

*Energy Saving & Environmental  
Protection Industry of the New Generation*



# Taiwan Micro-Grid

Renewable Energy, Living the Green Way



Solar Power



Wind Power



Hydropower



Biomass Energy



## Introduction of Micro-Grid

Renewable Energy,  
Living the Green Way

Comparing with centralized large power grid, micro grid is relatively a small sized, regionalized concept. The development of micro grid has a long history, actually, the world's first DC power plant built by Thomas Edison in 1882 in fact is a micro grid. Recently, micro grid again received spotlight due to the rising awareness of energy saving, carbon reduction, colossal disasters and the trend of renewable energy. In 2000, nations such as the US started to develop micro grid systems that combines renewable energy, which redefined the role of micro grid within the power system.

## Micro grid has the following features:



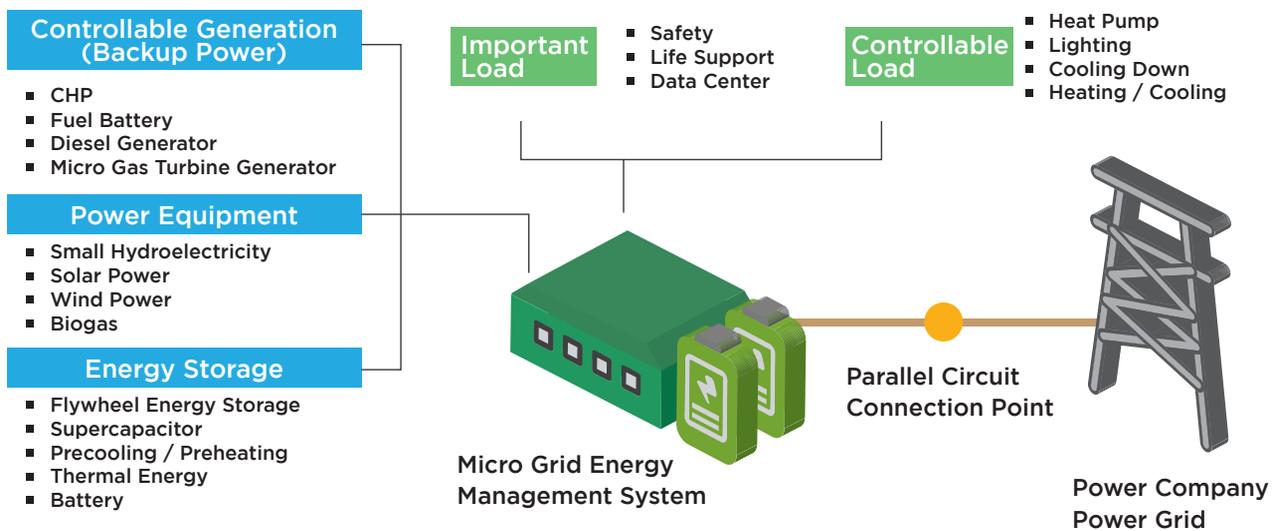
Micro grid is a regional power system composed of distributed power and load. Compared with traditional power grid, it is more flexible and due to its small size, easy to search and establish a location. In addition, installation cost is low.



Micro grid could effectively increase the renewable energy volume and avoid the power distribution network from directly facing diverse attributes of distributed renewable energy and its volume.



Higher level micro grid could seamlessly switch between island operation and grid-connected operation. When the main power grid endures challenges, it could switch to an independent operating model, maintaining a stable supply of power and could automatically synchronize again with the main power grid once power is restored.



Source: Lawrence Berkeley National Laboratory(2012/06) : Siemens(2014)

## The main application areas of micro grid include:

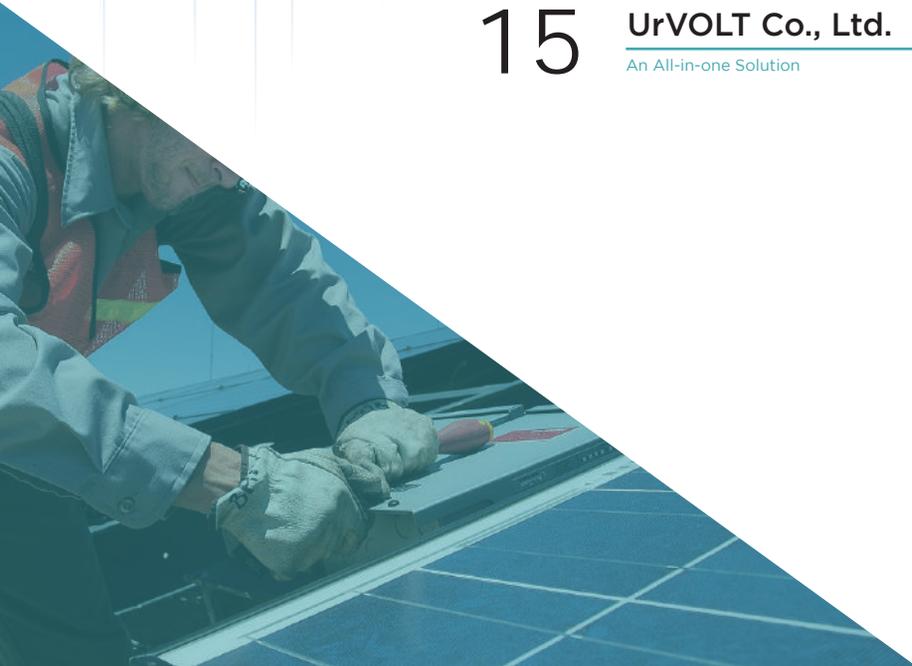
<b>Remote Areas and Offshore Islands</b>	Mainly applied in low power distribution fields, like Mainland China, India, Southeast Asia, Africa and South America.
<b>Community and Power Company Distribution Networks</b>	This is to strengthen the self-consumption capability of regional power grids and their resilience to disasters. Japan is one of the early investors, the US have numerous power companies that invested in establishment of micro grid system to enhance its reliability.
<b>Schools, Industrial and Commercial Park</b>	To ensure the power quality, reliability and raise its autonomy, the micro grid design focuses on safety and reliability, and mainly applied in the US and the Asia Pacific region.
<b>Military Bases</b>	Main emphasis of the application is for the micro grid to maintain normal operations, when the main power grid encounters emergent situations or in areas where war occurs. These applications are centralized within the US.

# Taiwan Micro-Grid

Renewable Energy, Living the Green Way

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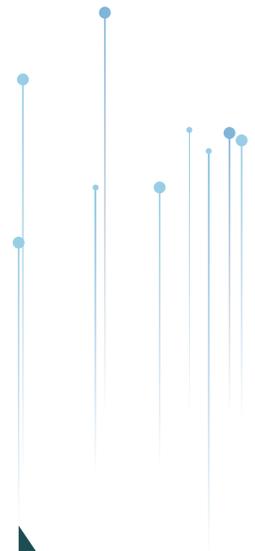
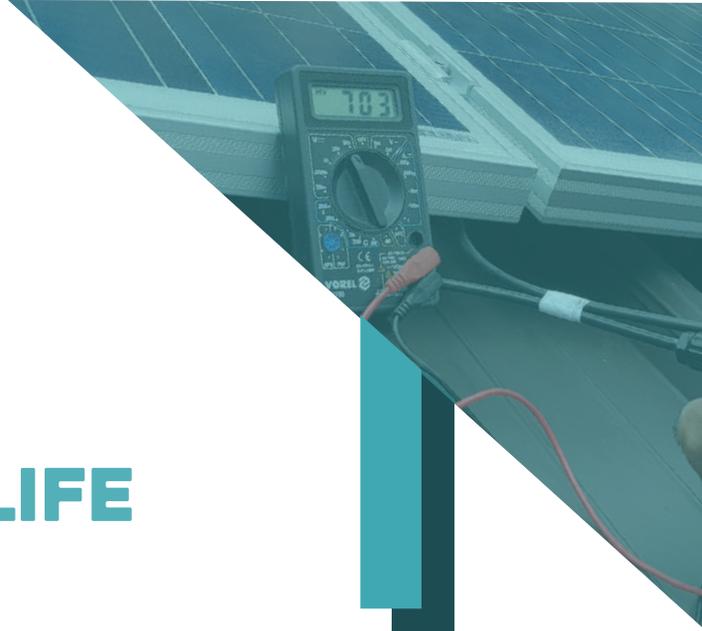
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## The Energy Expert on Lithium Battery

The First Step Towards Green Energy Protection Begins with Energy Storage

### ▶ About Celxpert Energy Corporation

With an environmental-friendly perspective, Celxpert Energy Corporation services Notebook PCs, consumer electronics, mobile phones and future automotive fuel batteries related industries and emphasizes on design and research development of battery packs.

Celxpert has recently entered the energy storage industry sector and committed to development of various lithium batteries to resolve the challenges of battery replacement, upgrades and relevant maintenance and then applied in electric scooters. Furthermore, Celxpert views 1.2, 2.5, and 2.7 kWh lithium batteries as their main products within the Micro-Grid industry sector, and perceives Taiwan as starting base to provide various lithium battery related energy solutions to the world.

## 加百裕工業

### *Celxpert Energy Corporation*

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## ▶ Product Introduction

Celxpert is involved in lithium battery relevant products. The list below showcase Micro-Grid related products:

1.2kWh Li-ion Battery Pack Unit		2.5kWh Li-ion Battery Pack Unit		ENPLUS 2.7kWh LFP Battery Pack Unit	
					
<ul style="list-style-type: none"> <li>Main energy storage for household needs.</li> <li>Supported by both small industrial grid storage and PV systems.</li> </ul>		<ul style="list-style-type: none"> <li>Main energy storage for household with higher storage demand.</li> <li>Applied to emergency power supply with small industrial grid.</li> </ul>		<ul style="list-style-type: none"> <li>Mainly applied for industrial/commercial use.</li> <li>Considerable energy storage needs are achieved by connecting the batteries in parallel circuit.</li> </ul>	
Model	ESS 48V A01	Model	ESS 48V B01	Model	ENPLUS 2.7 AB
Rated Voltage	48V	Rated Voltage	50.4V	Rated Voltage	51.2V (Operate Voltage:55.2V-40V)
Nominal Capacity	26Ah	Nominal Capacity	51Ah	Nominal Capacity	53Ah
Dimensions (mm)	130mm*230.5mm*362mm (W*H*D)	Dimensions (mm)	489.1mm*201.4mm*160.6mm (L*W*H)	Dimensions (mm)	482mm*142mm*424.5mm (W*H*D)
Weight	12.5Kg	Weight	18.530.3Kg	Weight	32Kg
Cont./Max. Discharge Current	26A	Cont./Max. Discharge Current	45A	Cont./Max. Discharge Current	25A(continue) 50A(Max. 15min)
Power Output	1.2kW	Power Output	2.5kW	Power Output	2.7kW
Protection Mechanism	Over-charge Voltage Over-discharge Voltage Over-discharge Current Over-temperature for Discharge	Protection Mechanism	Over-charge Voltage Over-discharge Voltage Over-discharge Current Over-temperature for Discharge	Protection Mechanism	Over-charge Voltage Over-discharge Voltage Over-discharge Current Over-temperature for Discharge
Max. Number of Parallel Circuit	32	Max. Number of Parallel Circuit	32	Lifecycle	70% in 3,000 cycles @25°C
Communication Interface	CAN Bus	Communication Interface	CAN Bus	Communication Interface	CAN Bus or RS485

## ▶ Product Application

The application of lithium battery is widely used, including energy-saving electricity charging equipment for household use. The lithium battery is sufficient to provide household lighting during nighttime by charging during off-peak hours (daytime). If combined with solar panels, it allows the household to achieve a self-sufficient, energy balanced green housing.

Combined with solar energy, lithium batteries for self-use applications not only could be applied onto households, but also factories, base stations, or even for commercial usage. Celxpert is customizable in various energy source and seeks to supply the world by establishing its roots in Taiwan.



Residence



Factory



Base Station



Hotel



## Formosa Power Lithium Iron Phosphorous Oxide Battery

Environmental Efficiency,  
Green Battery



# 台塑綠電

*Formosa Power*

### ▶ About Formosa Power

Formosa Plastics Transport Corporation, a subsidiary of Formosa Plastics Group established Power Battery Pack Project Team in 2012. Under the leadership of Mr. Wilfred Wang, Member of FPG Executive Board and Mr. Seiko Chen, Chairman of Formosa Plastics Transport Corporation, the firm focuses on three major areas, which include Storage, Starter and Power Battery.

The green energy industry has matured in recent years, Formosa Power is able to use its plentiful battery development experiences to nurture household, industrial and generalized Lithium Iron Phosphorous Oxide (LFPO) Battery. Furthermore, the corporation promotes their green products worldwide by aligning with green energy policies and global environmental development trend.



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# Lithium Iron Phosphorous Oxide Battery

## Industrial Energy Storage System

Energy Storage Container	20ft	40ft	40+10ft
System Capacity	500kWh	1.5MWh	2.1MWh



3U Battery Module



19 feet Energy Storage Cabinet



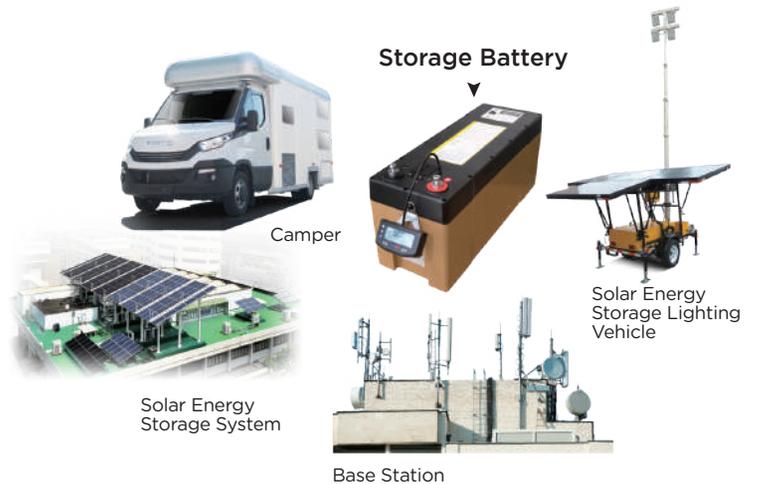
## Household Energy Storage System

System Capacity	5KWh (48V 100Ah)	10KWh (48V 200Ah)
Dimensions (DxWxH)	500x600x1200(mm)	



## Generalized Energy Storage System

Battery Specifications	48V 52.5Ah
------------------------	------------



## Product Features



**Intelligent**  
Smart IC Circuit, SoC which calculates the status of battery power volume.



**Humanized**  
Maintenance free, small size, light weight, no need to dissipate heat for installation, early warning for low capacity.



**Safety**  
Short circuit protection, anti-vibration.



**Long Lifecycle**  
The lifecycle is 5 times of lead-acid battery. Stable current output which prolongs the electronic equipment lifecycle.



## Power Transmission and Distribution Expert

Expert on Inverter, Specialized  
in Electricity for 40 Years

### ▶ About Allis Electric

Allis Electric Co., Ltd. was established in 1968, and committed to the research development, production and manufacturing of power system and power transmission & distribution related equipment. Nowadays, Allis Electric begins to move towards higher efficiency and cleaner distributed renewable energy supply.

Since 2012, Allis Electric has developed various diverse inverter goods in accordance of different distributed power grid products. It is expected that Allis Electric is able to bring a new generation of clean energy globally from Taiwan by developing a more efficient and cleaner power system.

# 亞力電機

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Co., Ltd.*



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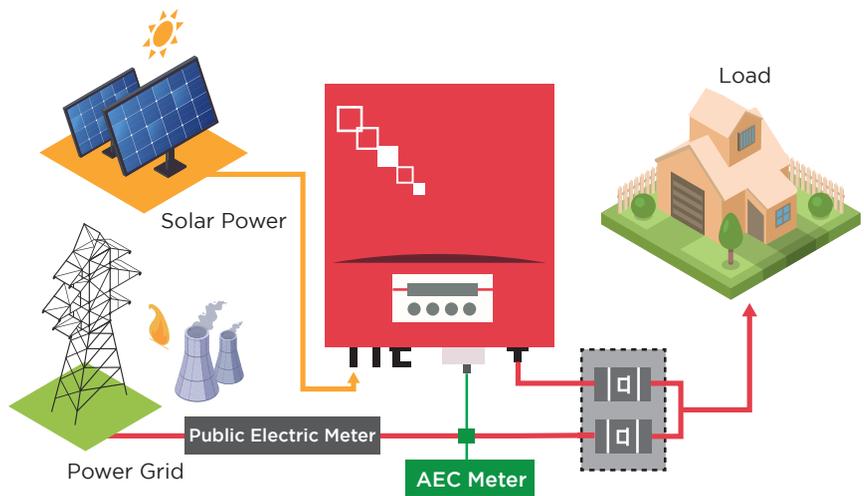
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## ▶ Selfnergy Series Solar Inverter

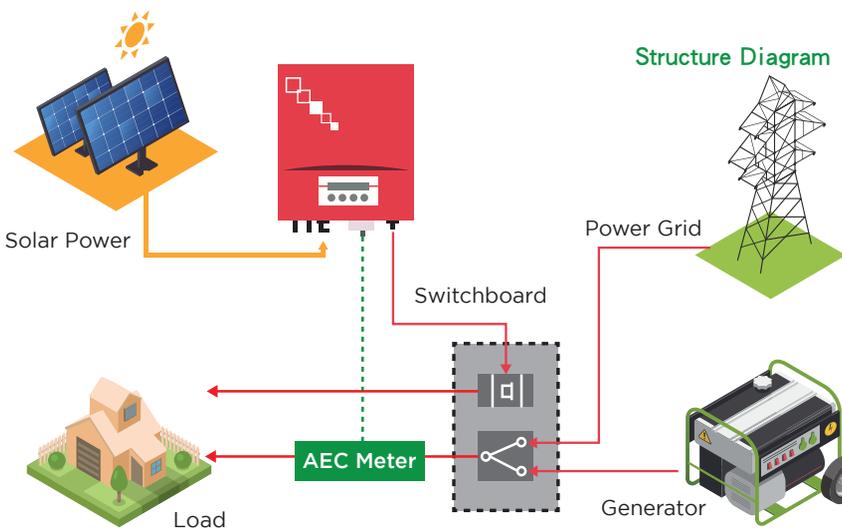
Allis Electric Selfnergy Series Solar Inverter is designed for areas which have long distance power transmission and utility distribution challenges.

The Selfnergy series solar inverter is easy to install without needing to modify facility distribution panel. It could create a self-use system simply through AEC smart meter, CT measurement and control of the inverter.



Structure Diagram

The design of the Selfnergy system is simple and easily applied with various kinds of load. Furthermore, Selfnergy system can parallel applied with diesel generator within developing countries, or regions in which utility network are still under construction. See the diagram below for detail explanation:



Structure Diagram

Considering adaptability of the inverter installation environment, the Selfnergy inverter has special module design for high power heating component; therefore even without a fan, the inverter can operate at 55°C without power derating through natural cooling, and could also achieve IP65 waterproof/dustproof level. In addition, the natural air cooling design has the advantages of low maintenance and increase of product lifecycle. It is particularly suitable for regions needing micro-grid total solution in tropical and island countries.

## ▶ Product Application



### Regions Utility Network Still under construction

It is allowed to directly connect with diesel generators within these regions.



### Green Power Equipment

Directly connect with solar power or other green energy source and transfer to AC power.



### Connect with Diesel Generator

Could connect with utility network and the diesel generator at the same time without needing further settings.



### Various Harsh Environment

Through natural cooling without additional fan, it is able to operate at 55°C environment and achieve IP65 waterproof/dustproof level.



## Expert on Energy Solutions

Uninterruptible Power System (UPS)  
Hybrid Solar Inverter

### ▶ About OPTI International

OPTI International Corporation created their first brand OPTI-UPS in Taiwan in 1999, and have established offices in Taiwan, United States, Netherlands and Dubai. With years of experience, the company is dedicated to global market sales, continues to provide electricity solutions and fulfills various power management needs and innovative products.

In 2007, OPTI built their second brand OPTI-SOLAR, which is to provide professional solar inverter as the main objective, and devoted for use in market areas such as Middle East and Africa in order to assist the general public to resolve the challenges of insufficient electricity. By continuing to establish their base in Taiwan, they consistently develop products with different specifications, provide convenient ways to obtain solar power, reduce the operational use of diesel generators, thus protect the environment.

## 蓄源科技

*OPTI International  
Corporation*

**OPTI-UPS**®  
Protect and Serve

**OPTI-Solar**®

# Introduction of Hybrid/ Off-Grid Solar Inverter



LCD Display Interface



Maximum Power Point Tracking (MPPT)



Dust Filter Design



High PV Voltage input



Able to Operate Without Batteries

Launched by OPTI-SOLAR, SP3000/5000 Handy and SP5000 Brilliant Ultra are embedded with MPPT PV charging controller, which could effectively obtain solar power. With "All-In-One" as the main focal objective of product design, it could obtain solar power, store energy and switch the output source through just one inverter.



SP3000 / SP5000 Handy



SP5000 Brilliant Ultra

## Product Features

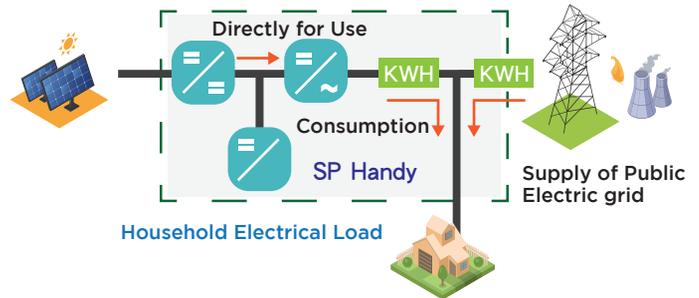
### Inverter Combined with Battery / Solar Power / Power

Solar inverter could simultaneously connect to the city power and solar panels and operate without interference from one another. The inverters are able to operate normally.

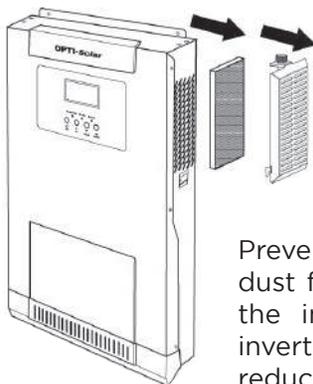


### Operate without batteries

SP3000/5000 Handy & SP5000 Brilliant Ultra are able to operate without batteries and directly output to the equipment connected through solar power; utility power could compensate while the solar power is insufficient.



### Design of the ventilation filter

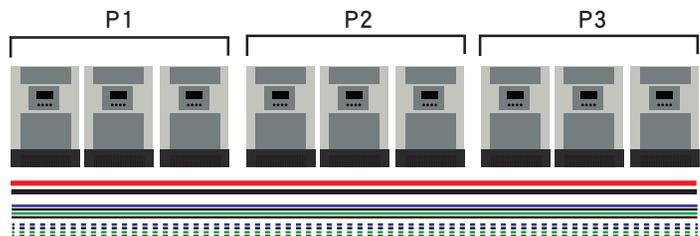


Prevent excessive dust from entering the inside of the inverter that would reduce its lifecycle.

### Multiple inverters are able to operate simultaneously

The SP5000 Brilliant Ultra could increase the system capabilities by adding number of parallel connections. A maximum of 9 inverters is able to operate simultaneously:

**Maximum output capacity 45kw**  
**Solar power maximum input capacity 40kw**



## Solar Rooftop Tile

Dark Black Solar Roof Tiles,  
Green Building Trend

### ▶ About Eterbright

Established in 2010, Eterbright Solar Co., Ltd. is a subsidiary firm invested by HIWIN. The company is specialized in the research development of CIGS thin-film solar power battery module which is widely applied to solar roof tile system, large-scale power station...etc.

Eterbright products have high photovoltaic conversion efficiency, great low light performance features and stable module efficiency. By using cadmium free, lead free and eco-material, provide environmental friendly products.

BIPV system are currently being introduced in various EU countries. Eterbright are pushing the world become green and better for all generation by various solar panel products.

上銀光電

*Eterbright Solar  
Co., Ltd.*

**eterbright®**

## Solar Rooftop Tile



### ePower Tile

#### 4.5kg 5400Pa

Light and sturdy material, easy and safe installation.

#### 672x372x37mm

Overall dimensions of the module, including the whole frame.

#### 636x317mm

Each power generation area after installation.

### Trend on Solar Power

#### Building Integrated Technologies

The global solar power market has benefitted due to the EU regulations on passive energy saving houses. New buildings must fulfill the strict energy saving requirements.

Eterbright's CIGS solar module satisfies the requirements of Building Integrate Photovoltaic (BIPV), building a bridge between both architectural design and renewable energy sector.



Overall frame



Appearance of the actual power generating status after installation

### 28Wp

Each ePower module wattage rating that fulfills standard installation.

### 140Wp/m<sup>2</sup>

CIGS Panel provides the Building 140Wp per square meter.

## Product Features



#### Environmental Non Toxic CIGS Thin-film

The patented cadmium and lead free manufacturing process received about 112 patents, 38 certifications including EU TUV, IEC, providing environmental friendly solar modules that are harmless to human body.



#### High Wind Pressure Durability and Snow Pressure Durability

Manufacturing technologies are not only unique worldwide, but also provides excellent flexibility and stability. Providing safety and strong solar products to end-users.



#### Easy to Install

Comparing with silicon solar module installations, easier to install, optimizing dimension, more safety and less weight.



#### Excellent Power Generating Features

Enable to harvest solar energy under low light. When silicon solar module affected by various weather conditions, ePower Tile generate power continuously.



#### Strong Anti-Shaded Effect

By unique thin-film features, the products perform better power output in real environment conditions even partially shaded by trees or other objects.



#### Dark Black Aesthetics

Aesthetic not only for appearances and also absorb wider spectral wavelengths, decrease reflection and glare.



## Mono Crystalline Silicon Solar Module

Deep Understanding of Solar  
Module, Stable and Reliable  
Quality

### ▶ About Gintung Energy

Gintung Energy Co., Ltd. established in 2005, Gintung Energy is under the Tatung Corporation as one of the leading solar module manufacturers. Their products have been applied and integrated to residential, commercial, industrial and architectural buildings, and are distributed to major solar markets worldwide.

Gintung Energy has passed ISO-9001 international quality management system, ISO-14001 environment management system, and ISO-45001 occupational safety and health management system certification. This shows that Gintung Energy's management quality are recognized globally, and will continue to promote green energy technology to the world.

# 同昱能源科技

*Gintung Energy  
Co., Ltd.*

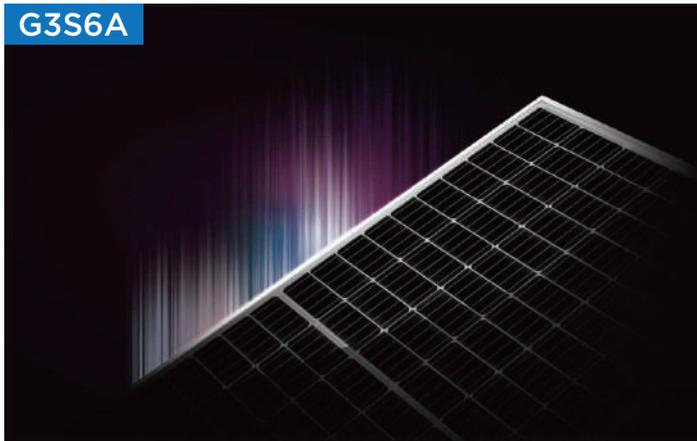
## **GINTUNG**

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# Mono Crystalline Silicon Solar Module



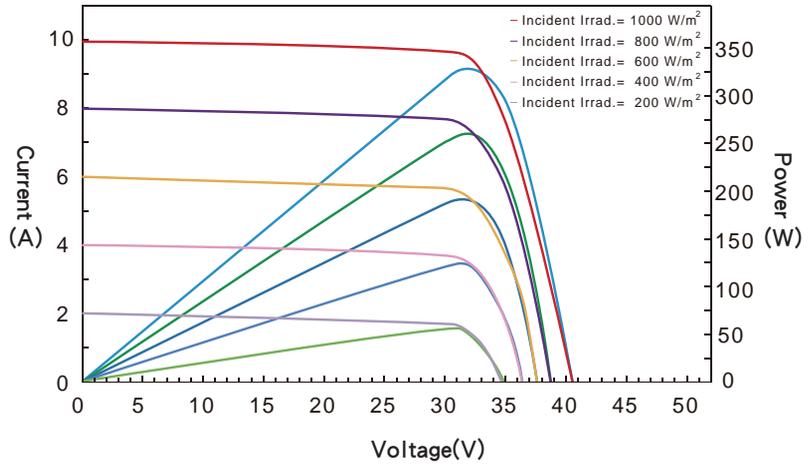
The product offers up to 10 years of warranty for repairs, returns and refunds. Furthermore, the firm guarantees their products could maintain 90% of its maximum power output within 12 years, and 80% of its maximum power output within 25 years.

Due to its special design, when compared with other products, the power generating unit has a smaller area. Furthermore, its features includes lower electrical resistance, high power generating efficiency, lesser lower hot spots, and loss of shade, and specially designed to withstand heavy loads. Moreover, the module has received Potential Induced Degradation (PID) examination and other certifications.

## Module Specifications

Type of Batteries	Mono 6 inch, Made in Taiwan
Number of Batteries (Piece)	120 pieces (6x20)
Module Dimensions	1,675 x 992 x 40mm
Glass	Thick 3.2mm/ ARC Coating
Module Weight	19kg
Cable Length	1,000mm
Junction Box	IP-68 Waterproof

## Current-Voltage Curve



## Product Features



### Lower Hot Spots

The electrical resistance is reduced between batteries, decreasing loss of shade and lowering the risk of lower hot spots.



### PID Resistant

Passed through IEC TS 62804-1 PID test: power attenuation ≤5%, Potential Induced Degradation(PID) examination 85°C, 85RH, 1000V for 96 hours.



### Heavy Load Resistance

The module heavy load resistance test is 7,200Pa.



### Highly Waterproof and Dustproof Junction Box

Use IP68 junction box, waterproof and dustproof.



### Made in Taiwan

Professional solar module manufacturer, 100% made in Taiwan.



### Passed through Multiple Certifications

Insulation test, outdoor exposure and UV test, fire resistant test, salt spray test, hail impact, and ammonia corrosion test.



## Solar Pump Drive System

Green Tech. Green Life.

### ► About Rhymebus

Rhymebus Corporation is established in 1987 and is a professional manufacturer of AC Motor Drives, Auxiliary Controllers and custom-made cases. The firm has strong strength of R&D and after sales services domestically and abroad.

Rhymebus implements "Responsibility" and "Innovation" as their management philosophy to respond to the energy-saving international trend. In accordance with government energy saving policies, operating efficiency of systems are greatly improved by combining Rhymebus AC Motor Drives, HVAC Systems and relevant products. Rhymebus will continuously dedicate to protecting the environment and creating a new low carbon emission era.

## 寧茂企業

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IATF16949:2016



ISO 9001:2015

## Solar Pump Drive System

By combining solar panels and inverters, RhymeBus Solar Pump Drive enables users to control motors in remote areas without power and conduct various applications, such as water pumping, irrigation pumping and wind extraction from fans.

In addition, solar cell could be simultaneously installed in power grid areas. By connecting a power smart switching device, it could automatically identify and select power source from either solar power or power grid, which fulfills users' demand of long operation time and effectively uses green energy.



▲ Areas for Product Applications



**RhymeBus Solar Pump Drive System**

## Product Features



### Security Protection

Fulfill international safety function standards and effectively resolve challenges, such as over pressure and dry run.



### Various Options

Automatically identify and switch between power grid and solar power.



### The Best Benefits

Original highly efficient motor control technique makes motor efficiency superior, eco-friendly and energy saving.



### Remote Control

APP developed by RhymeBus could remote control and monitor, making equipment management simpler.



### Automatic Control

Equipment could continuously operate due to built-in sunlight sensor with automatic power supply switching mode.



## PV Storage System

An All-in-one Solution

### ▶ About UrVOLT

UrVOLT Co., Ltd. was established in 2014, and has consecutively developed solar LED streetlight controllers, off-grid and "All-Function" hybrid PV inverters.

From 2019, the firm collaborated with other companies to launch its self-use PV storage system and cloud monitoring of CloudVOLT. UrVOLT is pushing for faster promotion and penetration rate of solar power and energy storage by expanding their product and relevant application. Viewing customer experience and sustainable environment protection as concept and aspiration, UrVOLT continues to promote their green products worldwide and raise its quality.

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## Self-Use PV Storage System



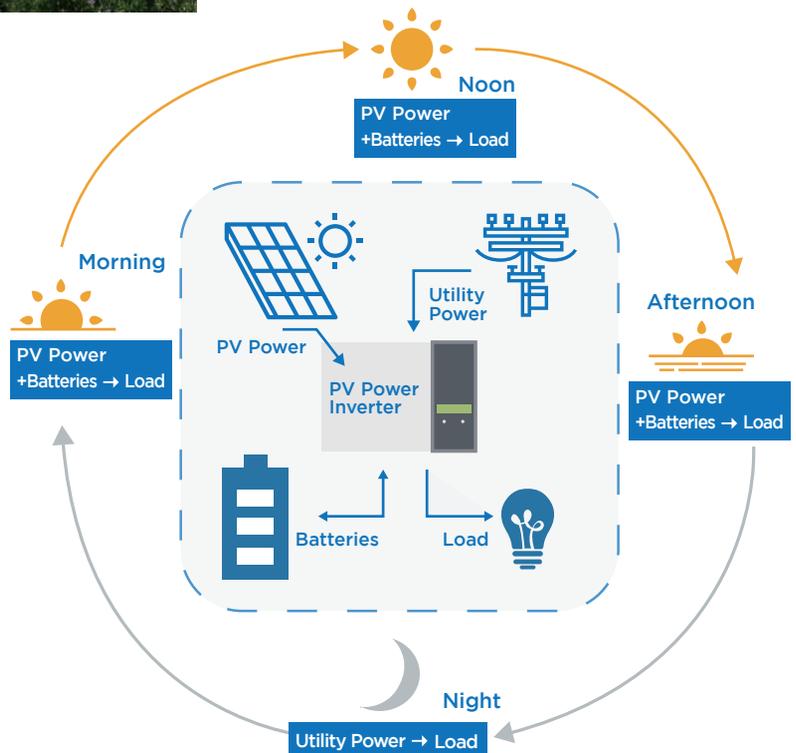
UrVOLT is the PV inverter supplier, which has the design capability and focuses on PV energy storage, with its technological quality recognized.

The integrated PV system developed by UrVOLT combines numerous advantages and has a wide range of applications, thus proactively promoted and becoming a solution for most of the clientele.

### Operating Methodology

When the PV power is insufficient, both solar power and batteries could supply power to the load; when the PV power is sufficient, solar power is able to charge the batteries. At nighttime, the load is fully supplied by utility power.

The built-in batteries could store and provide electricity when the PV power is insufficient, lowering energy needs and save costs. In the event of a power failure, the system could be transformed into UPS, which could continue to supply stable power, maintaining the daily life of the general public.



### Product Features



#### Turnkey Services

From solar panels, batteries to inverters; from project planning, to construction and installation.



#### High Efficiency

Long lifecycle design, with intelligent control, UPS, and multiple machines with expansion capacity feature.



#### Cloud Monitoring

Web based monitoring, iOS, Android and Wi-Fi cloud data recorder is compatible with the system.



#### High Returns

Low costs could reduce power bills, and receive high investment returns.



#### Made in Taiwan

Insist on using high quality local manufactured products, with stable technologies and reliable services.



## Water Based Solar Panel Floating System

Island Countries Solar Power  
Solutions



### ▶ About Sun Rise E&T

Sun Rise E&T Co., Ltd. established in 1995, Sun Rise E&T is committed to top quality high density polyethylene pipes. In 2010, the firm solely developed and promoted their floating solar energy system within the energy industry sector.

Realizing global warming challenges are urgent, the firm has long invested in research development of green materials and renewable energy, and has produced high density polyethylene pipes with lesser pollution to the environment. Sun Rise E&T actively promotes solar energy floating system domestically and abroad, excavating more possibilities for backup energy source. In addition, this could generate more cross-sector collaboration, maintain earth's sustainability, create potential business opportunities and professional developments for corporations.

## 旭東環保科技

*Sun Rise E&T  
Co., Ltd.*



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## ▶ Floating Solar Power System



Sun Rise E&T successfully developed the first floating solar system in 2010. By maintaining the core value of continuous optimization and improvement throughout the years, the firm has obtained various certificates and received patents from over 44 countries. Furthermore, actual establishments of the floating solar power system domestically and abroad are more than 100MW.

Sun Rise E&T manufactures the base of the floating solar power structure by using HDPE-PE100 material that could be used for more than 25 years; not only could it be recycled, but also does not affect the water quality. Additionally, it also holds other features such as anti-corrosion, acid and alkali resistant, high stability and high tenacity.

With the special design, the aerodynamics of this structure could effectively raise the volume of power generation. Furthermore, due to structural strength, it allows the system to naturally adapt to the water level changes within dry and wet terrain, thus largely raising the durability of solar power products.

The system could adjust the angle and position of the panel according to its needs and provide anchor design that fulfills the requirements. High strength of its system combines with appropriate buoyancy design and stable anchor has not only safely passed Japanese rigid wind tunnel tests, but also various wind disaster tests due to past abundant installation experiences.



Floating System Main Walkway

## ▶ Product Features

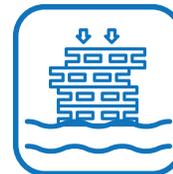


Safety Access to Floating System from Shore



### Solar Panels and Relevant Components

Own international patent, components for the floating system is designed to adjust its panel slightly in order to face the sun's ray.



### Buoy Base

The integrally injection molded buoy base carries and connects solar panels of different installation areas.



### Pipeline Repair Bridge

The foot pedal connected to the buoy base could provide daily construction and maintenance by installing pipelines or safety handrails.



## Customized Professional Integration of Green Energy

Specialized in Integration of  
Green Energy Total Solution



### ▶ About STC International

STC International Co., Ltd. established in 2006, STC International started as a machinery manufacturer, and committed to environmental protection matters. Considering that household market will be the main focus for green energy industries in the future, and understanding the importance of “storing power”, STC International transformed itself to a solar energy system integration supplier.

Due to rapid changes of the industrial development, STC International recently starts to develop various solar energy total solution and relevant services within the Southeast Asian countries, from street light to household overall green energy design, and clientele range from corporations, factories to personal houses.

## 展威國際

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## ▶ Micro Solar Power Energy Storage System

Micro Solar Energy Storage System are mostly used in areas in which utility power is difficult to reach or where grid is usually interrupted. The firm is able to provide a convenient power solution for remote areas or countries by evaluating the appropriate specifications for customization according to clientele's actual needs.



Support 24 hours refrigeration system



Improve people's lives



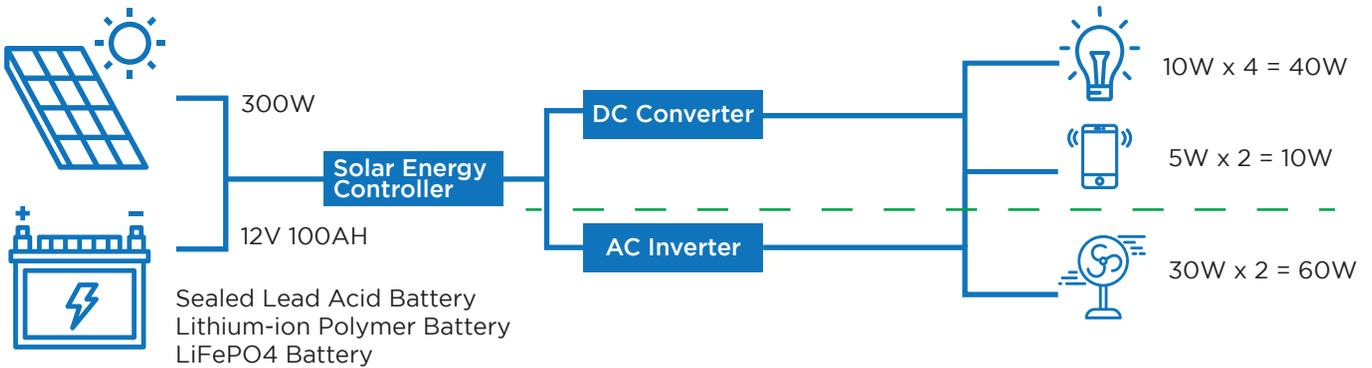
Compact solar system



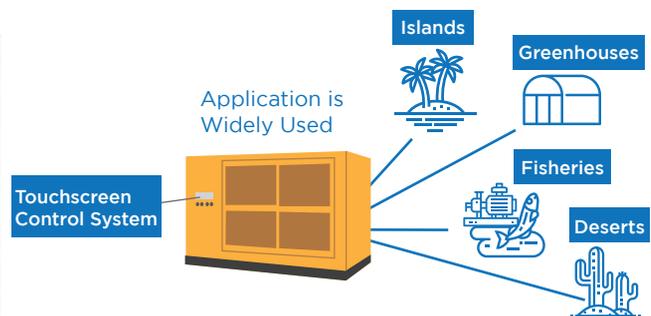
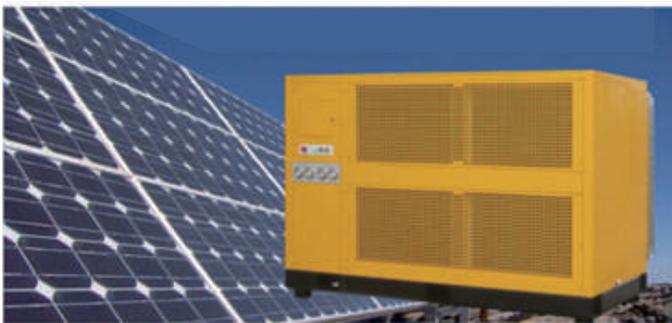
Support whole office energy

### Specifications

Solar Module	50 - 300W
DC Converter	300W / 600W
AC Inverter	500W / 1000W
Battery	Sealed Lead Acid Battery Lithium-ion Polymer Battery LiFePO4 Battery



## ▶ Solar Energy Water Production System

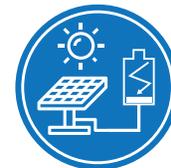


- ◆ Able to produce 30-3200 liters of water per day.
- ◆ Operating temperature is 5-40°C, operating humidity is 35-95 degrees.
- ◆ Able to fulfill the needs of various regions when combined with the solar energy system power generation.
- ◆ Drinking water could be produced when combined with filter (verified by SGS).



#### High Performance

Water is continuously produced in areas with relatively low humidity.



#### Low Power Consumption

Could be applied in various environments with power shortages when combine with solar panels.



#### Touchscreen

Grasp the current status of equipment by operating the touchscreen.



## Design Planning of Renewable Energy Power and Micro Grid System

The Green Solution When  
Combine with Sunlight, and  
Create Mutual Benefit



### ▶ About Ecolohas

Ecolohas Energy Technology Co., Ltd, established in 1998, focuses on integration of renewable energy system and power storage system, and owns a strong energy communication and power configuration technology team. Recently, they emphasize and invest heavily on the research development of solar energy system and power storage system design. Furthermore, they are proactively integrating and managing the products to build an array of energy network, decentralized energy, and smart micro-grid, which fulfills community needs. This could raise renewable energy power efficiency, thereby minimizing excess carbon emissions challenges, which would lead to a green sustainable, environmental friendly, and energy saving world.

## 節能屋能源

*Ecolohas Energy  
Technology  
Co., Ltd.*

**ecolohas**  
Ecolohas Energy Technology

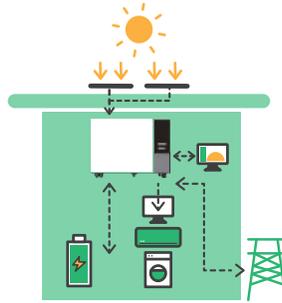
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## Product Introduction

### Smart Energy Storage System

The mobile smart energy storage system is specially developed for indoor and outdoor electricity use and is strong, durable, waterproof and dustproof. Furthermore, it has remote monitoring features that is able to monitor the solar energy power generating status and the battery storage status through the internet anywhere anytime. Cost for maintenance is low, and completely made in Taiwan.

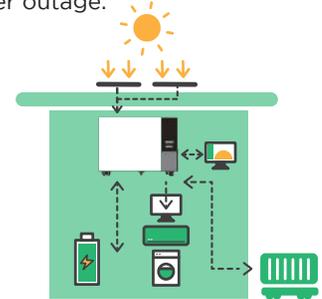


Hybrid Energy Storage System

- Able to provide electrical load from sunlight or power grid.
- Able to store solar photovoltaic into the batteries or onto the power grid.
- Become the emergency backup power during power outage.

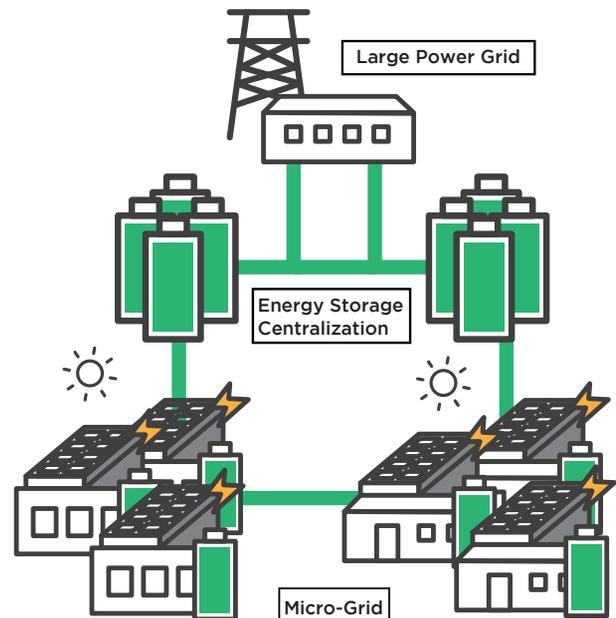
Off Grid Type Energy Storage System

- Able to provide electrical load from sunlight or fuel cell.
- Able to store solar photovoltaic into the batteries.
- The fuel cell used as a backup power.



### Smart Micro-Grid System

The home based smart micro-grid system integrates renewable energy system, energy storage system, solar energy power converter, 2 way charging and discharging battery device and smart energy management system (SEMS). By utilizing SEMS, and relevant components, the system could maximize solar energy. The product could also provide electricity for household appliances and equipment, such as electric lights, air conditioners...etc. After years of testing, the system have been verified in islands and disaster areas within Taiwan. By combining distributed energy storage facilities and centralized energy storage control, it could truly achieve the goal of smart micro-grid, in which the utility power substitution rate can reach 80%.



Solar Energy + Small Energy Storage

Operating the Smart Grid and Micro Grid Integration System



#### Innovative Technology

Solar energy is a ready to be used energy.



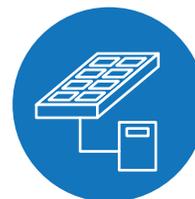
#### Low Malfunction Rate

Exquisite intelligence control.



#### Double Support

Automatic adjustment of solar energy and utility power.



#### Convenient Installation

Small sized quick coupling.



#### Great Efficiency

Control the Maximum Power Point Tracking (MPPT).



## Smart Household Optical Storage System

Smart Optical Storage System,  
Creating a Prosperous Era for  
Environmental Protection

### ▶ About United Renewable Energy

United Renewable Energy Co., Ltd. (URE) integrated the upstream, middle stream and downstream of the green energy industry and created a new vision for Taiwanese industries. Passivated Emitter and Rear Cell (PERC) relevant products have matured and are moving towards production of high end technologies such as Heterojunction Technology (HJT) battery solar panel. Currently URE is heading in the direction of global energy storage strategy in order to provide a comprehensive total solution for renewable energy.

The establishment of URE will adhere to Taiwan's energy policies and assist in transformation and creation of Taiwanese solar energy enterprises that holds international competitiveness. This leads to a prosperous integration platform that will allow domestic green energy industry continue to thrive in Taiwan.

## 聯合再生能源

*United Renewable  
Energy Co., Ltd.*



# URE Household Optical Storage System



### Support off grid or connecting grid requirements

Support various product applied scenarios that could directly do hybrid coupling or connect to the power distribution board for backup power.



### Support mobile APP and could be operated remotely

Remote control household optical storage system via APP.



### Used as a UPS

Used as a UPS to support household basic power when the utility power is disconnected.



### Elegant and Stylish Product Appearance

The design is elegant and stylish, therefore the product is able to integrate with the household decorations.



### Weather resistant outdoor rainproof mechanism

Could be placed outside when there is insufficient space indoors. Furthermore, the system is waterproof, dustproof and durable.

## System Specifications

Model	MA1
AC Output Power	5kW
Maximum PV Input Power	6kW
System Battery Capacity	11.4kWh (5.7kWh * 2)
Useable Battery Capacity	10kWh (90% DoD)
Battery Type	Lithium iron phosphate (LFP)
Weather Resistant Mechanism	IP65 water resistant rating
Warranty Length	5 years under warranty and 10 years of maintenance warranty

## Photovoltaic Inverter Specifications

Max. PV Input Current	12Ax2ports
Max. PV Input Voltage	580Vdc
MPPT Part number	2 ports
MPPT Voltage Range	125V-550V
Max. Charge and Discharge Current	100A
Max. Charge and Discharge Power	5kW
Power Phase	Single phase
Rated Voltage Output	220-240Vac
Power Grid Voltage Range	180-270V

Rated Power Output	50/60Hz
Off-grid Switching Time	10-20mSec
Information Display	LCD
Working Environment Temperature	-10 -50°C
Working Environment Humidity	15% -85% (without condensation)
Dimensions	600x250x600mm
Weight	60kg
Connecting Grid Specification	VDE 4105, VDE0126, AS 4777.2/3, CE10-21,G59/3
Safety Specifications	IEC 62109-1&-2, CE-EMC

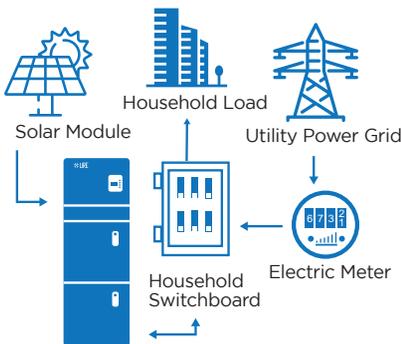
## Battery and BMS Technical Parameters

Battery Module Model	MA1-BAT
Battery Capacity	5.7kWh
Battery Useable Capacity	5kWh (90%DoD)
Weight	65kg
Dimensions	600x250x600mm
Max. Number of Battery Parallel Circuit	6
Max. Charge and Discharge Current	56A (0.5C)
Lifecycle	≥6000 times

## Product Application

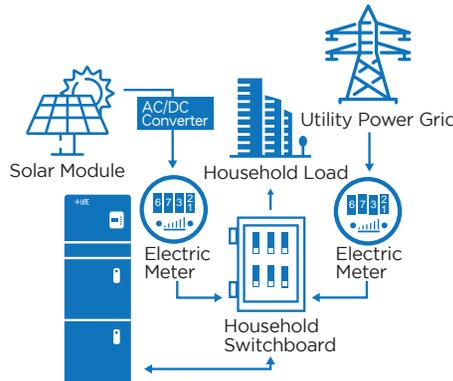
### 1. DC Coupling

The product is DC coupled with PV and mostly used in application of newly installed system.



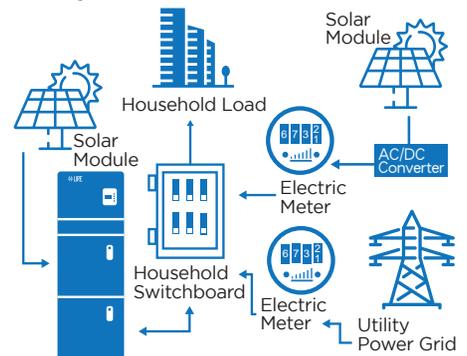
### 2. AC Coupling

The product is AC coupled with PV and mostly used in the application of system modification.



### 3. Hybrid Coupling

The product is AC and DC hybrid coupled with PV and mostly used in application of solar module installation and system modification.



## iPV Tracker

Precise Tracking of the Sun



## 太陽光電集團

*Big Sun Group  
Co., Ltd.*

### ▶ About Big Sun Group

Established in 2006, Big Sun Group Co., Ltd provides EPC installation, construction, and maintenance projects to domestic solar power stations. In addition, the group provides dual-axis solar iPV Tracker and iPVita Cloud Management System that monitors solar equipment in real time. The corporation focuses on being a solar power technology pioneer and solutions provider in system services among the green energy industry. Currently Big Sun Group is strongly committed to expanding iPV Trackers in services relevant to global licensing, and promoting the “One terrain with multiple yields” concept, enabling the system naturally coexist with the environment. With Taiwan as the starting point, the corporation will continue to expand services relevant to global licensing and make contributions to green-energy industries and sustainable economy across the world.



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## ▶ iPV Tracker Solar System



iPV Tracker is the firm's representative product which raises solar power efficiency and balances the power grid. It allows continuous flow of solar energy to transform into daily power consumption in an economical and efficient manner.

The patented cable-driven dual-axis solar tracking system features 360° rotation angle and has a sturdy structure. In addition to its reliability, its weather resistant features could also lower maintenance and operating costs.

This system could combine the high-efficiency, bifacial module and various different application solutions that could maximize solar photovoltaic power capacity, lower unit power costs and fulfill daytime power supply curve of the power grid. Furthermore, when combined with iPVita energy management system, it could achieve high availability, becoming the new generation of smart solar photovoltaic system.



**Universal Joint**

Set up dual-axis on the pillar, so the platform could rotate in 2 directions.



**Cable**

The platform is shifted by 4 corners, and could assist in kinetic equilibrium of the product.



**Spring**

The shock absorbing function could assist in raising its wind resistance.



**Reel**

Accurate tracking within  $\pm 0.5^\circ$  deviation.

## ▶ Product Features

### Weather Resistance



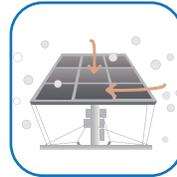
**Wind Resistant**

When the wind speed reaches certain magnitude, the solar panel changes into safe mode, lying flat to reduce its wind affected area.



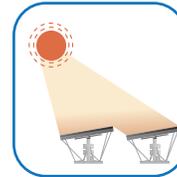
**Dust Removal**

The panel could adjust the tracking and tilting position based on the varied wind direction of seasons, in order to reduce the accumulation of sand and dust.



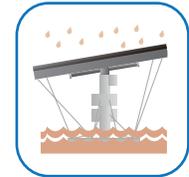
**Snow Removal**

The solar panels could be set to tilt to the fullest extent and rotate, so the accumulated snow could slide off.



**Back Shading**

Solar panels are tilted to the largest angle in order to prevent mutual shading, and could absorb the most sunlight and raise the land usage rate.



**Flood Avoidance**

The possibility of malfunction by flooding and flood impact under extreme weather is lowered by designing the height of main electric motor control components, such as motor and controllers, more than 1.5 meter.

### iPV Tracker Global Licensing Services

Striving for transformational development, Big Sun Group mainly focuses on global technology licensing of iPV Tracker Solar System. Furthermore, the corporation works with global partners to mutually implement the system and promote the "One terrain with multiple yields" concept which supports ecological coexistence.

Companies and partners that received licensing permissions are able to design the tracker based on their specific needs, and could use the iPV Tracker cable-driven technology, a key point to the system. The corporation could accelerate sales speed of the iPV Tracker by using diverse ways of collaboration.

Big Sun Group has already expanded on the recruitment of licensees around the world. Licensed iPV Tracker Solar System with its "One terrain with multiple yields" model has already successfully applied globally and receiveds great feedbacks, this reduces carbon emissions, improves the international environment and contributes to the sustainable economy.



## Integration of Power Vehicles and Electromechanical System

Electromechanical  
System Integrator



# 威量電能

*Velotric Energy  
Co., Ltd.*

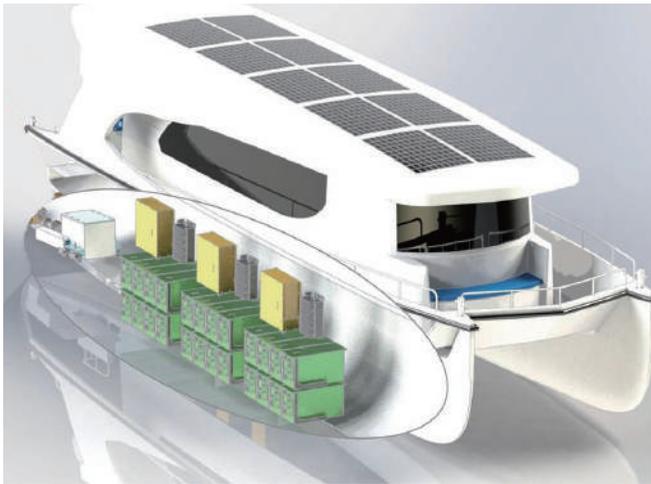
### ▶ About Velotric Energy

Velotric Energy Co., Ltd. is dedicated to the development of sectors related to the design of battery module, battery health management, environmental protection energy storage system and electric vehicles. The firm also holds the research development of various batteries and electromechanical systems, grasping numerous key components and integration technologies.

Velotric Energy continues to promote electric ferries domestically and partakes in the power system planning of Israel fuel cell batteries firm, which allows Taiwanese industries to rise and shine on the global stage. Velotric Energy will continue to proactively develop eco-friendly energy saving electric vehicles and green products by seeking a better future for the world.



## ▶ Electric Ferry System



The electric ferry system has lesser restrictions than conventional diesel ferries and has the advantages of energy saving, zero carbon emission, low pollution and low noises. Furthermore, the power is sufficient enough to fulfill all the sailing schedule throughout the day.

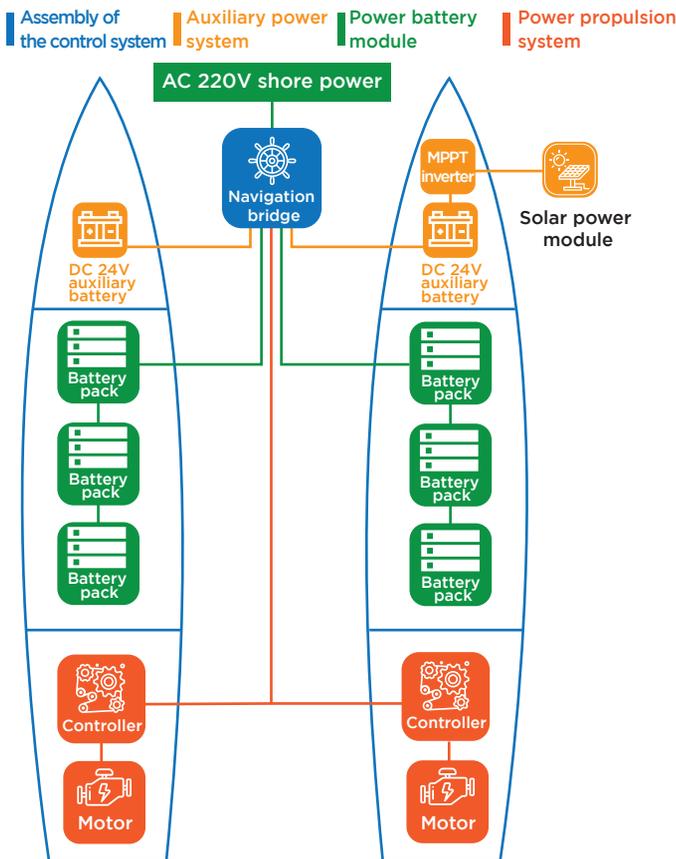
The power system of the electric ferry adopts DC96V, a safe and low voltage. In addition, 6 units of 10kwh batteries are connected in parallel sets to disperse risks of the 60kwh lithium iron power battery. Velotric's protection against electric shock is the most requested safety requirements within low voltage modules.

Velotric Energy has already completed over 14 installations of electric ferry system till now, and has functions allowing to remote monitor the battery and motor operating status and its temperature. The system assists ship owners to effectively manage safety and health status of the battery.

## ▶ Information

### Structure of the Power System

Velotric Energy is able to offer custom-made structure of the power system according to the actual needs of the ship owners. The battery configuration and whether to install solar power modules could be customized in order to optimize the overall system to the best status. The structure below is model of the catamaran.



### Power System Specifications



Motor



Controller

#### Motor Parameter List

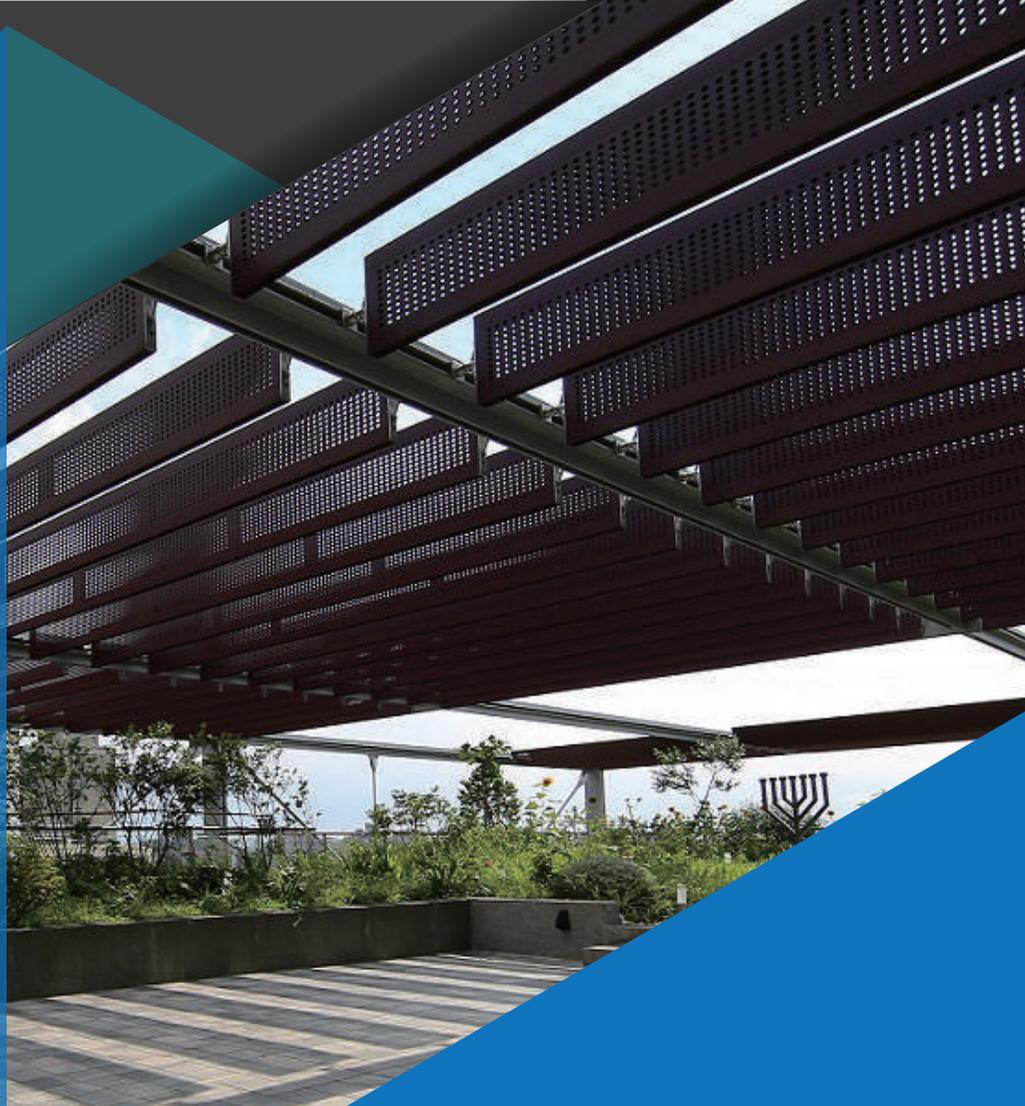
Rated Power	30KW	Insulation Grade	F
Rated Current	300Amp	Max. Current	450Amp
Rated Revolution	1000RPM	Max. Rotation Speed	1200RPM
Rated Torque	300Nm	Protection Rating	IP 54

#### Controller Parameter List

Input Voltage	DC72-750V	Rated Input Voltage	DC96V
Max. Input Current	340Amp	Control Method	Vector V/F Control
Accuracy of Speed Control	30.2%	Protection Rating	IP67
Cooling Method	Forced water cooling	Vibration	< 4.9m/s <sup>2</sup> (0.5G)
Protection Function	Short Circuit, Overcurrent, Overvoltage, Under Voltage, Overheating, Overload Protection	Storage Temperature	-40°C~+70°C

## Establish Waste Recycling Ecosystem

Innovative Technologies  
For Waste Recycling



## 台以環能

*TXI Eco Inc.*

### ▶ About TXI Eco Inc.

TXI Eco Inc. is established with the goal of creating a perfect agricultural circular economy. It simultaneously resolves the two major challenges of waste treatment and energy storage through energy and resource utilization of agricultural waste.

TXI Eco introduces relevant agricultural and waste treatment technologies from Israel, Europe and the United States through Taiwan Israel Investment Cooperation Center (TXI Center). The firm then combines and creates various solutions and technologies relevant to the agricultural circular economy. Furthermore, TXI Eco is able to establish Taiwan's competitiveness in the long term by combining and exporting Taiwan R&D capabilities from the industry, government and academic sector to the international agricultural circular economy market.



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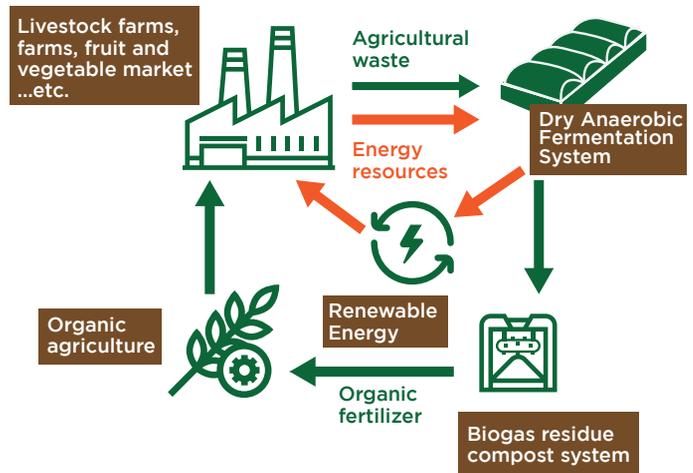
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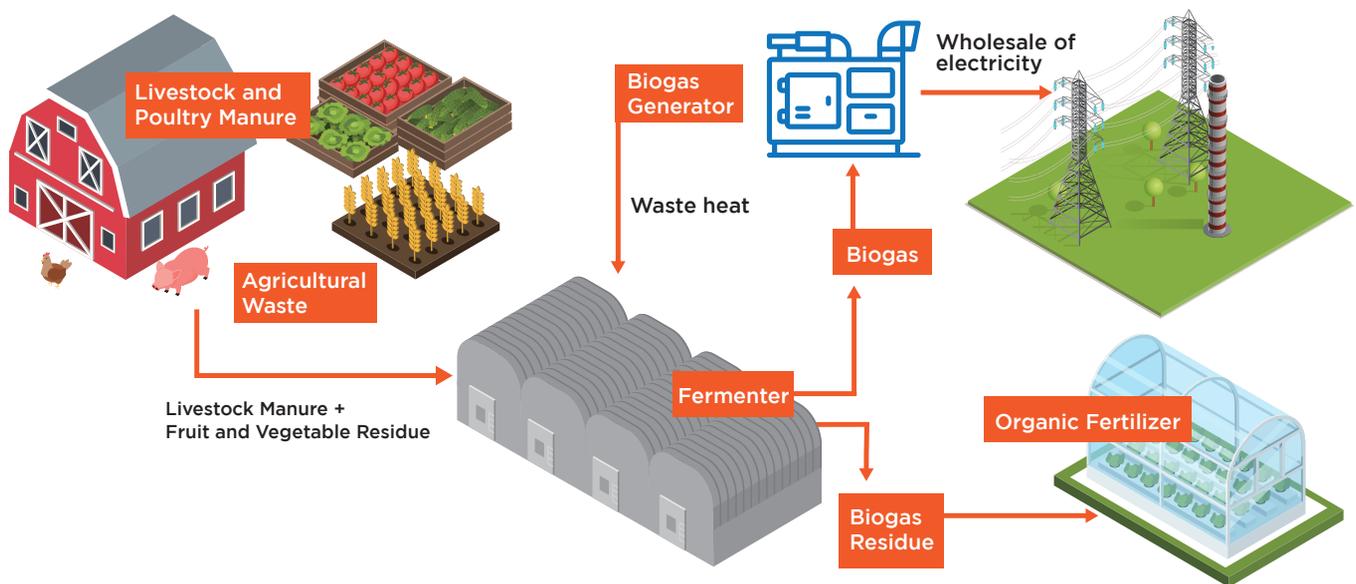
## ▶ Dry Anaerobic Fermentation Technology

### Technology Transfer from Industrial Technology Research Institute (ITRI)

The technology is applied to process agricultural waste, fruit and vegetable residue, poultry manure...etc. Organic waste can produce biogas through dry anaerobic fermentation, after desulfurized to generate electricity for thermoelectric application.



## ▶ Anaerobic Fermentation and Electric Power Generation and Application of Compost



#### Agricultural Waste

Various agricultural waste is not easily discarded, and garbage is transformed into gold.



#### Energized

Through Dry Anaerobic Fermentation System, biogas is produced to generate biomass green electricity.



#### Composted

After the fermentation process, the biogas residue is processed as compost, which produces organic fertilizer. There is zero waste of resources.



#### No Wastewater

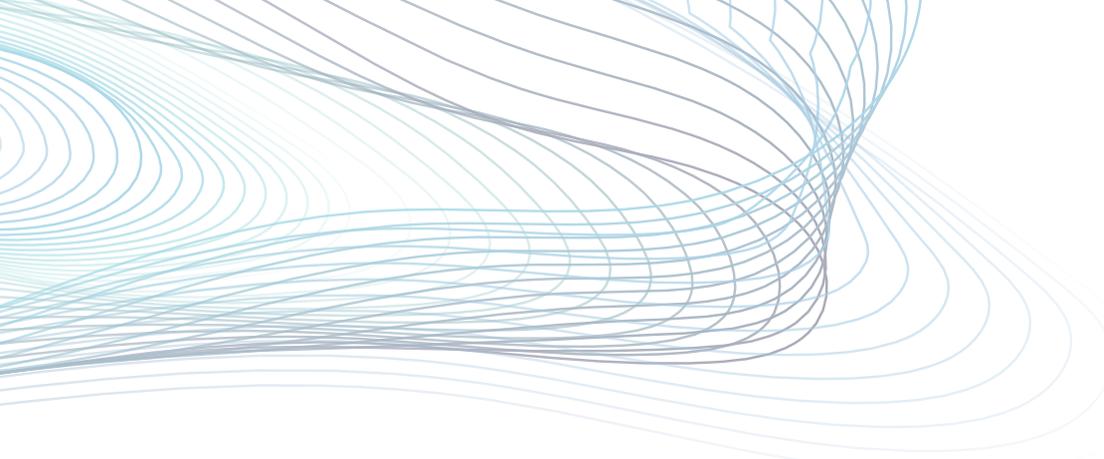
There is no additional water supply for Dry Anaerobic Fermentation System, which extends to low demand for wastewater treatment.



#### Odorless

The system has undergone strict control management and design, thus not causing any odor and air pollution due to the completely closed fermentation process.





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The Energy Expert on Lithium Battery

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## Rhymebus Corporation

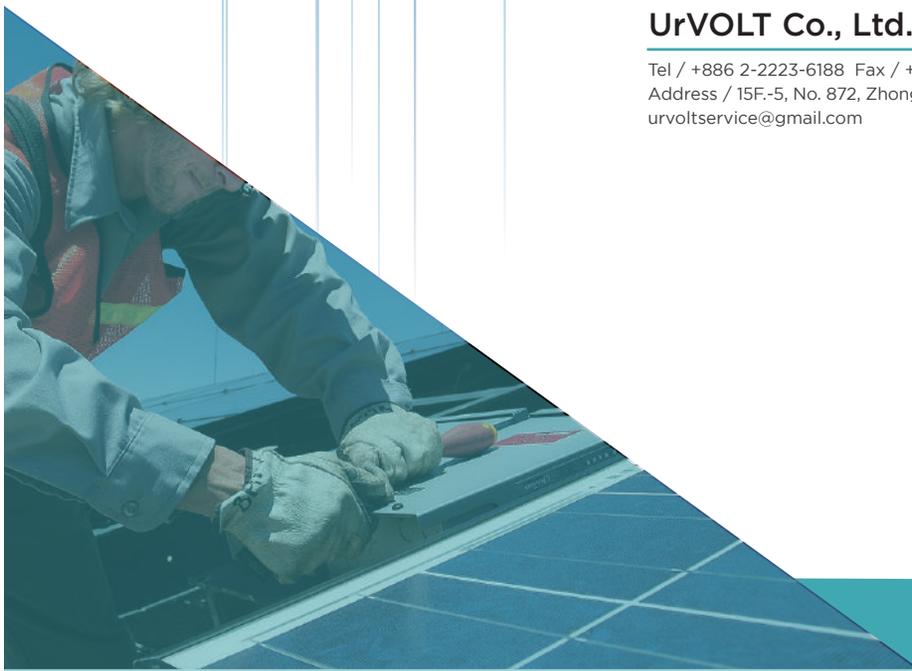
Solar Pump Drive System

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Establish Waste Recycling Ecosystem

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# GREENING YOUR LIFE



經濟部推動綠色貿易專案辦公室  
GREEN TRADE PROJECT OFFICE  
MINISTRY OF ECONOMIC AFFAIRS

Ad by Bureau of Foreign Trade,  
Ministry of Economic Affairs (BOFT, MOEA)

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