

this
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Sunman Energy

27 May 2024

10:00 am – 11:00 pm | CEST, Berlin

1:00 pm – 2:00 pm | Dubai

4:00 pm – 5:00 pm | CST, Beijing



Bella Peacock

Editor
pv magazine

pv magazine
webinars

Solar solutions for low-load bearing and tricky commercial roofs




Dennis Shi

President
Sunman Energy

Welcome!

Do you have any questions?  

Send them in via the Q&A tab.  We aim to answer as many as we can today!

You can also let us know of any tech problems there.

We are recording this webinar today. 

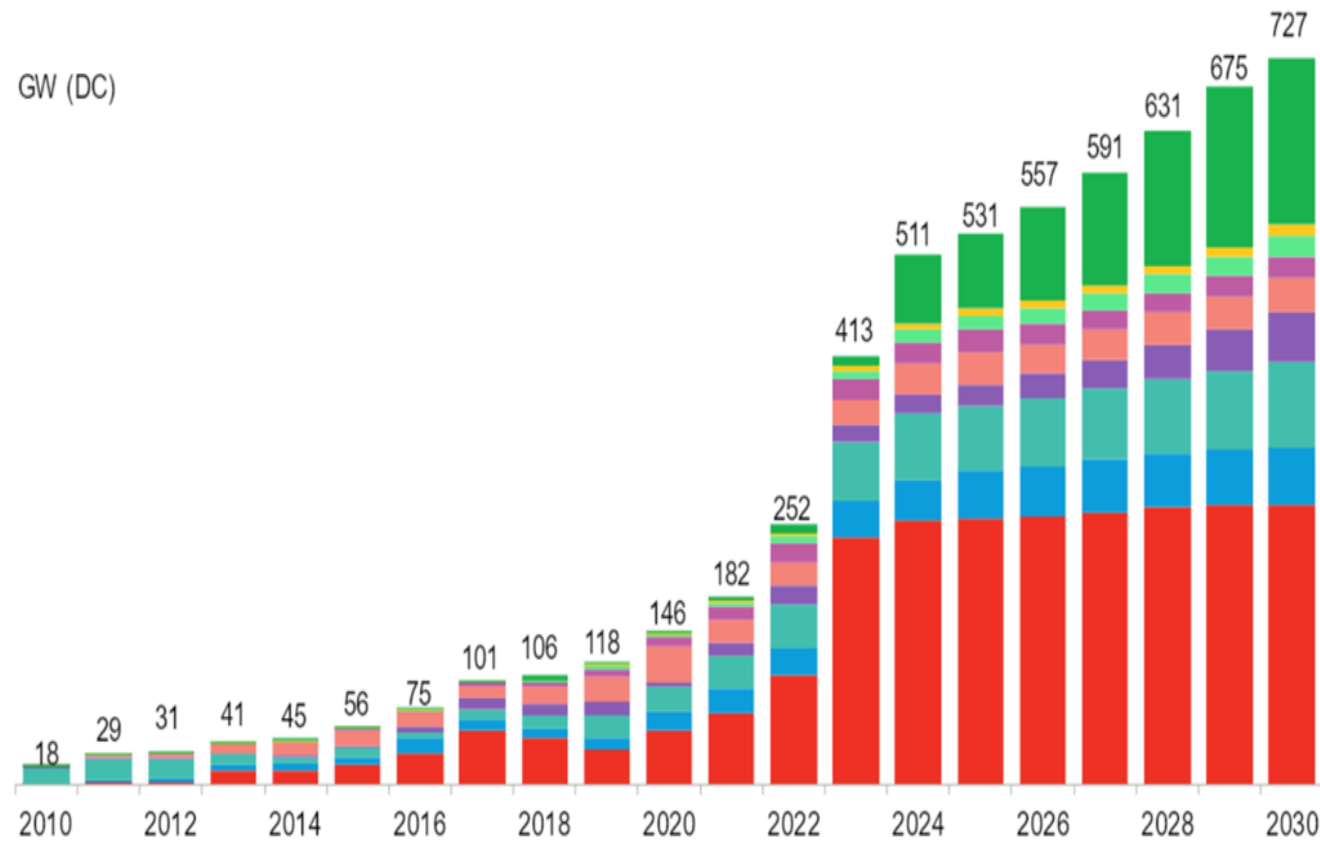
We'll let you know by email where to find it and the slide deck, so you can re-watch it at your convenience.  

Unlocking the C&I Rooftop Market with Sunman's Lightweight Solar Applications

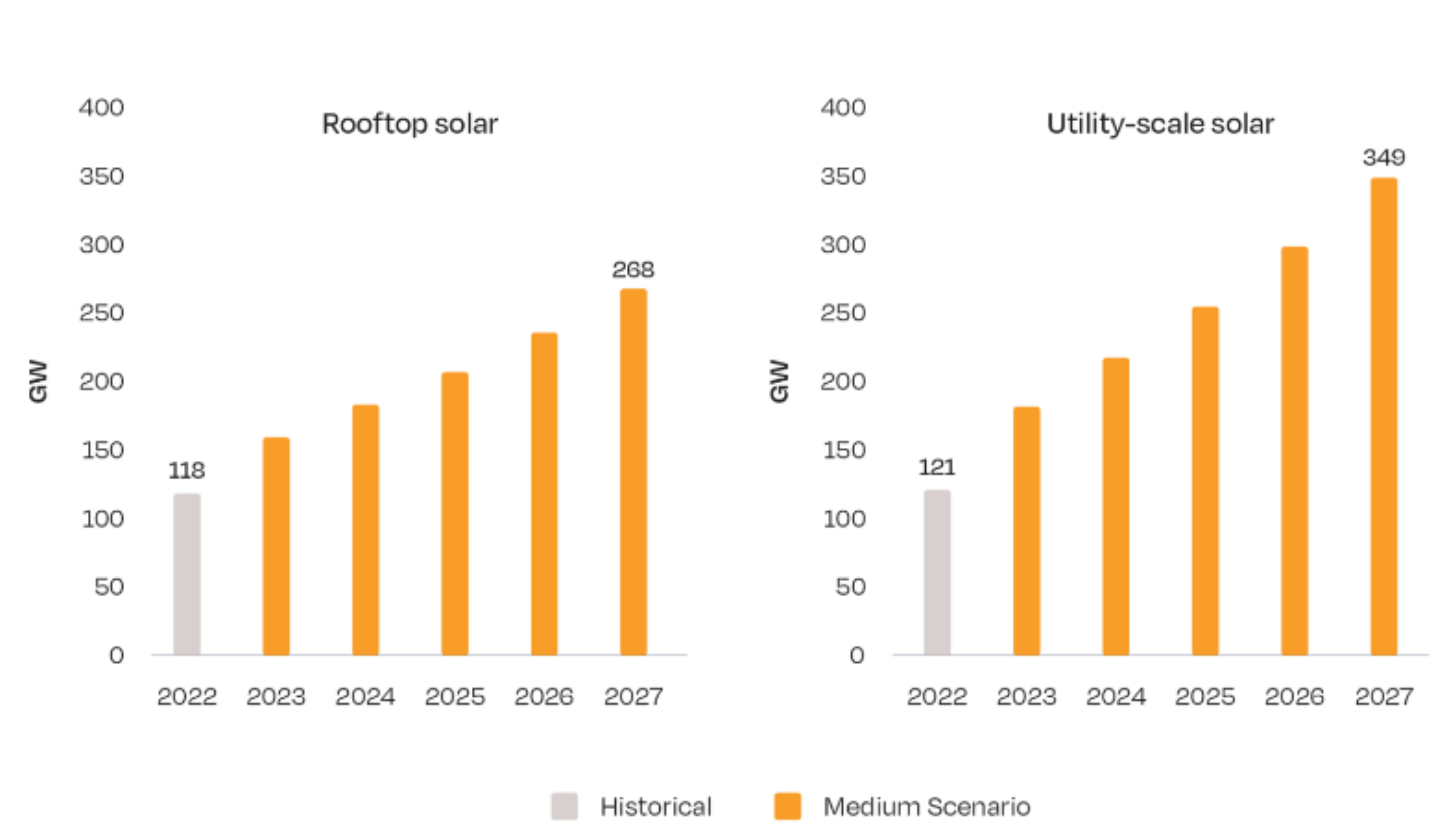
Dennis Shi
27th May 2024

Annual PV capacity to exceed 500 GW in 2024, estimated >40% annual capacity will come from rooftops

Figure 2: Historical and mid-scenario forecast for global PV installations



SOLAR PV ROOFTOP AND UTILITY-SCALE SEGMENTS SCENARIOS 2023-2027



Source: Global PV Market Outlook, 4Q 2023 Growth, Hangovers and a Game of Chicken – Bloomberg New Energy Finance

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- BNEF: Newly added PV capacity will surpass the 500 GWp mark in 2024.
- Earlier forecast by SolarPower Europe: Rooftop solar will make up >40% of added global capacity each year.

An estimated **40%** of C&I rooftops cannot install glass modules because of structural limitations...



- When buildings fall under the 15 kg/square meter load-bearing threshold, roof reinforcements are required to install solar, which is expensive and disruptive to on-site activities...

Demand for lightweight solar is Real

Customer Request #1:



Many thanks for your email. Let me present our project:

1. Our Company is planning to construct solar power plant on our shed roof of the factory (photo attached). Due to the low static bearing capacity we will install ultralight PV modules:



Customer Request #2:



Overall, the site assessment confirms that the site can accommodate solar PV well in the outlined 4 key areas. The overall infrastructure can accommodate 1,500kW+ Solar PV system with the only limitations being the roof areas, and the structural strength of the roof. There are structural challenges on two of the key roof areas that are limited by roof load. This is due to the complexity in design, and span of these main

Customer Request #3:



May 20, 2021 18:52



我下午去看这种厂房就是承重不足的

A wide-angle photograph of a rooftop solar installation site. The foreground shows several rows of dark, rectangular solar panels mounted on a metal roof structure. The panels are arranged in a grid pattern. In the background, a dense urban skyline is visible under a cloudy sky. A large white cylindrical structure, possibly a ventilation unit, is prominent on the right side of the roof. The overall scene is well-lit, suggesting a clear day.

Can't install glass modules?
Uncover the potential of lightweight solar

Sunman at a Glance



- Founded in **2014**, Sunman is an Australian Solar Company.
- Successfully commercialized the world's first ultra-light solar module "**eArc**".
- eArc is based on market-proven **crystalline silicon cell technologies** and innovative in its **patented encapsulation system**.
- Capacity: **1 GWp** in Jiangsu, China (3 GW planned).
- Delivered **700 MWp** shipments since inception.

eArc at a Glance



Ultra-Light



Flexible



Higher Safety



Durable



Fast-Installation



Aesthetic



High packing density for transportation

A high-level comparison with glass modules



Glass



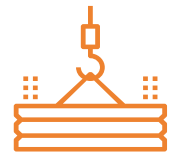
eArc



Heavy and rigid - 15 kg/m²



Labor and equipment intensive installation process



Significant usage of glass, steel, aluminum exposes to commodity price inflation

Ultra-light

2.8 kg/m²

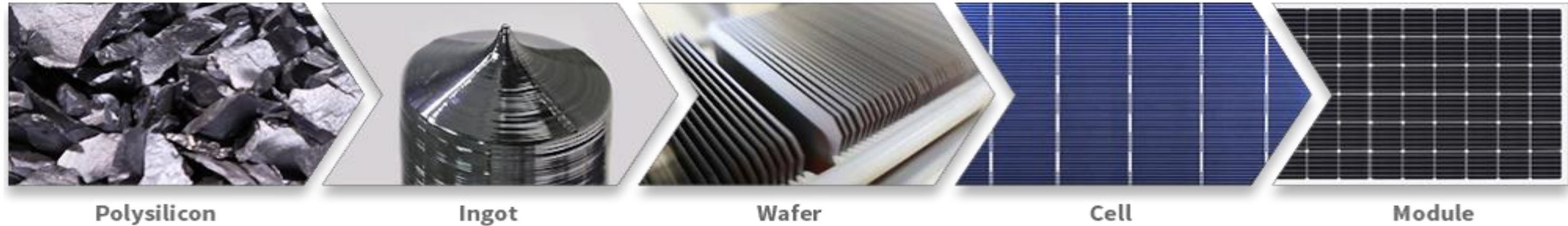
Fast Installation

c.50% savings in labor costs

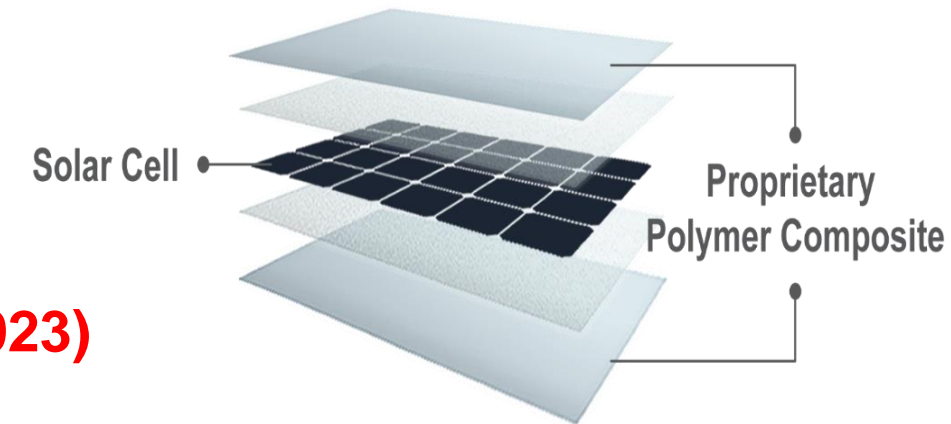
Lower commodity usage in module and sub-structure

c.33% savings in structure costs

eArc shares the same supply chain as glass modules



- **Cell-agnostic: insulated from upstream technology swings**, such as PERC replacing Al-BSF and TOPCon replacing PERC.
- **Highly scalable** with **similar CapEx intensity** as glass modules.
- **Huge beneficiary of large supply chain Investments. (~\$130 Billion in 2023)**
- **Shorter supply chain for non-silicon BOM:** Does not require localized supply of solar grade glass and metal, **facilitates supply chain re-shoring.**



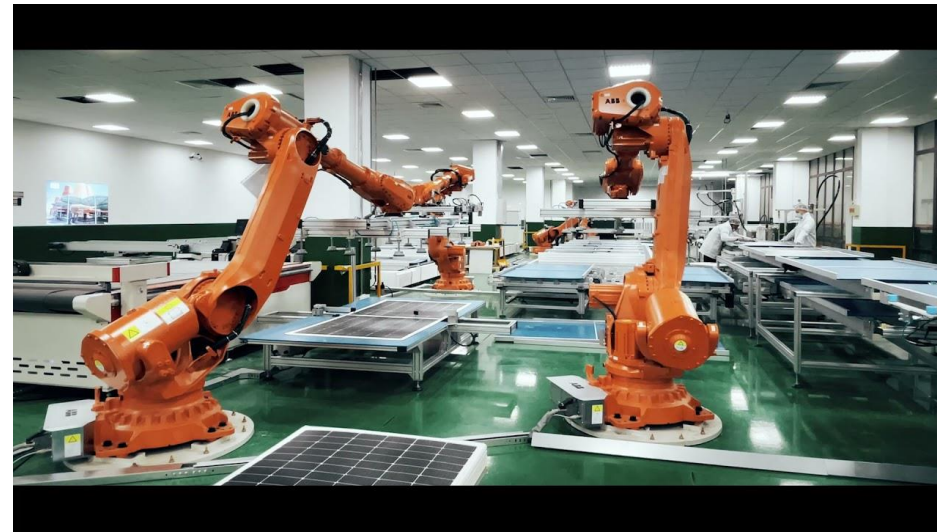
Sunman's "3M" operational model

Material



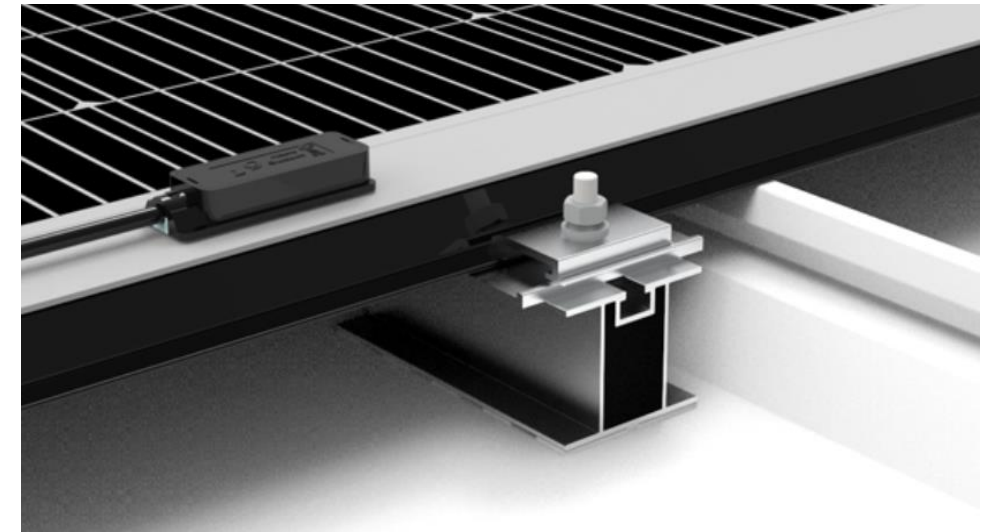
- R&D and mass-production capability for proprietary composite materials (front and back sheet).

Module



- Automated GW-scale lightweight module manufacturing lines with state-of-the-art equipment and intelligence systems.

Mounting



- Ability to develop and provide total mounting solutions around lightweight solar modules for various application scenarios.

Complete Certifications for Global Deployment

認 証 書
Certificate

IEC PVm 認証業務規程第7項の規定により、認証登録の要件に適合しているものと認められますので認証します。
I hereby certify that the product mentioned below complies with the Requirements for the Registration of Certification in the Rules for Operation of PVm Certification, Section 7.

認証書番号: PV190-53201-1002
Certificate Number: PV190-53201-1002

認証登録日: 平成29年9月4日
Date of Issue: September 4, 2017

有効期限: 平成34年9月3日
Date of Validity: September 3, 2022

認証取得者: SUNMAN (HONG KONG) LIMITED
Certificate Recipient: SUNMAN (HONG KONG) LIMITED, ROOM 1401, 14/F., WORLD COMMERCE CENTRE, HARBOUR CITY, 7-11 CANTON ROAD, Tsimshatsui, Kowloon, HONG KONG, P.R. CHINA

認証製品製造工場: (PV190-a)
Factory of Certified Product: ZHENJIANG FENGYUAN NEW ENERGY TECHNOLOGY CO., LTD. NO.1, NINGZHU SOUTH ROAD, YOUFANG TOWN, ZHENJIANG, JIANGSU, 212218, CHINA

試験基準: IEC61215 Second edition 2005-04,
Applied Standards for Testing: IEC61730-1 First edition 2004-10,
IEC61730-2 First edition 2004-10

製品の型名等
Type Name of Product:
認証モデルの名称: 太陽電池モジュール (単結晶)
Name of Certified Model: PV module (single crystal)
認証モデルの型名: SMA310N-6X12 etc.
Type of Certified Model: As shown in the attachment for details
認証モデルの仕様: 付属書IIのとおり
Specification of Certified Model: As shown in the attachment for details

一般財団法人 電気安全環境研究所
Japan Electrical Safety & Environment Technology Laboratories
理事長 藤田 康久
President: Yasuhisa Koyasuda

東京都渋谷区代々木5-14-12
5-14-12 Yoyogi, Shibuya-ku, Tokyo

VDE Prüf- und Zertifizierungsinstitut

**ZEICHENGENEHMIGUNG
MARKS APPROVAL**

Sunman (Hong Kong) Limited
Room 1401, 14/F., World Commerce Centre
Harbour City, 7-11 Canton Road,
Tsimshatsui
Kowloon
HONG KONG
ist berechtigt, für ihr Produkt,
is authorized to use for their product

**Terrestrische Photovoltaik-Module mit Silizium-Solarzellen
Crystalline silicon terrestrial photovoltaic modules**

die hier abgebildeten markenrechtlich geschützten Zeichen
für die ab Blatt 2 aufgeführten Typen zu benutzen /
the legally protected Marks are shown below for the types referred to on page 2 if

Geprüft und zertifiziert nach /
Tested and certified according to

DN EN 61215 / VDE 0128-21:2006-02 EN 61215:2006-02
DN EN 61733-1 / VDE 0128-20:12-11:2007-10 EN 61733-1:2007-06
DN EN 61733-1A:1 / VDE 0128-20-1A:11:2012-09 EN 61733-1:2007-06:2012
DN EN 61733-1A:2 / VDE 0128-20-1A:21:2014-03 EN 61733-1:2007-06:2014
DN EN 61733-1A:3 / VDE 0128-20-1A:31:2015-06 EN 61733-1:2007-06:2015
IEC 61215:2005
IEC 61733-1:2006
IEC 61733-1:2006/AMD1:2011
IEC 61733-1:2006/AMD2:2015
IEC 61733-2:2004
IEC 61733-2:2006/AMD1:2011

Beispielt zum / valid until: 2019-04-30

VDE Prüf- und Zertifizierungsinstitut GmbH
VDE Testing and Certification Institute
Zertifizierungsstelle / Certification
Dienstrech: 2016-02-04
(letzte Änderung / updated: 2016-12-22)

VDE

CSA Group

Certificate of Compliance

Certificate: 70133275 Master Contract: 269671
Project: 70133275 Date Issued: 2017-05-04

Issued to: Sunman (Hong Kong) Limited,
Room 1401, 14/F., World Commerce Centre, Harbour City,
7-11 Canton Road, Tsimshatsui, Kowloon, Hong Kong.
Attention: Ted Kong

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and US Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Issued by: Qiang (Sean) Jiang
Qiang (Sean) Jiang

PRODUCTS
CLASS - C531110 - POWER SUPPLIES-Photovoltaic Modules and Panels
CLASS - C531190 - POWER SUPPLIES-Photovoltaic Modules and Panels - Certified to US Standards

Photovoltaic Modules with maximum system voltage of 600 V dc and Class C fire class rating (Canada),
Model Series SMDXXXM-6X12 (XXX = 275 to 340 step 5), SMDXXXM-6X10 (XXX = 230 to 280 step 5),
SMDXXXM-4X12 (XXX = 140 to 170 step 5), SMDXXXM-4X10 (XXX = 185 to 225 step 5), SMDXXXM-4X10 (XXX = 155 to 190 step 5), SMDXXXM-4X09 (XXX = 140 to 170 step 5), SMDXXXM-4X06 (XXX = 090 to 110 step 5), SMDXXXM-4X04 (XXX = 060 to 075 step 5), SMDXXXM-2X12 (XXX = 090 to 110 step 5), SMDXXXM-2X10 (XXX = 075 to 095 step 5), SMDXXXM-2X06 (XXX = 045 to 055 step 5), SMDXXXM-2X04 (XXX = 030 to 035 step 5).

Model Series SMDXXXP-6X12 (XXX = 275 to 340 step 5), SMDXXXP-6X10 (XXX = 230 to 280 step 5),
SMDXXXP-4X12 (XXX = 185 to 225 step 5), SMDXXXP-4X10 (XXX = 135 to 190 step 5), SMDXXXP-4X06 (XXX = 090 to 110 step 5), SMDXXXP-2X12 (XXX = 090 to 110 step 5), SMDXXXP-2X10 (XXX = 075 to 095 step 5), SMDXXXP-2X06 (XXX = 045 to 055 step 5).

鉴衡认证

太阳能光伏产品金太阳认证证书

证书编号: CGC2002001820138

申请人名称: 上海(集团)新能源科技有限公司
地址: 上海市浦东新区川沙新镇川沙路1号
制造厂家地址: 上海(集团)新能源科技有限公司
地址: 江苏省扬州市江都区江都镇江都工业园
产品名称: 太阳能光伏组件
型号: SMDXXXM-6X12
规格: 详见证书附件(共4页)
标准: 符合IEC61215:2005, IEC61730-1:2004, IEC61730-2:2004
证书有效期: 2017-05-04至2022-09-03

本证书与证书附件及证书说明共同构成证书的全部内容, 证书企业在产品出厂及检验合格前须经本实验室技术人员审核, 否则本证书无效。

上海鉴衡认证中心有限公司
地址: 上海市浦东新区川沙新镇川沙路1号 邮编: 201201 www.cgc.org.cn

eArc is the first module of its kind to pass the IEC 61215:2016, IEC61730:2016, UL61730 (USA) and CGC (China).



Further Durability Testing

IEC 60068-2-68 Blowing Sand Test Lc 1 Confirmation of test results

VDE Renewables File Ref.: 10398/ ET-20210823-165

Applicant: Sunman (Zhenjiang) Company Limited
No. 1 Mingzhu South Road, Youfang Town, Yangzhong City,
212218 Zhenjiang, Jiangsu, China

Product: Crystalline silicon Photovoltaic (PV) Modules

Type:

- A) SMXXXX-4X12UW
- B) SMXXXX-4X10UW
- C) SMXXXX-4X12UW
- D) SMXXXX-4X12UW
- E) SMXXXX-4X12UW
- F) SMXXXX-4X12UW
- G) SMXXXX-4X12UW
- H) SMXXXX-4X12UW
- I) SMXXXX-4X12UW
- J) SMXXXX-4X12UW
- K) SMXXXX-4X12UW
- L) SMXXXX-4X12UW
- M) SMXXXX-4X12UW
- N) SMXXXX-4X12UW
- O) SMXXXX-4X12UW
- P) SMXXXX-4X12UW
- Q) SMXXXX-4X12UW
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- AH) SMXXXX-4X12UW
- AI) SMXXXX-4X12UW
- AJ) SMXXXX-4X12UW
- AK) SMXXXX-4X12UW
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- AM) SMXXXX-4X12UW
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- AV) SMXXXX-4X12UW
- AW) SMXXXX-4X12UW
- AX) SMXXXX-4X12UW
- AY) SMXXXX-4X12UW
- AZ) SMXXXX-4X12UW

XXX in the type replaces the power in watt and can be any number between:
325 - 380 for A), E), I), M), Y), AG)
215 - 290 for C), G), K), O), AA), AE)
415 - 440 for Q), U), AH), AL), AF)
275 - 290 for S), W), AJ), AN), AR), AV), AY)
405 - 440 for T), X), AK), AQ), AS)
155 - 165 for AU), AZ)

Manufacturer: Sunman (Zhenjiang) Company Limited
Standard: IEC 60068-2-68, Dust and Sand test Lc1
Based on IEC 61701.2011

Test conditions:

- Dust concentration: 4.8 - 5.3 g/m³
- Wind velocity: 18.3 - 20.7 m/s
- Particle size: Variant 3, <500 µm
- Dust composition: Quartz, 95% SiO₂
- Testing time: Front side: 4 h, Rear side: 4 h

File Ref.: 10398/ ET-20210823-165 Page 1 of 2

IEC 61701:2020 Salt mist corrosion testing of photovoltaic (PV) modules Confirmation of test results

VDE Renewables File Ref.: 10398/ ET-20220711-121

Applicant: Sunman (Zhenjiang) Company Limited
No. 1 Mingzhu South Road, Youfang Town, Yangzhong City, 212218
Zhenjiang, Jiangsu, China

Product: Crystalline silicon Photovoltaic (PV) Modules

Type:

- B) SMXXXX-12X11UW
- B1) SMXXXX-10X11UW
- B2) SMXXXX-8X11UW
- B3) SMXXXX-12X11UW
- B4) SMXXXX-12X11UW
- B5) SMXXXX-10X11UW
- B6) SMXXXX-8X11UW
- B7) SMXXXX-12X11UW
- B8) SMXXXX-10X11UW
- B9) SMXXXX-8X11UW
- B10) SMXXXX-12X11UW
- B11) SMXXXX-10X11UW
- B12) SMXXXX-8X11UW
- B13) SMXXXX-12X11UW
- B14) SMXXXX-10X11UW
- B15) SMXXXX-8X11UW
- B16) SMXXXX-12X11UW
- B17) SMXXXX-10X11UW
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- B94) SMXXXX-12X11UW
- B95) SMXXXX-10X11UW
- B96) SMXXXX-8X11UW
- B97) SMXXXX-12X11UW
- B98) SMXXXX-10X11UW
- B99) SMXXXX-8X11UW
- B100) SMXXXX-12X11UW

XXX in the type replaces the power in watt and can be any number between:
800 - 655 for B), B1) 545 - 595 for B), B1)
900 - 540 for B), B1) 465 - 445 for B), B1)
400 - 435 for B), B1) 380 - 415 for B), B1)
200 - 215 for B), B1) 180 - 195 for B), B1)
455 - 495 for B), B1) 415 - 450 for B), B1)
330 - 380 for B), B1) 310 - 340 for B), B1)
165 - 180 for B), B1) 145 - 165 for B), B1)
405 - 440 for B), B1) 155 - 165 for B), B1)
405 - 440 for B), B1) 155 - 165 for B), B1)

Manufacturer: Sunman (Zhenjiang) Company Limited

Standard: IEC 61701:2020, Salt mist corrosion test

Test conditions:

- Test method: 8
- Testing time: 1440 hrs
- Chamber temperature: 35°C
- Relative Humidity: 95 %
- Mist pH level: 3.5

VDE RENEWABLES GmbH | Tel: +49 69 6306 5300 | Location: Ahrensburg | Bank Information: Deutscher Bank AG
Sternenstraße 32 | Fax: +49 69 6306 5320 | District Court: Amtsgericht Ahrensburg | IBAN: DE 25 0007 0010 0235 0000 01
42679 Ahrensburg, Germany | Email: renews@vde.com | Registration No.: HRB 18020 | Tax Number: 254/141/00700 | BIC: DEUTDE33HAN

IEC 62716:2013 Photovoltaic (PV) modules - Ammonia corrosion testing - Confirmation of test results

VDE Renewables File Ref.: 10398/ ET-20210823-165

Applicant: Sunman (Zhenjiang) Company Limited
No. 1 Mingzhu South Road, Youfang Town, Yangzhong City,
212218 Zhenjiang, Jiangsu, China

Product: Crystalline silicon Photovoltaic (PV) Modules

Type:

- B) SMXXXX-4X12UW
- D) SMXXXX-4X12UW
- J) SMXXXX-4X12UW
- M) SMXXXX-4X12UW
- P) SMXXXX-4X12UW
- R) SMXXXX-4X12UW
- S) SMXXXX-4X12UW
- T) SMXXXX-4X12UW
- U) SMXXXX-4X12UW
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- AY) SMXXXX-4X12UW
- AZ) SMXXXX-4X12UW

XXX in the type replaces the power in watt and can be any number between:
325 - 380 for A), E), I), M), Y), AG)
275 - 290 for B), F), J), N), Z), AD), AG)
215 - 290 for C), G), K), O), AA), AE)
415 - 440 for Q), U), AH), AL), AF)
275 - 290 for S), W), AJ), AN), AR), AV), AY)
405 - 440 for T), X), AK), AQ), AS)
155 - 165 for AU), AZ)

Manufacturer: Sunman (Zhenjiang) Company Limited

Standard: IEC 62716:2013, Ammonia corrosion testing

Test conditions:

- Hours including heating up: 8 h
- NH₃ - concentration (ppm): 6667
- Chamber temperature: 60 °C
- Relative Humidity: 100 %
- Hours including cooling: 18 h
- NH₃ - concentration (ppm): 0
- Chamber temperature: 23 °C
- Relative Humidity: 75 %

VDE RENEWABLES GmbH | Tel: +49 69 6306 5300 | Location: Ahrensburg | Bank Information: Deutscher Bank AG
Sternenstraße 32 | Fax: +49 69 6306 5320 | District Court: Amtsgericht Ahrensburg | IBAN: DE 25 0007 0010 0235 0000 01
42679 Ahrensburg, Germany | Email: renews@vde.com | Registration No.: HRB 18020 | Tax Number: 254/141/00700 | BIC: DEUTDE33HAN

IEC TS 62804-1:2015 Photovoltaic (PV) Modules - Test Methods for the detection of potential-induced degradation Part 1: Crystalline silicon Confirmation of test results

VDE Renewables File Ref.: 10398/ ET-20230518-116

Applicant: Sunman (Zhenjiang) Company Limited
No. 1 Mingzhu South Road, Youfang Town, Yangzhong City,
212218 Zhenjiang, Jiangsu, China

Product: Crystalline silicon Photovoltaic (PV) Modules

Type:

- CJ) SMXXXX-4X24UW
- CV) SMXXXX-4X24UW
- CW) SMXXXX-4X24UW

XXX in the type replaces the power in Watt and can be any number between:
415 - 440 for CJ), CV) 155 - 160 for CW)

Manufacturer: Sunman (Zhenjiang) Company Limited

Standard: IEC TS 62804-1:2015

Test conditions:

- Testing time: 96 h
- Chamber temperature: 85°C
- Relative Humidity: 85 %
- Potential to ground: ± 1500 V
- Power degradation: < 5%
- Dry Insulation: > 40 MQm²
- Wet Insulation: > 40 MQm²

Pass criteria:

Date	Status	Revision
02-09-2020	Final	02

Straightforward
Mauritiusaan 49, 4129 EL
Urmond, Netherlands
+31 (0) 88 1662700
info@straightforward.nl
www.straightforward.nl

Bankability Report Sunman eArche modules

Sunman(Zhenjiang) Co.,Ltd.

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Dust Testing

Salt Mist Corrosion
Testing level 8

Ammonia Testing

PID Testing

Straightforward Module B
ankability Testing

High performance modules built for the C&I Market



SMF520J-12X12UW



SMH520J-12X12UW

- 520W 144 half-cut cell
- 182 mm PERC cells
- SMF (frameless) or SMH (pre-integrated with mounting brackets)
- 2.8 kg/m² or 4.1 kg/m²
- New TOPCon product TBA (2024)

A photograph showing three workers on a corrugated metal roof installing solar panels. One worker in a yellow shirt and hat is using a power drill on a metal rail. Another worker in a yellow shirt and hat is holding a solar panel. A third worker in an orange shirt and hat is kneeling and working on the roof. The roof is covered with a grid of metal rails and some solar panels are already installed.

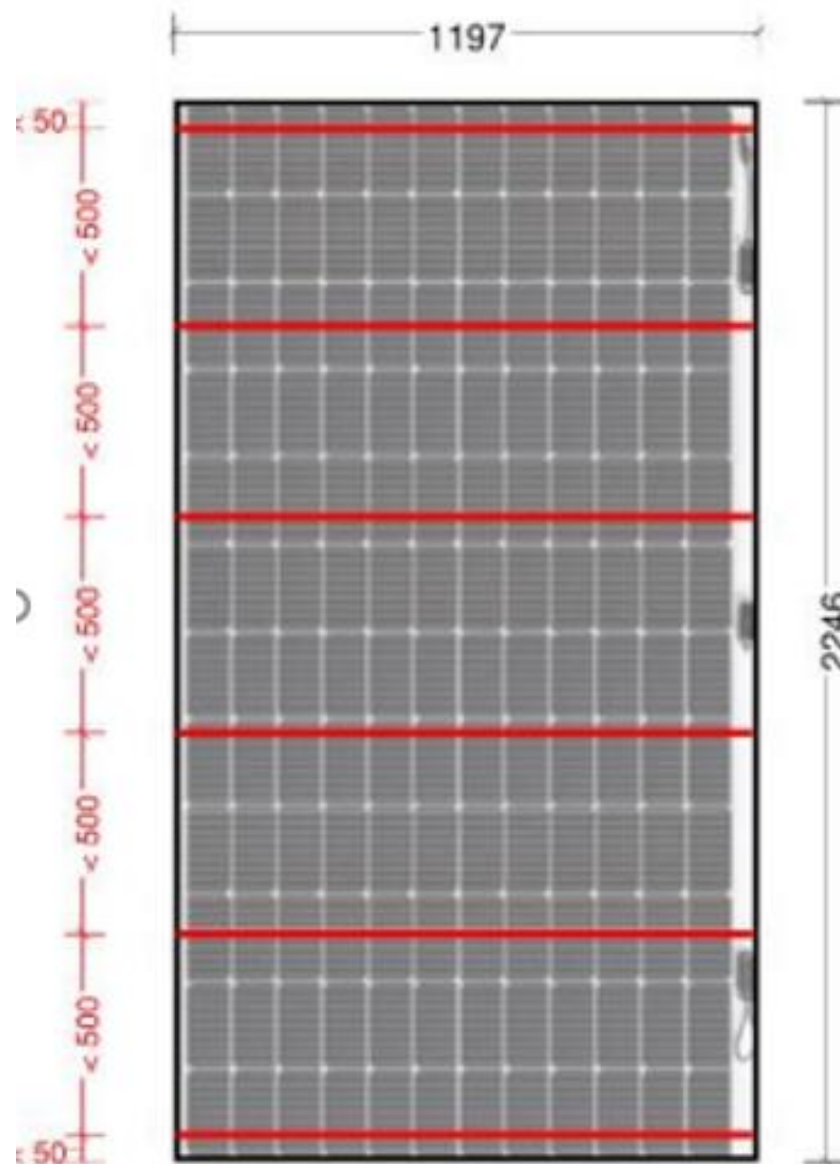
How to install lightweight solar modules?

What is “Quick-Bonding”?

- Quick-Bonding is a mature construction technique, proven in the building and automotive industry for over 60 years.(Similarly, Sunman modules can be glued or “bonded” onto various roof substrates)
- Silicone has the same chemical base as “sand” and “quartz”, thus highly resistant to weathering and UV radiation.
- The global structural silicone market size was valued at \$38.1 billion in 2021, projected to reach \$81.6 billion. (2031)
- All silicones undergo rigorous testing based on mature standards before being introduced into the construction industry.
- Tests focus on adhesion, cohesion, and durability, including weather-resistance, UV, temperature extremes, and chemicals.



Typical fixing methodology



Profiled Metal decking – various coating.

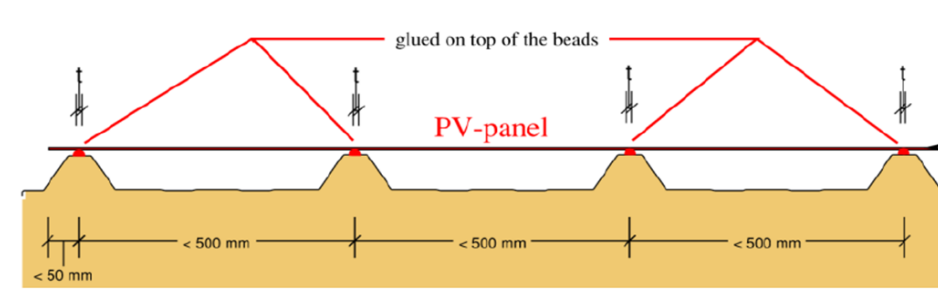


Figure 1 Gluing principle for trapezoidal roof directly

Membranes, PVC or EPDM or other material that are compatible with silicone gluing.

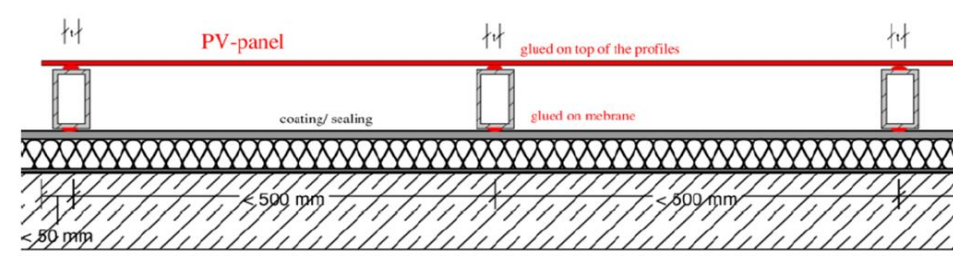
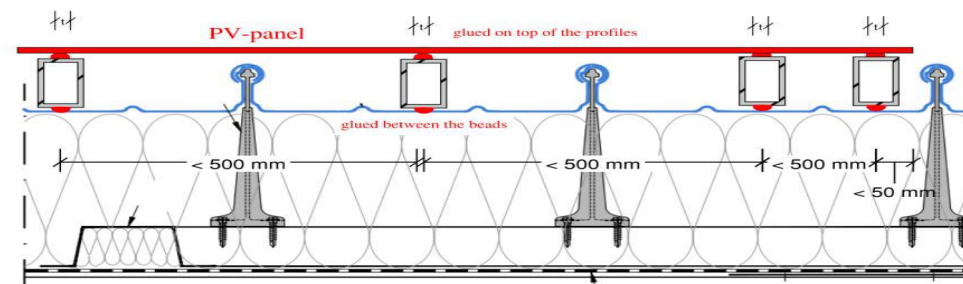


Figure 3 Gluing principle for membrane roof with add. Profiles

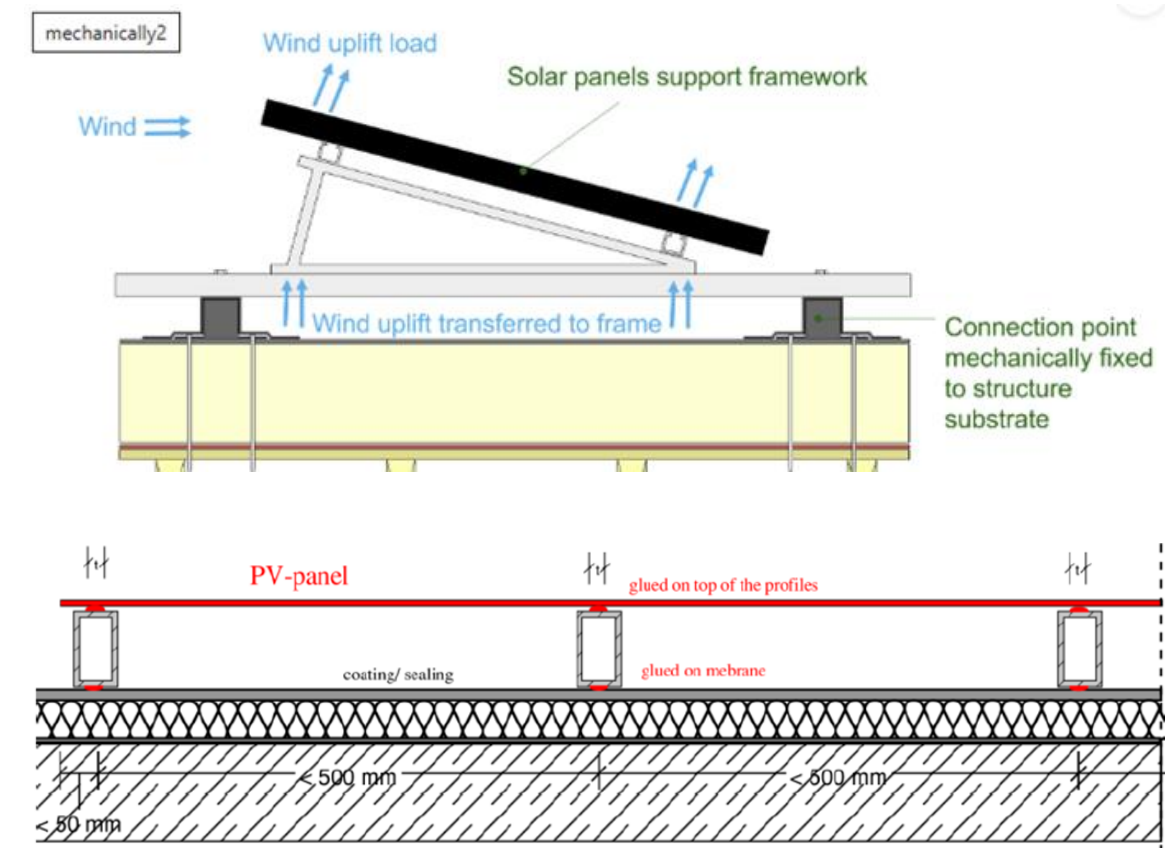
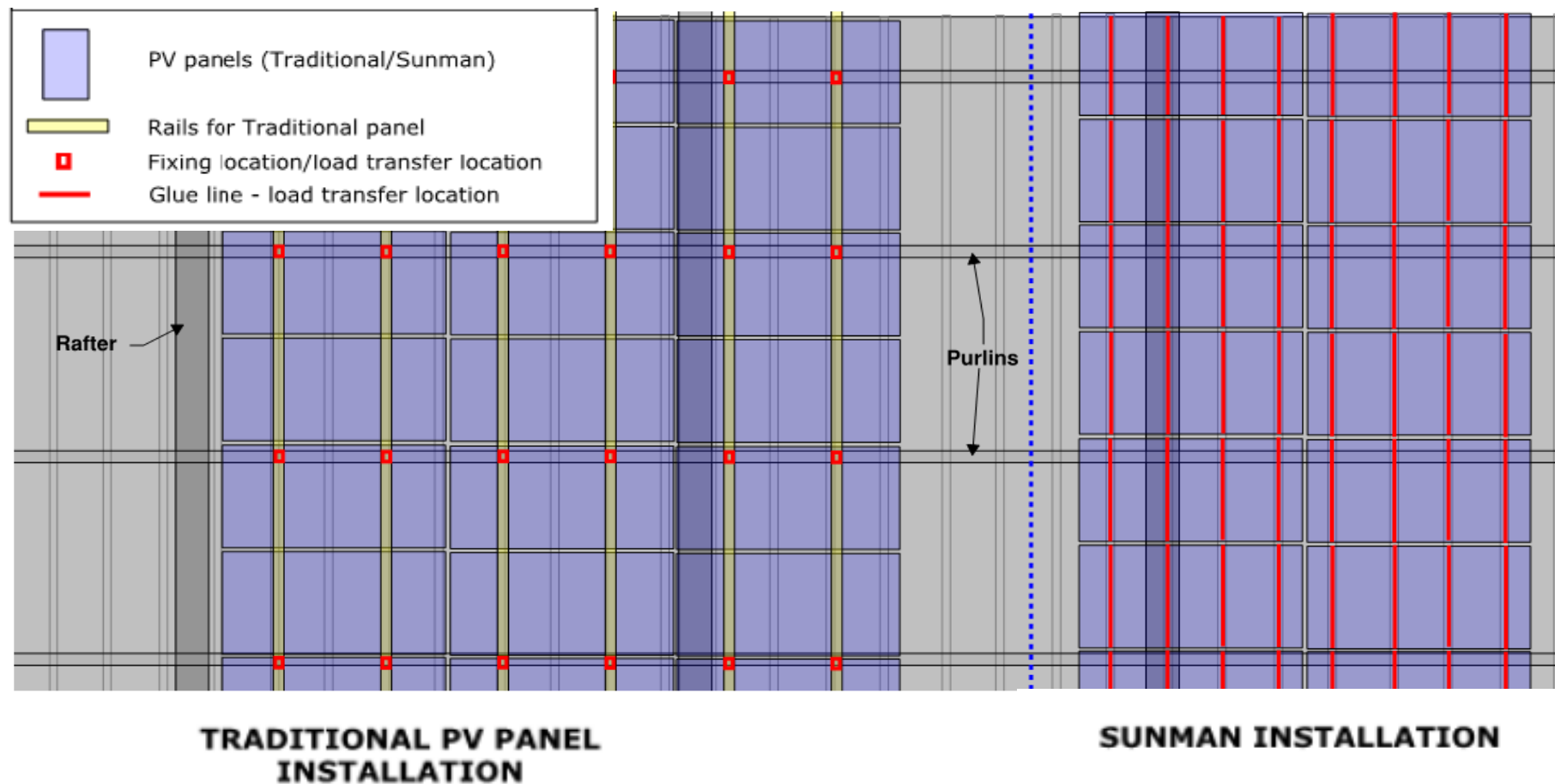


Taken from “Sunman Lightweight PV Solar Module Installation: Desk-study - Structural application guideline for the German market”

Joint study conducted by global structural engineering firm partner: **ARUP**

Structural Benefits: Sunman modules vs Traditional modules

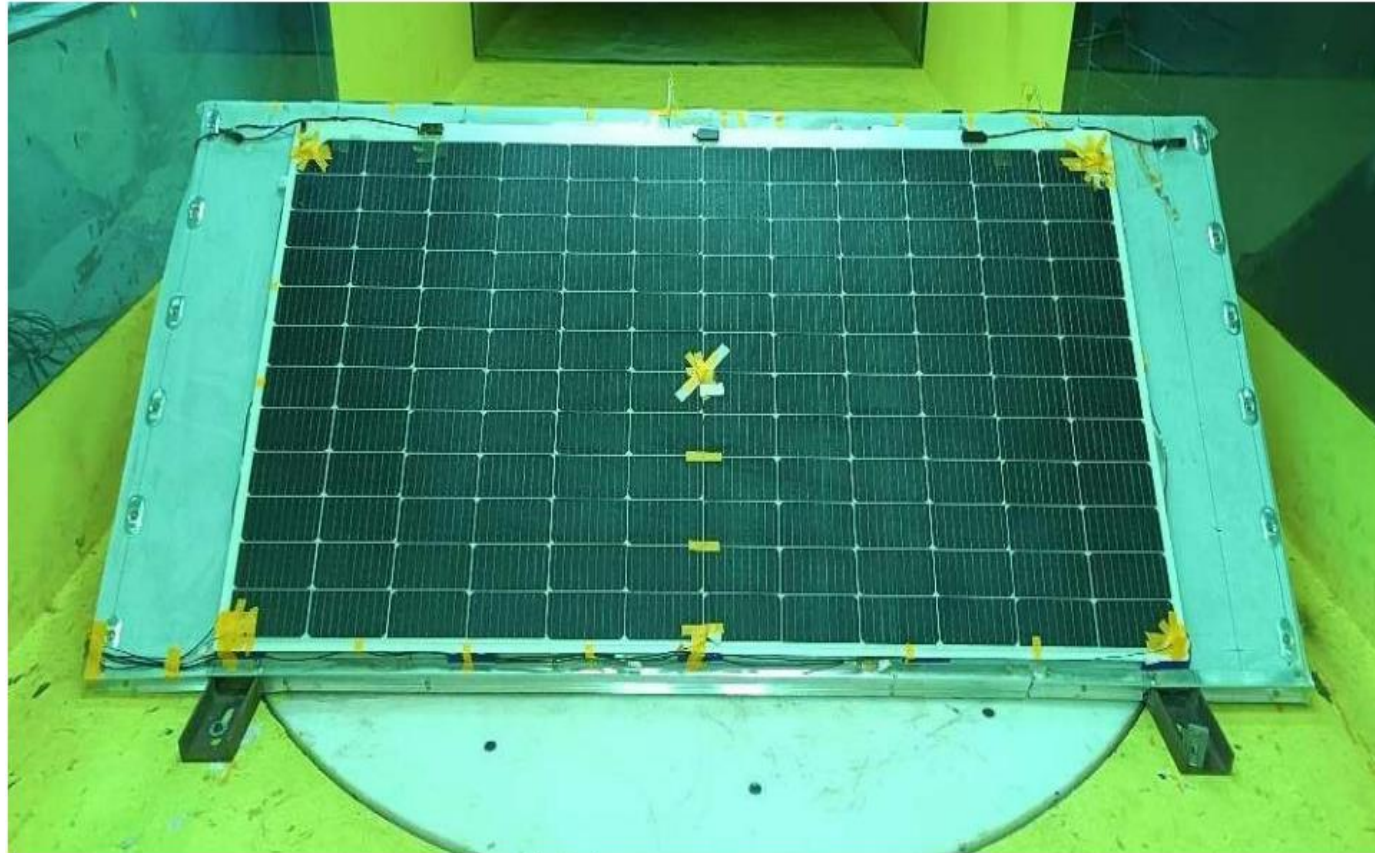
In contrast, Sunman panels offer a distinct advantage. Their design ensures a more even distribution of load across the panel due to the evenly dispersed glue lines. This characteristic minimises the risk of localised stress on the roof, particularly in critical areas like edges and corners. Consequently, Sunman panels are a preferred choice for installations in such regions, eliminating potential concerns associated with traditional panel installations.



“Sunman Structure process assessment and methodology”: Technical white paper conducted by Australian Structural Engineering Partner Relationships built on trust



System Level Durability: 160 km/h wind-tunnel test



迎风坡照片 Photo of windward slope

子样编号 Sample No.	检测参数及结果 Test parameters and results				结果 Result
	安装角度(°) Installation angle	管道风速 [V _{Pipeline}](m/s) Pipeline wind speed	换算风速[V _{Conversion}] (m/s) Converted wind speed	持续时间[s] Duration	
PVT2250501	45	17.86	25	120	组件以及安装系统完好 The components and mounting system are intact
PVT2250502	145	17.86	—	120	
PVT2250501	45	21.44	30	120	
PVT2250502	145	21.44	—	120	
PVT2250501	45	25.01	35	120	
PVT2250502	145	25.01	—	120	
PVT2250501	45	28.58	40	120	
PVT2250502	145	28.58	—	120	
PVT2250501	45	32.15	45	600	
PVT2250502	145	32.15	—	600	

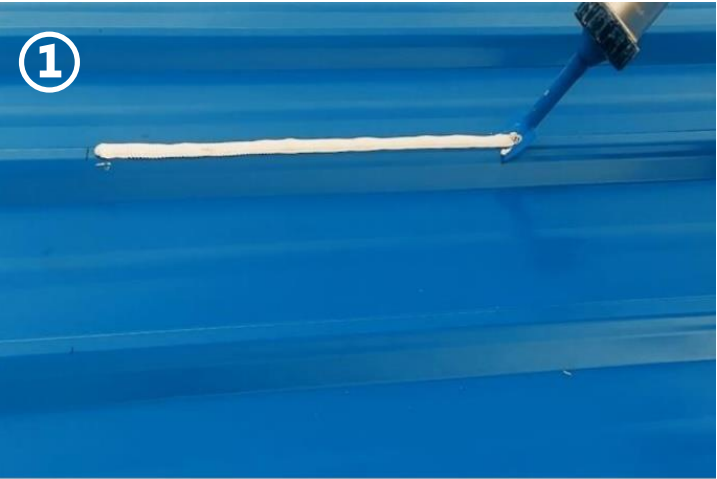
- Module glued on substrate at 45 degree slope.
- Build up of windspeed from 25 m/s to 45 m/s.
- Wind tunnel test peak at 45 m/s for continuous 10 minutes.
- **No failure or detachment of glue and module from substrate.**



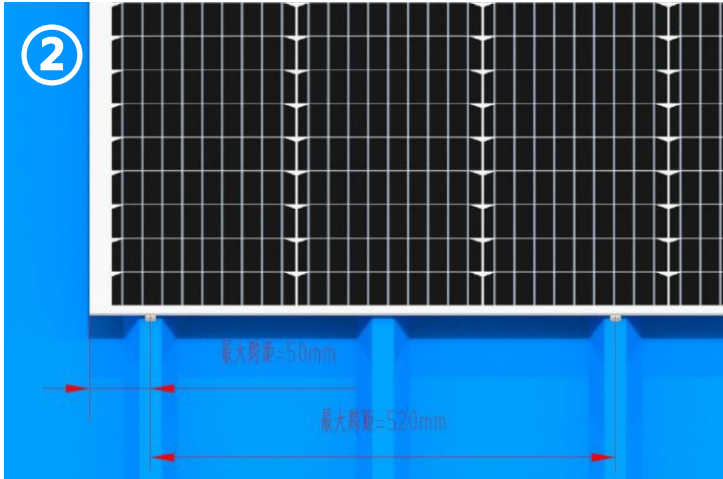
Market Applications

C&I Applications (SMF)

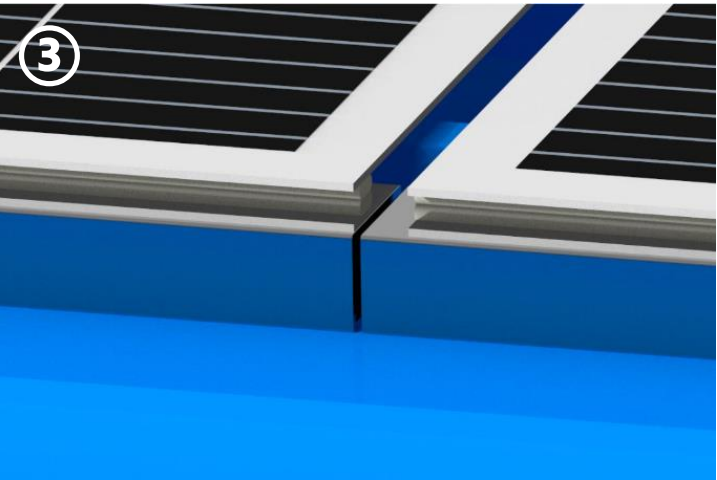
Metal Roofs – Quick-Bonding



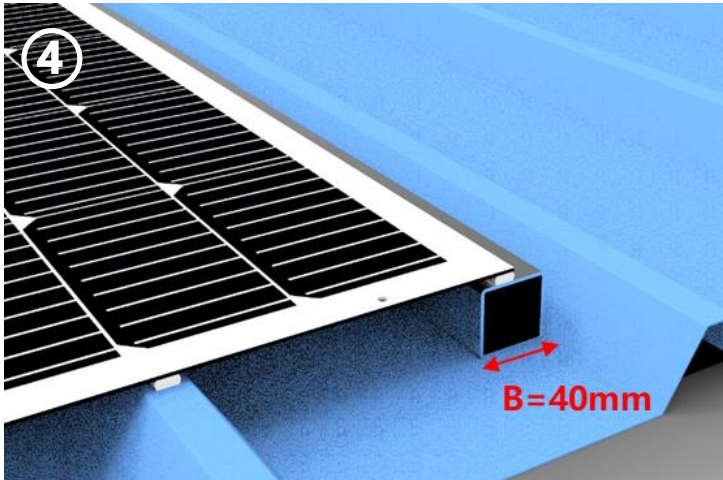
① Evenly apply glue to the peaks of metal roof profile (>10mm width).



② The spacing between lines of glue is $\leq 520\text{mm}$, and when the overhanging part of the module is $> 50\text{mm}$, use aluminum square tube.



③ Ensure that the ends of aluminum tubes lay between panels.



④ Aluminum square tube is required to be aluminum profile 6063-T5/T6, anodized AA10 or above.

C&I Applications

Metal Roofs – Quick-Bonding



C&I Applications

Metal Roofs – Quick-Bonding



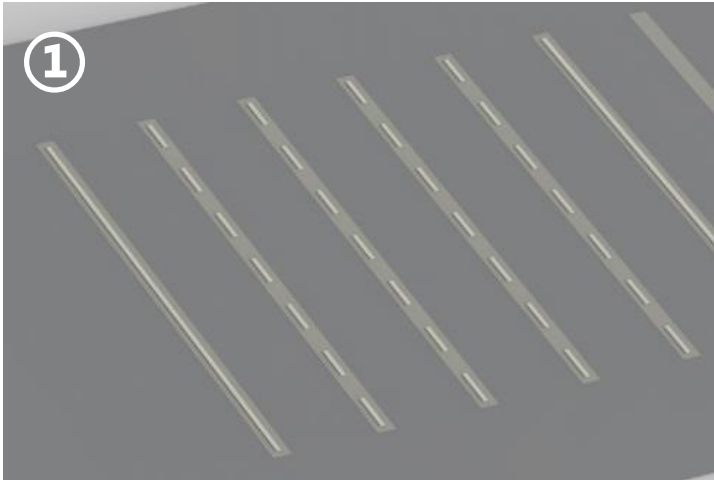
C&I Applications

Metal Roofs – Quick-Bonding

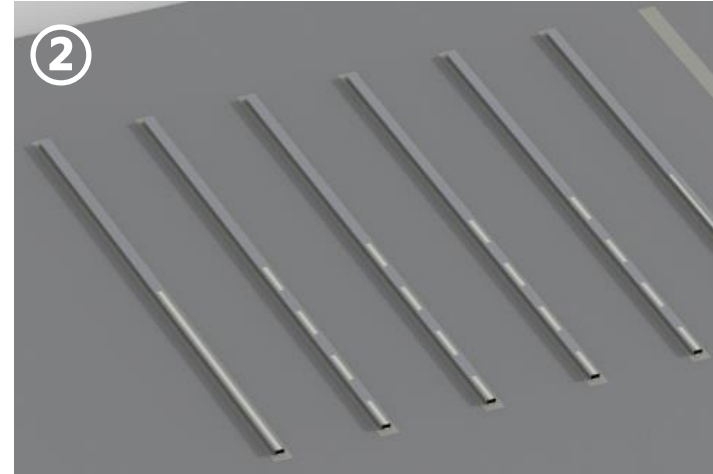


C&I Applications

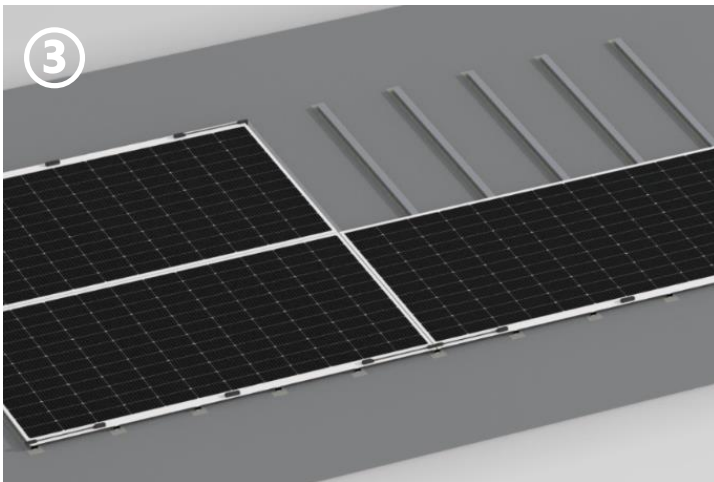
Membranes and Flat Roofs – Quick-Bonding



Clean the roof with the cleaning agent specified by Sunman. Apply the recommended glue that is appropriate for the roofing material.



Place tube onto the glue lines and put another layer of glue on the top side of the tube.



Place panels in the manner displayed in the diagram. (430W correspond to 5 tubes, 520W correspond to 7 tubes)



Ensure a single panel is not mounted on two tubes – expansion and contraction of the tubes may cause issues, such as deformation of the panels.

C&I Applications

Membranes and Flat Roofs – Quick-Bonding



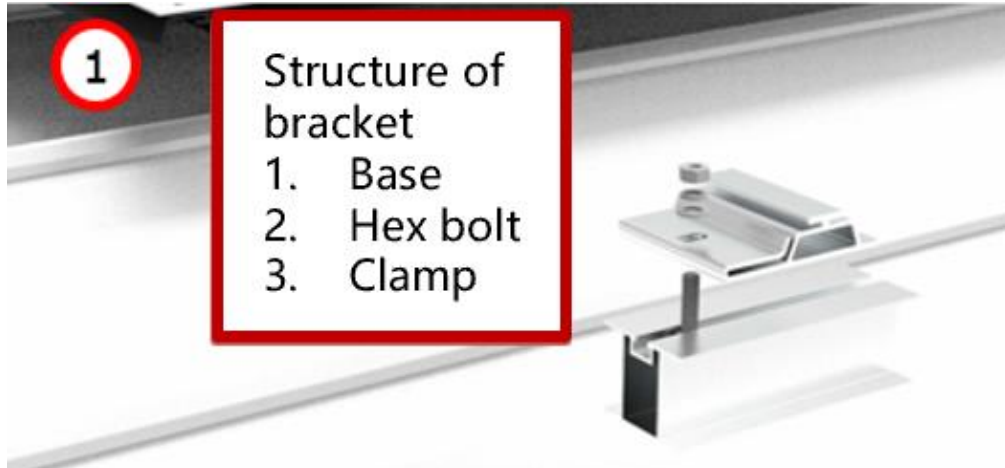
C&I Applications

Membranes and Flat Roofs – Quick-Bonding

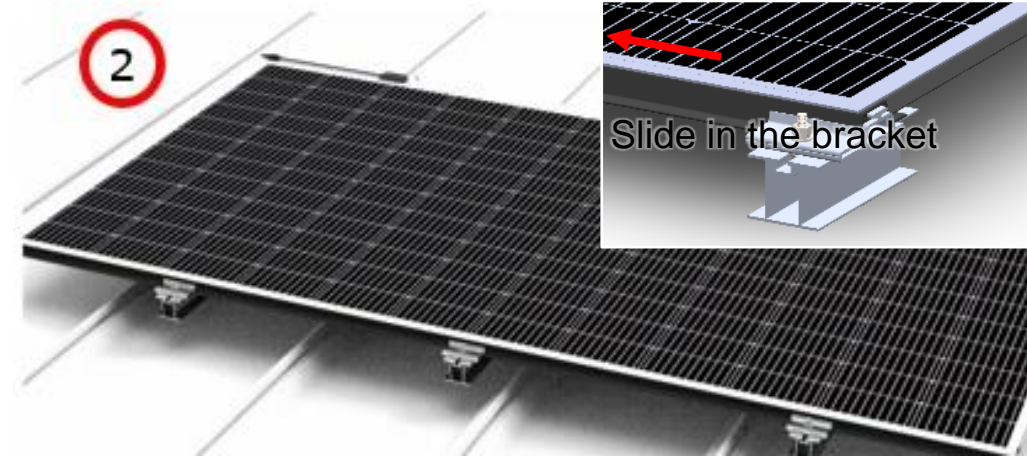


C&I Applications (SMH)

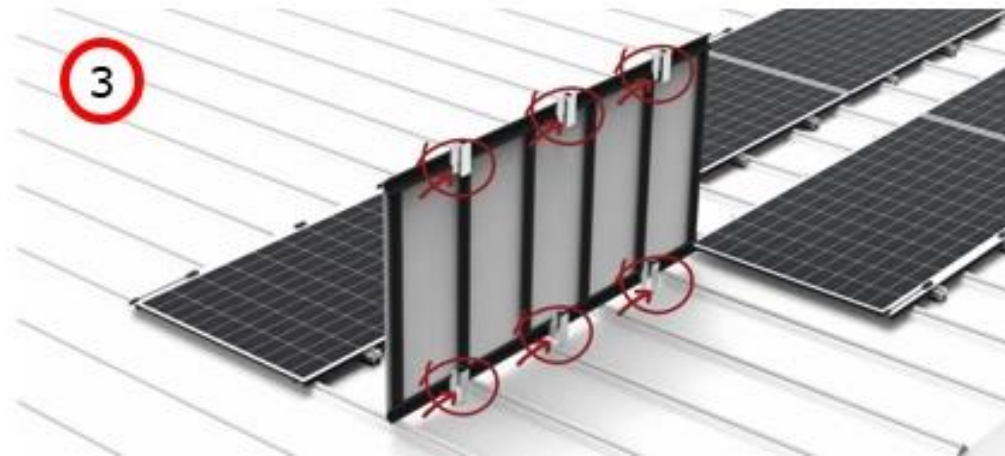
Metal / Membrane Roofs – Mechanical Fixation



Assemble the bracket.



Install the bracket onto the prefabricated panel.



Apply glue to the base.



Paste the modules.

C&I Applications (SMH)

Metal / Membrane Roofs – Mechanical Fixation



China | 9.9 MW

Other Applications

EV Charging Infrastructure and PV Carports



**World's First Retractable Solar Carport
Switzerland | 420 kW**



**PV Carport
China | 143 kW**

Other Applications

Facades



Other Applications

Vehicle Integrated Photovoltaics



Hong Kong, China

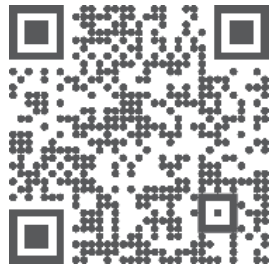


Netherlands

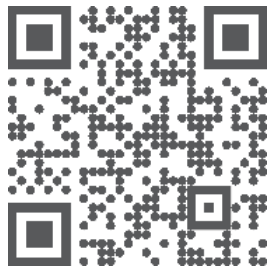


Switzerland

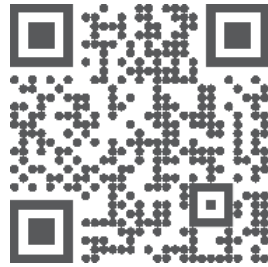
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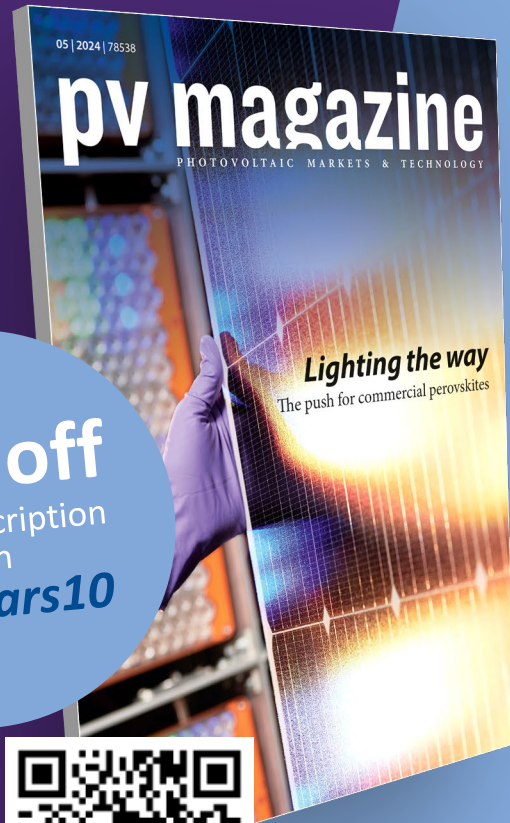
Q&A



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**Real-world case study
and solar business
growth outcomes from
predictive analytics**

Wednesday, 5. June 2024

1:00 pm – 2:00 pm EDT, New York City

7:00 pm - 8:00 pm CEST, Berlin

**Rescheduled webinar:
Procuring bankable PV
and energy storage as
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