SUNMAN Lightweight Solar Pioneer

SUNMAN ENERGY

CORPORATE BROCHURE

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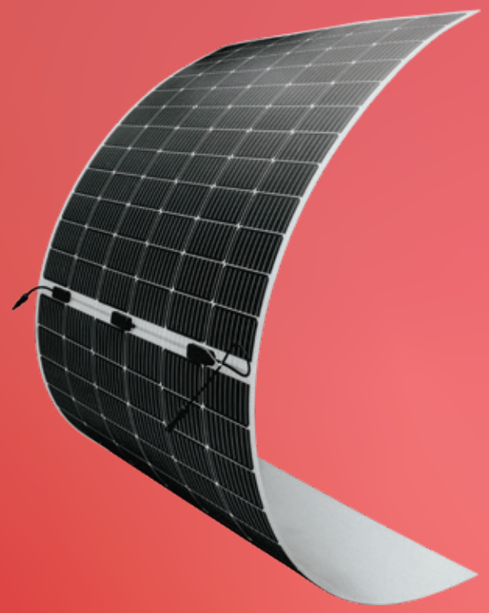
ABOUT SUNMAN

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. As of 2021Q4, 150 MW of eArc has been installed worldwide.

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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 3.3 kg/m² with a minimum bending radius of 0.5 m. The frameless design also removes the need of earthing a frame.

Off-Grid

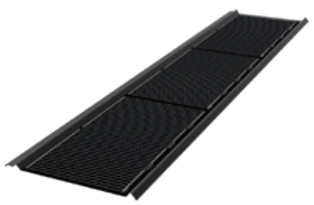
VIPV Series

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.

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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/㎡. 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.

Waterproof Membrane Roofs

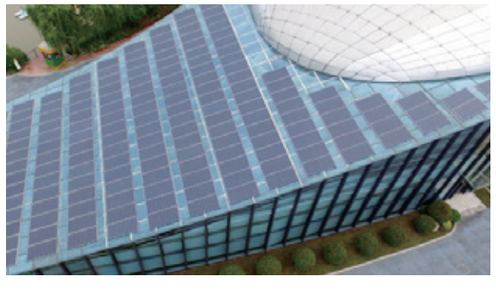
Roof membranes, such as TPO and PVC, are becoming increasingly popular waterproof covers for commercial roofs. Due to penetration issues, waterproofing membranes cannot accommodate conventional glass modules. By bonding eArc to these roofs, new solar generation capacity can be created.

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.

Glass Roofs

Glass roofs typically cannot accommodate the penetrative installation methods associated with conventional glass modules. However, eArc can be bonded on top of glass roofs and unlock the generation potential of these structures.



Carports

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

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.

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.

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.

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PROJECTS

Low Load-Bearing Roof

Jiangsu Province, China | 7MW

Low Load-Bearing Roofs

Low Load-Bearing Roof

Jiangsu Province, China | 1.2MW

Low Load-Bearing Roof

Zhejiang Province, China | 600kW

Low Load-Bearing Roof

Shanghai, China | 600kW

Australia National Maritime Museum

Australia | 235kW

Low Load-Bearing Roof

Jiangsu Province, China | 530kW

Low Load-Bearing Roof

Netherlands | 500kW

Low Load-Bearing Roofs

Low Load-Bearing Roof

Germany | 460kW

Low Load-Bearing Roof

Henan Province, China | 280kW

Low Load-Bearing Roof

Germany | 245kW

Low Load-Bearing Roof

Beijing, China | 300kW

Low Load-Bearing Roof

Shandong Province, China | 275kW

Gas Station

Chongqing, China | 150kW

Waterproof Membrane Roofs

Bitumen Membrane

France | 500kW

Norwegian Dairy Farm

Norway | 137kW

TPO Membrane

Spain | 80kW

Bitumen Membrane

Germany | 225kW

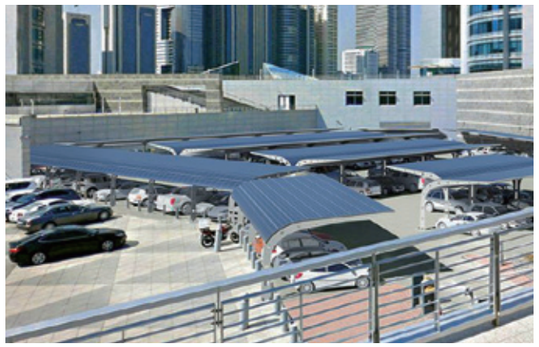
Bitumen Membrane

Heilongjiang Province, China | 485kW

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

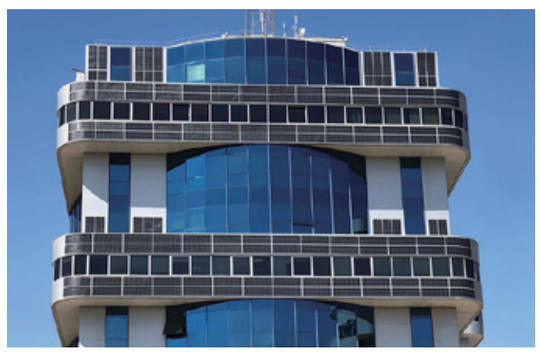
Germany | 33kW

Solar Facade

UAE | 30kW

Solar Facade

Shanghai, China | 88kW



Solar Facade

Spain | 30kW

Residential Facade

Japan | 15kW

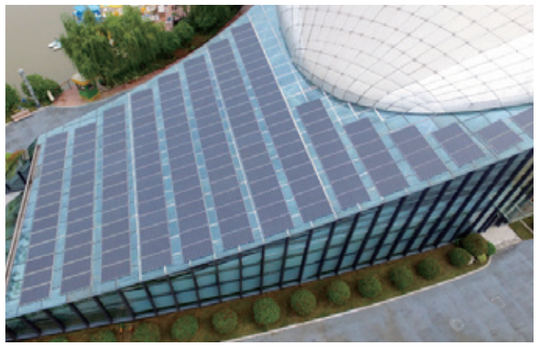
Others

Curved Metal Roofs

Australia | 100kW

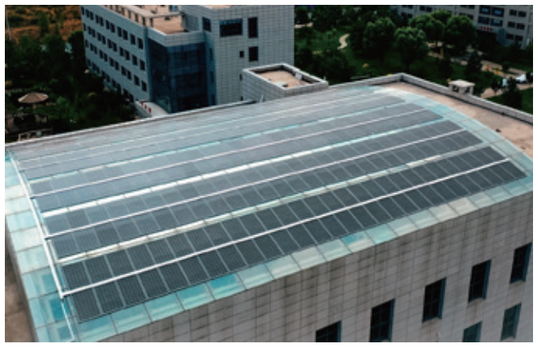
Expo Dubai 2020

UAE | 93kW



Expo Garden

Jiangsu Province, China | 52kW



Curved Glass Roofs

Shanxi Province, China | 100kW

Agricultural greenhouses

Ningxia Province, China | 22.5kW

Zero Carbon Park

Jiangsu Province, China | 90 kW + 147 kW

Off-Grid

The World's First Solar Train

Australia | 6.4kW

Cold Chain Vehicle

Switzerland | 2.6kW

Ski-wax trucks

Beijing,China | 4.5kW

Metro

HongKong, China | 2.3kW

Yacht

Australia | 6.5kW

SUNMAN ADVANTAGES

150MW

Cumulative Volume

As of 2021Q4, the historical cumulative shipment volume of eArc has reached 150 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 2021Q4, Sunman's R&D team has developed 112 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 61215:2016, IEC61730:2016 and UL1703 (USA). In addition, eArc has gained regional endorsement from JET (Japan) and CEC (Australia). eArc has also passed additional module quality assessments, including 3000 hours of damp heat, UV exposure (25 years equivalent), PID, salt mist and ammonia corrosion tests.

Investors

Sunman is backed by Softbank China VC, SOUTHERN CROSS Venture Partners and CEFC (Clean Energy Finance Corporation).

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.