







# PEG<sup>®</sup> EW SYSTEM OVERVIEW

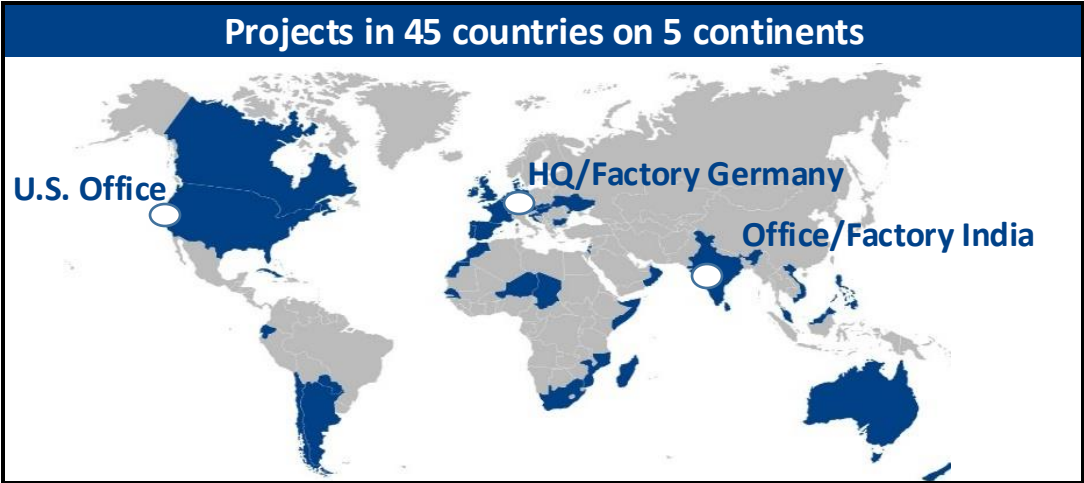


**PEG<sup>®</sup>** Revolutionizing  
Solar Mounting

# Jurchen Technology, bringing German Innovation to the global solar market

### The clever double solution for solar power plants

-  Founded in 2008, headquartered in **Helmstadt, Germany**
-  Offering PEG racking and wiring harnesses
-  Engineering design and R&D team in **Germany**
-  Manufacturing facilities in **Mumbai, India** and **Germany**



### Highest German standards guide our actions

 High German quality standards and workmanship	 Long-lasting, proven reliability	 High quality materials and manufacturing	 Certified ISO 9001
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### Data & facts

<b>4.2 GW</b> of substructure	<b>4.5 GW</b> of wiring harness
<b>88 MW</b> of rooftop installation	<b>145 m</b> of module clips

# PEG<sup>®</sup> Main Benefits

High land use of **2,1 MWp/ha**  
(~225% higher MWh yield per hectare)



Weather Resilient Design  
(storm proof to **298+ km/h**)



Slopes up to **20° (36,4%)**  
(higher flexibility and less earth works)



**Cost-effective CAPEX**  
(racking and DC supply, logistics and installation)



**50% reduced labor**  
(quick installation / low skilled labor)



**No heavy machines needed**  
(only handheld tools for installation)

# Furthermore PEG<sup>®</sup> Advantages

**Hot dip galvanized** steel is suitable up to C5 corrosion class (e.g. near ocean)



Very light system of **6 kg per kWp** (720W modules)



**72% less carbon** footprint (78 % less steel, no foundations and low logistics)



Proven globally, over **600+ MWp** installed



Low profile & shallow foundations <1m above & below ground



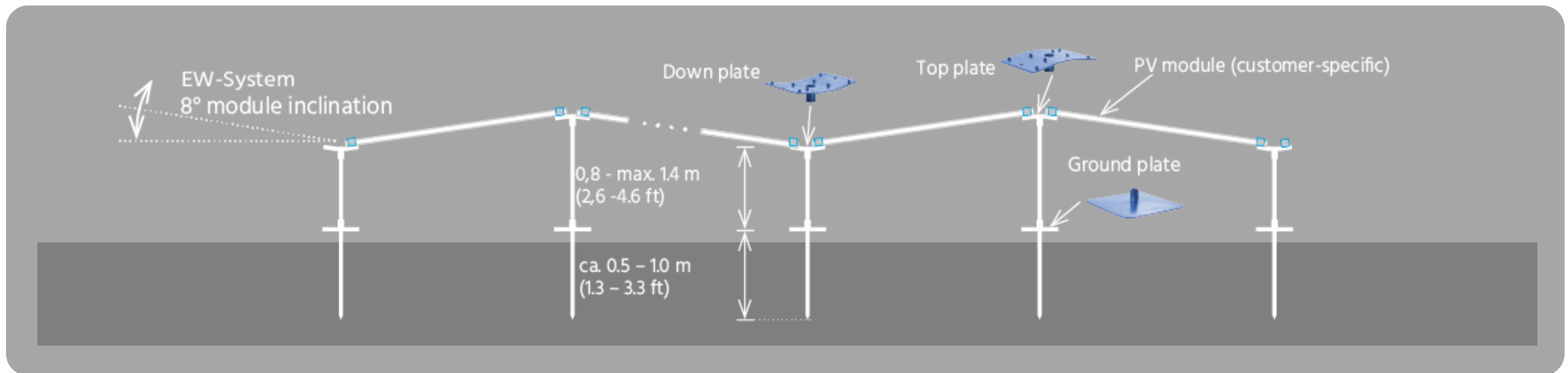
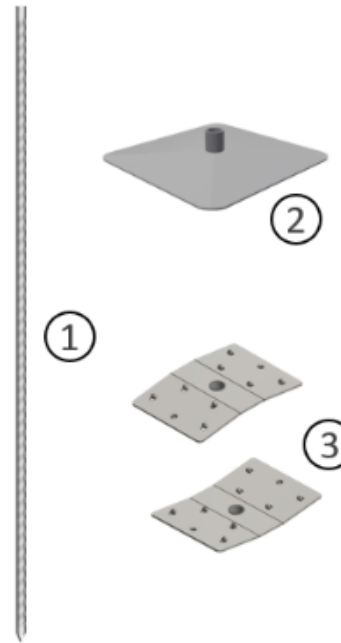
**Mechanical engineering**, Jurchen takes care of the layout, loads and statics



# PEG<sup>®</sup> : Patented Design Characteristics

## Only 3 items:

- ① Steel rod
- ② Ground plate
- ③ Head plate



- 1. subject to the site conditions and system design
- 2. Depends on the POT-values. For exceptional permafrost conditions, the ramming depth could be up to 2m, done by the use of two rods crimped together onsite through a sleeve, subject to project-specific approval.

## 1) Surveying and marking rod positions

- ① String lines with or without GPS staking corners
- ② Marking device, semi automated or manual (with GPS tracker)
- ③ Marking robot, e.g. CIV robotics



## 2) Ramming

- ① Use hammer drill, post driver or PEG Drive Robot (late Q1 25)
- ② “PEG Assist Platform” including magnetic rod guidance and balancer
- ③ PEG DRIVE: autonomous ram

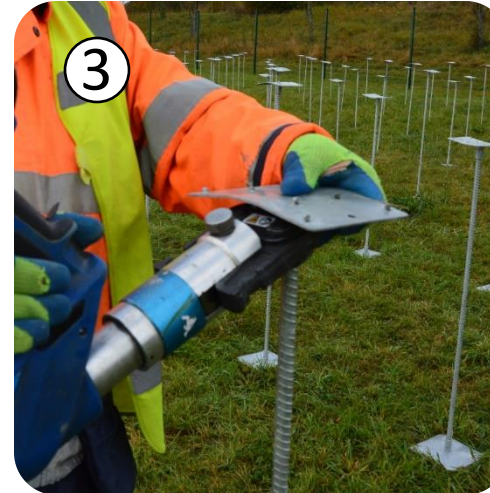
Rotary laser, GPS surveying device or/and string line for rods to reduce the measurement effort



# PEG®: Installation of Rods and Modules

## 3) Plate Installation/Crimping

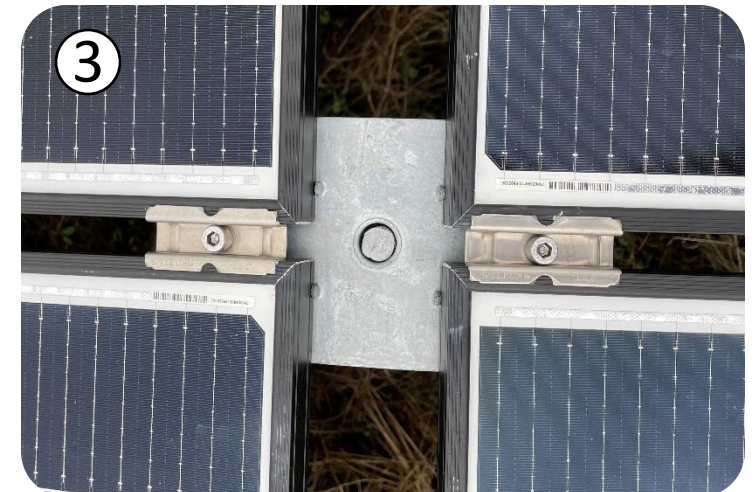
- ① Ground plate (installed at ground level on any rammed rod)
- ② Top plate (installed at top of long rod)
- ③ Down plate (installed at top of short rod)
- ④ Crimping tool & ⑤ crimper jaws detail



# PEG<sup>®</sup>: Installation of Rods and Modules

## 4) Installation of modules

- ① Place modules
- ② Installation of module clips
- ③ Center clips provide grounding



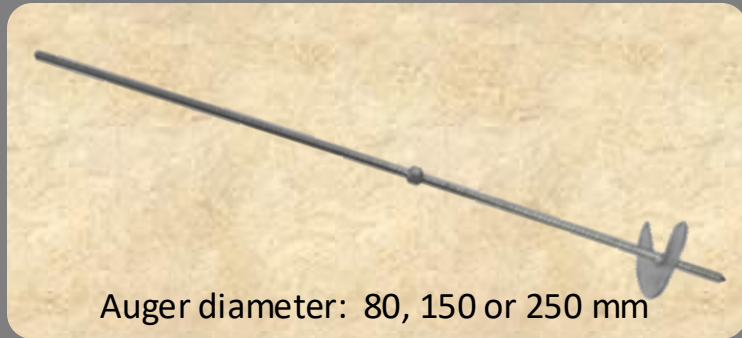
# PEG<sup>®</sup>: Under Array Design and Cable Management



# PEG®: Optional Solutions

## Anchor Rods PEG

for soft soil and shallow foundations  
(e.g. swamp, sand, landfill, brownfields)



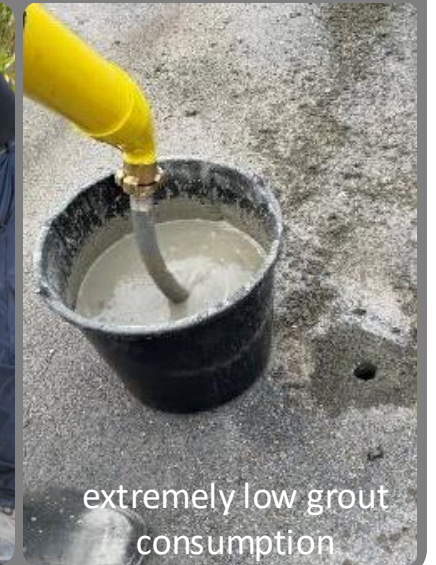
## Self-Ballasted PEG

If no ground penetration is permitted



## Pre Drilled PEG

For rocky ground, asphalt or if there are obstacles in the ground

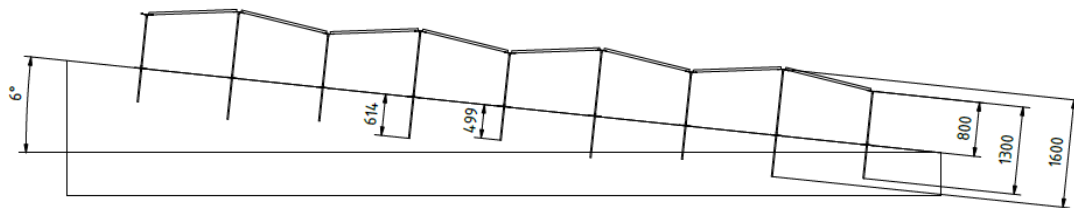


# Design: Ground/Soil Requirements – Type & Slopes

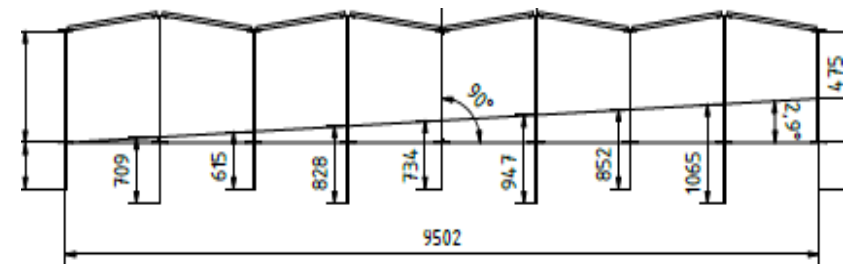
## Site slopes:

The PEG can be installed on the following slopes (EW or NS):

- Up to ~20 degree (~36.4%)
- PEG Design adapted per site requirements including wind, snow and module size



Example installation for 11% parallel to slope



Example installation for 5% slope with snow to min PEG BOM costs



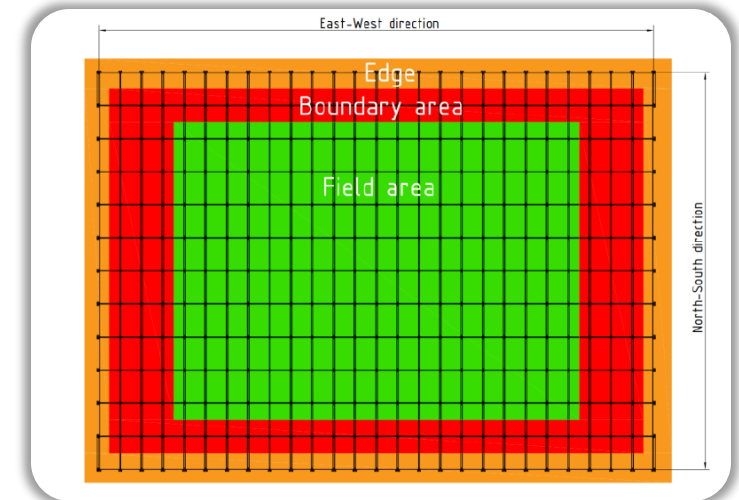
# PEG<sup>®</sup> EW backup information



**PEG<sup>®</sup>** Revolutionizing Solar Mounting

# PEG<sup>®</sup>: High Load Wind Design

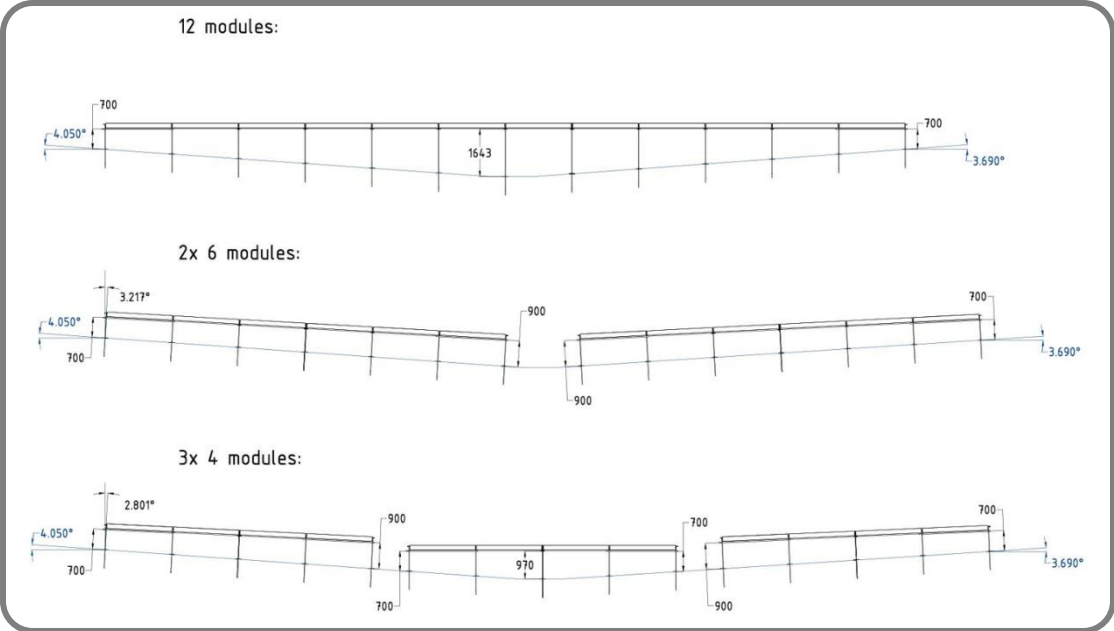
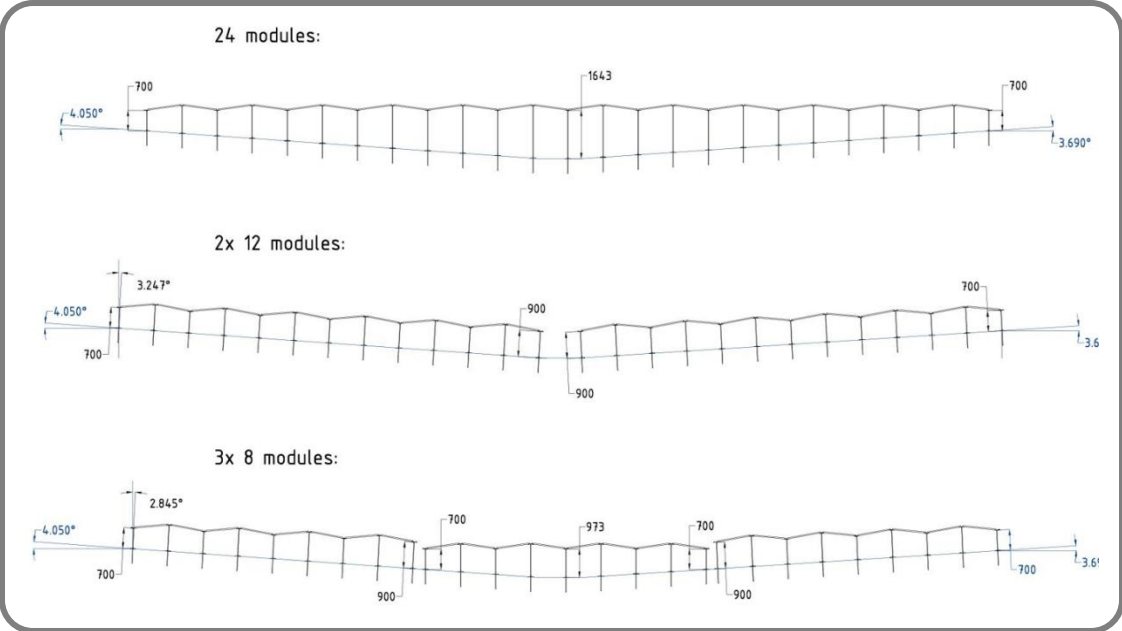
- PEG Design is determined by wind speed, wind exposure and module size
- 475 watt module max wind speed standard design 180 mph wind exposure C, ASCE  
→ 185+ mph for HL design
- 550 watt module max wind speed standard design 160 mph wind exposure C, ASCE  
→ 200+ mph for HL design



Images above show HL clip design with additional rod in the middle of the module. ↑  
The graphic on the right shows wind impact on PEG block and shows hybrid block design. →

# PEG<sup>®</sup>: Soil Requirements – Flatness

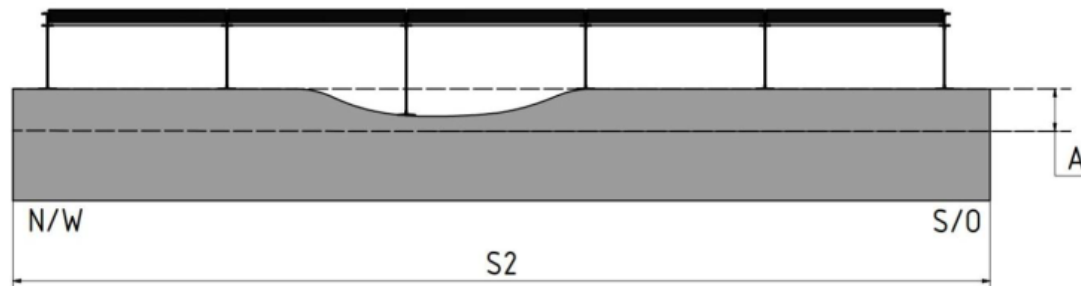
**Handling slopes by using smaller blocks** - below left shows EW orientation and right show NS



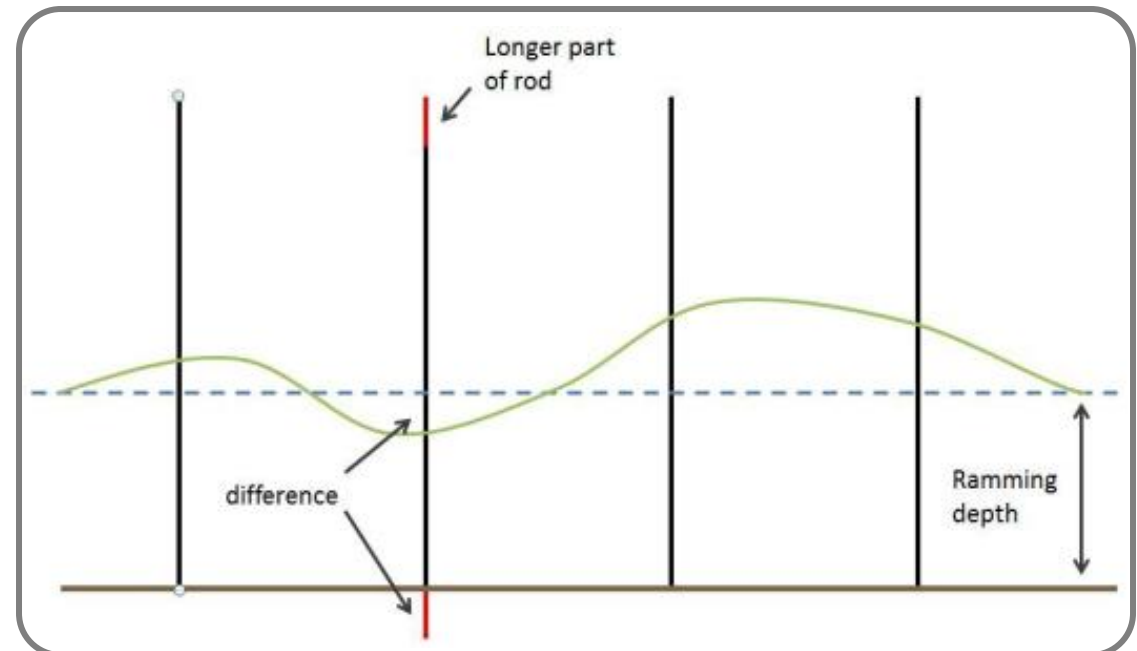
Further information available in the Jurchen Technology PEG slopes guidance.

# PEG<sup>®</sup>: Soil Requirements – Undulations

- Ground flatness: Up to 500mm dip (19.68 Inch) over 9-40m (29- 130ft)
  - Larger dips are possible but would decrease ground clearance of modules
- The rods should be sufficiently long for the undulations onsite (or use rod extensions)



A = Up to 0.5m (~27.5 Inch), S2 = 9-40m (29- 130ft)  
\*The above is implemented through customized block size to address the ground flatness



Further information available in the Jurchen Technology PEG slopes guidance.

# PEG<sup>®</sup>: O&M – Vegetation Control

## Mowing Solutions:

- Fabric sheet placed on the ground, prevents vegetation growth. Commercially available product, not flammable, water permeable
- Robotic mower under the structure, autonomous or operated by remote
- Clover grass, ~150mm (~0.5ft) tall, drought-resistant, prevents other plant growth
- Sheep, successful trials in Europe and Ecuador since 2022



# PEG®: O&M – Modules Cleaning

## Robotic Cleaning Machines:

- GEVA BOT, first productive use since August 2022, ~220 modules/hours with 1m wide brush (for Landscape modules' orientation), or ~470 modules/hours 2m wide brush (for Portrait modules' orientation)
- Serbot pvCLEAN, successfully tested during 2022 for commercial use
- Manual cleaning: Gal-In, a lightweight, 18 kg (40lb), pulled with a rope and operated by two workers. 430 modules cleaned per man-hour.



Additional information is available online

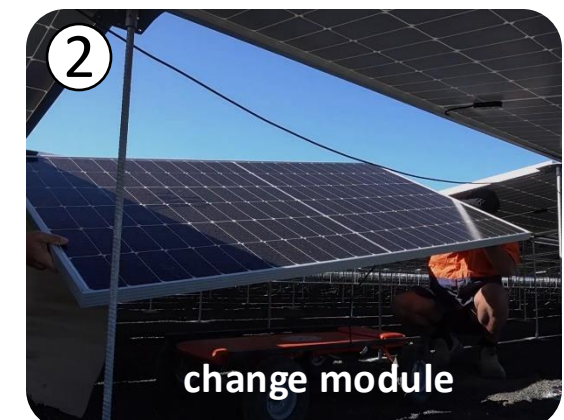
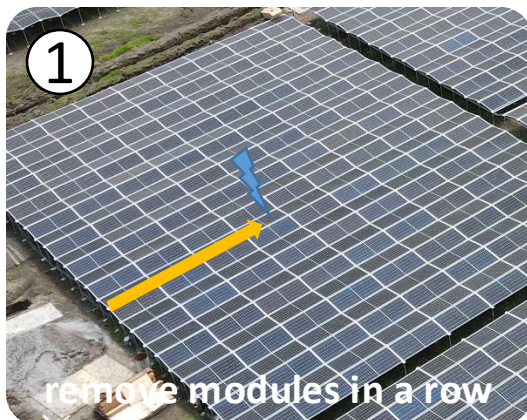
# PEG<sup>®</sup>: O&M – Modules replacing

## There are two different solutions to replace modules:

- 1 Remove modules in row:**

As the array it only waist high, you need two guys and a screwdriver. Work from the outside to the module to be replaced. I.e. first remove a module on the outside and put it aside, then the next one, etc. until you reach the defective module. Then replace the module and reinsert the unscrewed modules. In this case, you would have to remove for example a maximum of 6 modules (+ the defective one) if the block size is 24x14.
- 2 From underneath :**

Drive with a trolley under the PEG system to the module to be replaced. Unscrew the clamps from below through the gap between the module using a cordless screwdriver. Remove and replace the module with a second person. Screw the module clamps tight again. Done.



# PEG: Bankable System

- **Debt finance was provided** for PEG projects, both pre and post construction
- **DNV-GL bankability report**

Examples of banks provided debt finance for PEG projects

## Australian banks



## Dutch banks



Mounting type	GCR (Ground Cover Ratio)
PEG	≈ 1.0
Fixed-tilt, ground-mount	US locations: 0.40 Tropical locations: 0.87-0.93
Single-axis tracker	0.33

Energy land-use efficiency (MWh/acre/yr)	
Location	Gain PEG vs. FT/SAT
St. Cloud, Minnesota	+217% FT +224% SAT
Las Vegas, Nevada	+227% FT +222% SAT
Raleigh, North Carolina	+231% FT +241% SAT

- PEG's main advantage is in the efficiency of land use (the energy output per acre) and CAPEX reduction.
- the area-related energy harvest per acre is almost the same for either the fixed-tilt or single-axis tracker systems, while the PEG system exhibits a comparative 227% advantage over either of these types.
- The PEG product has been installed in the field since 2014 and Jurchen has not received any warranty claims to date.
- Jurchen has performed geotechnical and structural engineering which is typical for a product of this type,

# PEG® : Approved Modules

- Modules suitable for PEG must have frames
- Approved modules list regularly updated at <https://www.jurchen-technology.com/products/pv-substructures/peg>
- Some approved module manufacturers:

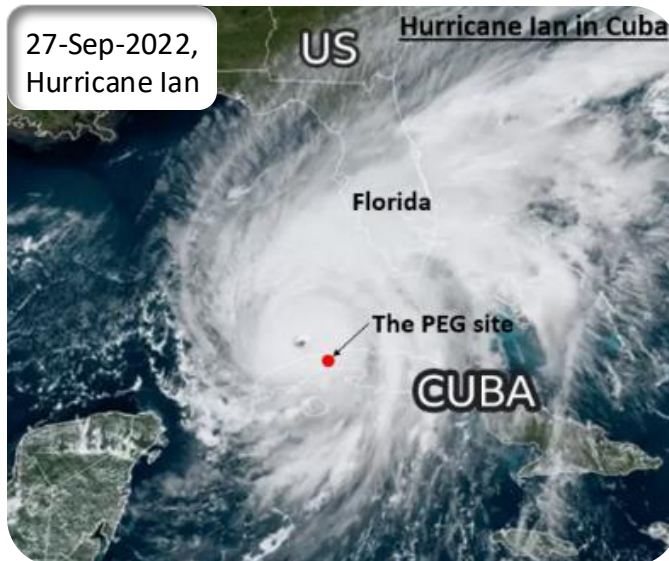


\*Approved for UL2703

→ Module's compatibility with PEG **MUST** be confirmed before ordering!

# PEG®: Design Robustness – Track Record

- Hurricane Ian hit the PEG EW site in Cuba in Sep 2022 with intense winds, Category 3, ~120mph (~190kmh) speed, without causing any damage to the PEG plant, Hurricane Rafael also hit the site with 125 mph winds in Nov 2024 with no damage
- Three severe storms (Zeynep, Ylenia, and Antonia) on the Waalwijk Landfill site in the Netherlands during early 2022, with extreme winds up to 100 mph (160 km/hr), without any damage to the PEG substructure, modules or cables



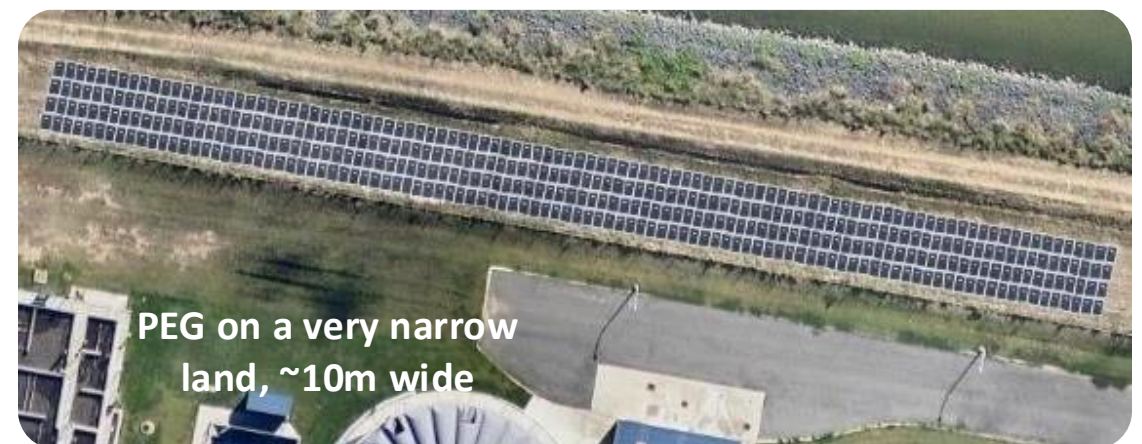
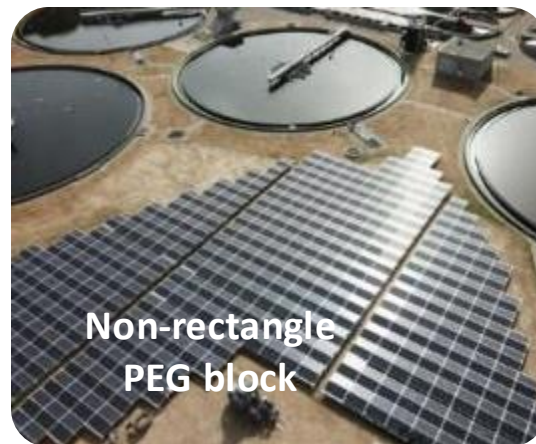
**Bert van Woudenberg**  
Director, ProfiNRG



»» At first glance the PEG might look a vulnerable and weak substructure, however the engineering work done by Jurchen Technology and the 3 extreme storm events only few months after the completion of the PEG installations had proven completely otherwise, clearly showing the PEG unique design is very robust and can withstand for extreme weather events. This is even more impressive due to the system's shallow foundation which was required for this old landfill site where the substructure could not be deeper than 0.5m below ground. ««

# PEG<sup>®</sup> : Land Use

- Extremely high land use: 2,0MWp/Hectare with 550W modules
- Flexible system design allowing very high land use, also on sites with irregular shape (e.g. narrow and long or not-rectangle)
- The system's orientation can be aligned to the site boundaries (NOT to the East-West direction) to maximize the land use, with minimal impact on the system's yield (low 8 degree module tilt)



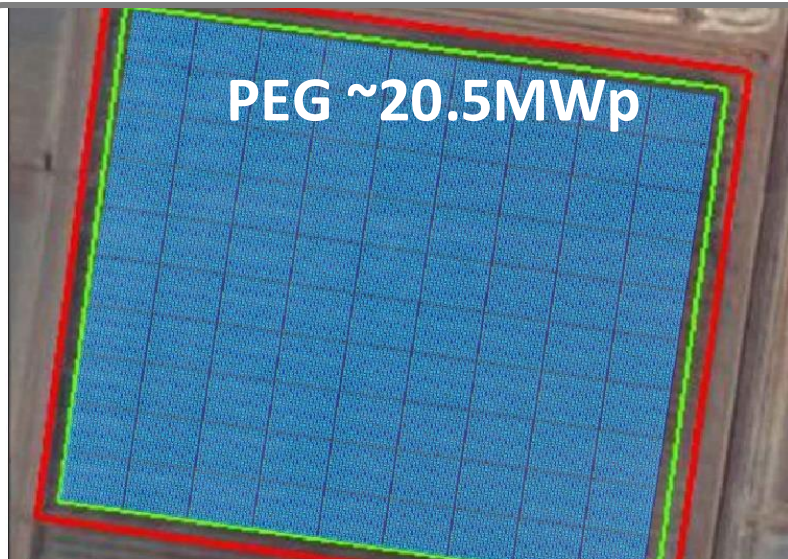
# PEG® : Material Specifications

Item	Material ( <b>India</b> / <b>Germany</b> supply)	Corrosion protection ** ( <b>India</b> / <b>Germany</b> supply)	Weight
<b>Rod *</b>	Ripped Steel rebar: Fe 500D / B500B	Zinc coating ~80 µm	16mm rod: ~1.75 Kg/m (~1.18lbs/ft)
<b>Ground plate</b>	Steel: S275MPa / S280GD	Zinc coating ~50 µm HDG / Z275 MA Pre-galvanized	~0.8 kg (1.76lbs)
Top plate	Steel: S275MPa / S280GD	Zinc coating ~50 µm HDG / Z275 MA Pre-galvanized	~0.46 kg (1.0lbs)
<b>Corner Bracing</b>	Steel: E250 or E350 / DX51D	Zinc coating ~80 µm HDG / Z275 MA Pre-galvanized	~3.5-4.0kg (~7.7-8.8lb)
<b>Middle clamp</b>	Stainless steel: SS304 / 1.4301	(None)	~0.05 kg (0.11lbs)
<b>Edge clamp</b>	Aluminium Alloy: 6063-T6 / EN AW 6060	(None)	~0.04 kg (0.09lbs)
<b>Bolts</b>	Stainless steel: SS304 / A2-70	(None)	~0.02 kg (0.045lbs)

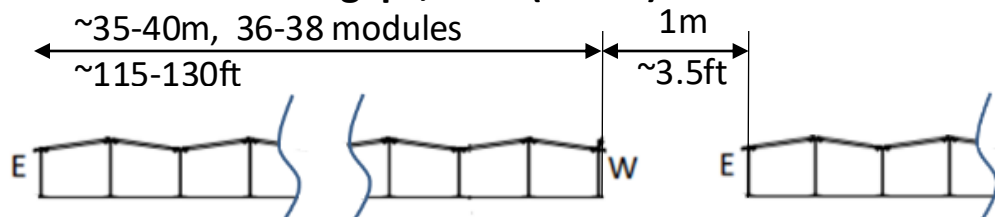
\* The rods diameter is 14mm (non UL), 16mm or 20mm. The length of the short & long rods is determined per site based on the required ramming depth (determined by Geotech report and pullout tests) and the required above-ground height. \*\* Indian plates supply are HDG (Hot-Dip Galvanized). German plates supply are pre-galvanize.

# PEG<sup>®</sup>: Land Use – Example

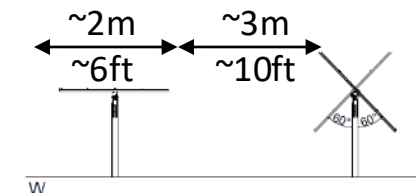
Layout example PEG vs Tracker on the same land with the same modules:  
The DC with PEG EW is ~3 times higher vs with Tracker!



Fewer gaps, ~1m (~3.3ft) each



Many large gaps, ~3m (~10ft) each



# PEG: Packing & Delivery

- Substructure weight (16mm rods): **~9kg (~20lb) per kWp** for MWp scale system (with 550W modules)
- **~2.25MWp** (16mm rods) packed in a **40ft HC container** (with 550W modules)

Examples of PEG item packing for shipment



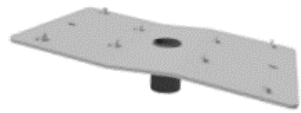
The **PEG packing specification** is available upon request

# PEG SD (Sun Directed): Design Characteristics

## PEG SD System

### Design and Construction:

- **Fixed-tilt system** PEG SD is designed to provide a high density solution for sloped sites with minimal earth works, minimized erosion, less than 6 feet clearance above ground, and 2"2" foundation depths. Ideal for high civil work sites with \$100k+ civil cost/acre and \$55+/MWh electricity costs (PJM Market)
- Racking is **lightweight**, reducing material consumption, logistics, and installation costs, while increasing installation speed and lowering the carbon footprint



SD-Plate



rod with ground screw

### Efficiency Improvement



### Cost Reduction



# PEG<sup>®</sup> : CAPEX Costs Saving vs other systems

Cost Factor	Saving
Material	<b>Substructure: 50-65% less, DC cables: ~20-30% less</b>
Logistics	<b>~50% less</b> due to far lower substructure quantities and weight
Labor	<b>~50% less</b> due to less labour time (hr/MW) & skilled labour (avg. hr cost)
Construction material	<b>No concrete &amp; sand is required</b> for foundations or DC trenching
Machinery & tools	<b>No heavy machinery is required</b> (e.g. ramming, trenching, concreting). Only small forklift for site logistics and hand tools required.
Site operation	<b>~30-50% less installation time</b> , leading to saving of site operation costs, e.g. management, safety & security labor & equipment, consumables, Etc.
Safety	<b>Far simpler installation process</b> , e.g. without working on heights and without heavy substructure items, leading to significant less OHS effort and injury risks
Land	<b>DC area ~50-65% smaller</b> → Lower land acquisition / rent costs, lower installation costs, shorter perimeter fence



Bluestone Service Group  
Cape Town, South Africa  
Phone: + 27 82 387 7140  
E-mail: [colin@bluestoneservice.africa](mailto:colin@bluestoneservice.africa)  
[www.bluestoneservicegroup.com](http://www.bluestoneservicegroup.com)  
The Jurchen Technology accredited  
commercial & distribution agent for  
Africa

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Jurchen Technology GmbH  
Prinz-Ludwig-Str. 5  
97264 Helmstadt

phone: +49 9369 98229-6600  
E-Mail: [info@jurchen-technology.com](mailto:info@jurchen-technology.com)  
[www.jurchen-technology.com](http://www.jurchen-technology.com)