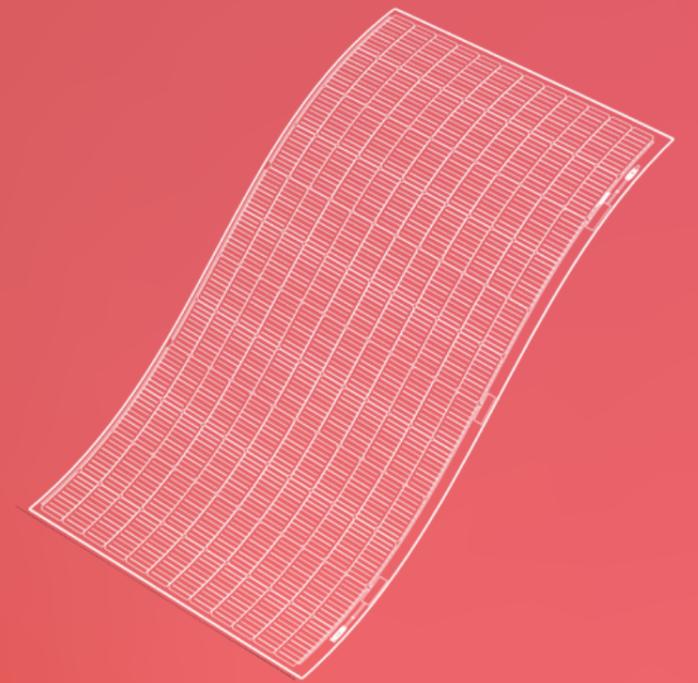


SUNMAN ENERGY

CORPORATE BROCHURE

2023



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ABOUT SUNMAN

Sunman Energy is a technology company founded by a group of industry veterans delivering the future of Solar. Through the research and development of composite materials, Sunman has successfully commercialized the world's first glass-free, lightweight and flexible Panel – eArc. Replacing glass completely, eArc brings solar power to markets and applications scenarios that were previously impossible.



The World's First **GW-Scale** Lightweight PV Module Manufacturing Base

Sunman's GW-scale lightweight PV module manufacturing facility sits on a 260-acre commercial park in Jiangsu Province, China. The facility houses an R&D center, along with vertically integrated composite material and module production lines. Sunman's lightweight module production line is the first of its kind, combining advanced equipment technology with effective information management systems. The production equipment is also compatible with 210 mm, 182 mm, 166 mm, and other large-sized silicon wafers. In terms of quality control, the line is equipped with four high precision EL screening check points and ABB robotic arms to reduce human interference during production.



eArc TECHNOLOGY

eArc - Ultra-light, Glass-free Technology

eArc is the world's first glassless solar module. An innovation combining proven crystalline silicon solar cells with Sunman's patented composite material, eArc has the same durability and robustness of conventional glass modules. However, unlike glass:

eArc is akin to a flexible "solar skin", 70% lighter and up to 95% thinner. eArc requires 0 penetration or mounting equipment during installation, cutting time-on-site by 40%. eArc is easier to transport in bulk - up to 60% more kW per pallet. eArc targets a variety of applications glass modules cannot service.

Do More with Less - eArc Applications

Sunman sees eArc as a core-enabling technology that will expand the market and deployment of solar. Currently, eArc addresses several markets that glass modules underserve, including lightweight C&I roofs, waterproof membrane roofs, vehicle integrated photovoltaics and off-grid energy.

Moreover, eArc is paving the way for new innovations, gaining momentum in cross-market applications such as building materials and robotics.

SUNMAN PRODUCTS

eArc Modules

Unlike conventional glass modules, installation of eArc series does not involve penetrating or compromising the waterproofing membrane of the roof. Instead, eArc is bonded onto the surface via adhesives. eArc is extremely suited towards lightweight corrugated metal roofs, glass roofs and polymer roofs.



SMF Series

The SMF series is frameless and has the most flexibility. This series of products is suited to many innovative cross-market applications.



The weight of F series sits at 3.2 kg/m² with a minimum bending radius of 0.5 m. The frameless design also removes the need of earthing a frame.

Off-Grid



VIPV Series

Electric and zero-emission modes of transportation, such as trains, yachts, mopeds, logistic vehicles are becoming increasingly prevalent in the modern economy. eArc can help electrify the transportation sector by increasing cruising distances and powering core functions, such as lighting, air conditioning and tail lifts.



Portable eArc Charger

Leveraging eArc technology, Sunman has developed a portable solar charger, which comes with a charge controller and an optional battery. The solar charger is perfect to support energy needs during outdoor activities and remote travels.

BIPV



eRoof

The eRoof is a prefabricated BIPV (building integrated photovoltaic) product that seamlessly integrates eArc with metal roofing sheets. Careful design attention was given to cell layout and cable management, resulting in an aesthetically pleasing construction. The eRoof maintains the same fireproofing, waterproofing and installation characteristics of traditional metal roofs.

SUNMAN APPLICATIONS



Low Load-Bearing Roofs

eArc is the go-to solution for roofs that suffer from structural issues. An estimated 40% of commercial and industrial roofs lack the minimum load capacity to support conventional glass modules. Glass modules can only be installed when buildings have a minimum load capacity of 15 kg/m². When buildings fall under this threshold, additional structural strengthening is required for solar to be installed, which is costly and disruptive to on-site business activities.



Carports

The foldable solar p v roof covers the parking lot of Jakobsbad-Kronberg cable car and will power various on-site activities, such as EV charging and cable car operation.

Waterproof Membrane Roofs

Roof membranes, such as TPO and PVC, are becoming increasingly popular waterproof covers for commercial roofs. Due to penetration issues, waterproofing membranes cannot accommodate conventional glass modules. By bonding eArc to these roofs, new solar generation capacity can be created.



Transportation

As the transportation sector strives to lower its carbon footprint, many modes of transport, such as trains, yachts, RVs and trucks look to eArc as a means to electrify core equipment, such as air conditioning, tail lifts and lighting.



Curved Roofs

Conventional and rigid glass modules cannot be installed on roofs with curved angles. On the other hand, eArc modules can be bonded directly to these roof types. Moreover, the flexibility of eArc modules compliment the curvature of these buildings, providing an aesthetic solar solution.



Outdoor and emergency

In locations where grid access is limited, Sunman's portable products can greatly improve energy access. Simply lay the modules in an area with sufficient sunlight and connect your electronics.

Balcony Solar

Balcony solar is the product we designed mainly used on Balcony. With the character of light weight, it could be used on the balconies higher than 4 Meters. Passing the IEC61215& 61730 standard and its industry level Quality give the customer reliable guarantee on long lasting power output.



Building Integrated Photovoltaics

In recent years, the substantial decrease in the cost of solar power has opened the doors for a diverse set of applications, including building integrated photovoltaics. Sunman's eRoof is a product that can be used in the construction industry, targeting both new builds and renovations.



SUNMAN PROJECTS



Low Load-Bearing Roof
Jiangsu Province, China | 30MW

Low Load-Bearing Roofs ▾



Low Load-Bearing Roof
Fujian Province, China | 11.5MW



Low Load-Bearing Roof
Netherlands | 3.2MW



Low Load-Bearing Roof
Hainan Province, China | 3.5MW



Low Load-Bearing Roof
Jiangsu Province, China | 4MW



Low Load-Bearing Roof
Germany | 1.8MW



Australia National Maritime Museum
Australia | 235kW

Low Load-Bearing Roofs ▲



Low Load-Bearing Roof
Hainan Province, China | 1.5MW



Low Load-Bearing Roof
Netherlands | 1MW



Low Load-Bearing Roof
UK | 1.8MW



Low Load-Bearing Roof
Zhejiang Province, China | 1.8MW



Low Load-Bearing Roof
Zhejiang Province, China | 2MW



Low Load-Bearing Roof
Germany | 680kW

Waterproof Membrane Roofs ▲



Bitumen Membrane
France | 1.5MW



PVC Membrane
Norway | 450kW



TPO Membrane
Australia | 325kW



Bitumen Membrane
Netherlands | 2MW



Bitumen Membrane
Zhejiang Province, China | 1.4MW

Carports



World's First Retractable Solar Carport
Switzerland | 420kW



Curved Carport
UAE | 273kW



Curved Carport
Jiangxi Province, China | 143kW



PVDF Membrane Carport
Shandong Province, China | 10kW



PVDF Membrane Carport
Yunnan Province, China | 7.5kW

Facade



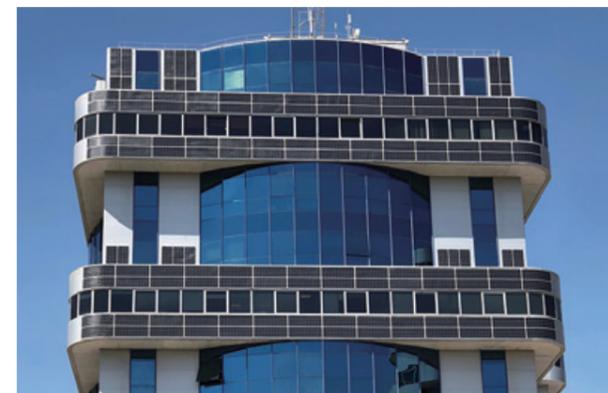
Solar Facade
Shanxi Province, China | 1MW



Solar Facade
UAE | 30kW



Solar Facade
Norway | 200kW



Solar Facade
Spain | 30kW



Solar Facade
Germany | 33kW

Others ▾



Curved Metal Roofs
Australia | 100kW



Expo Dubai 2020
UAE | 93kW



Expo Garden
Jiangsu Province, China | 52kW



Balcony Solar
Germany | 310W



Agricultural greenhouses
Ningxia Province, China | 22.5kW



Zero Carbon Park
Jiangsu Province, China | 1MW

Off-Grid ▾



The World's First Solar Train
Australia | 6.4kW



Cold Chain Vehicle
Switzerland | 2.6kW



Trucks
Netherlands | 2.2kW



Metro
HongKong, China | 2.3kW



Yacht
Australia | 6.5kW

SUNMAN ADVANTAGES

400_{MW}

Cumulative Volume

As of 2022Q4, the historical cumulative shipment volume of eArc has reached 400 MW, with a compounded annual growth rate of 100% - ranking first in the field of lightweight and flexible solar modules.

100+

Patents

Since 2014, Sunman has been constantly innovating. As of 2022Q4, Sunman's R&D team has developed 124 patents, of which 26 are patents for inventions.

30+

Sale Territories

Sunman's sales territories cover more than 30 countries across 5 continents. Sunman will continue to expand its global reach and service new markets and regions.

20+

Professional Certifications

eArc is the first module of its kind to pass the same durability and safety tests as glass modules, including IEC 61215:2021, IEC61730:2016 and UL61215, UL61730 (USA). The IEC61215 confirms eArc's ability to withstand prolonged exposure to open air climates. eArc has also passed additional module quality assessments, including 3000 hours of damp heat, UV exposure (25 years equivalent), PID, salt mist, blowing sand and ammonia corrosion tests.



Investors

Sunman is backed by Softbank CVC, CEFC (Clean Energy Finance Corporation), NIO CAPITAL, Southern Cross VENTURE PARTNERS and CITIC CAPITAL.



Founder

Sunman is the brainchild of pioneering energy scientist and entrepreneur Dr. Zhengrong Shi. In 2000, Dr. Shi founded Suntech Power, a pioneering solar panel manufacturer that listed on the New York Stock Exchange. As an academic, Dr. Shi has published more than 100 papers and is the owner of 80 patents. Dr. Shi is also a professor at the University of New South Wales and an academician in the Australian Academy of Engineering.

