日	2016. 2. 22.