



Cut your LCOE by optimizing PV tracker performance

Webinar

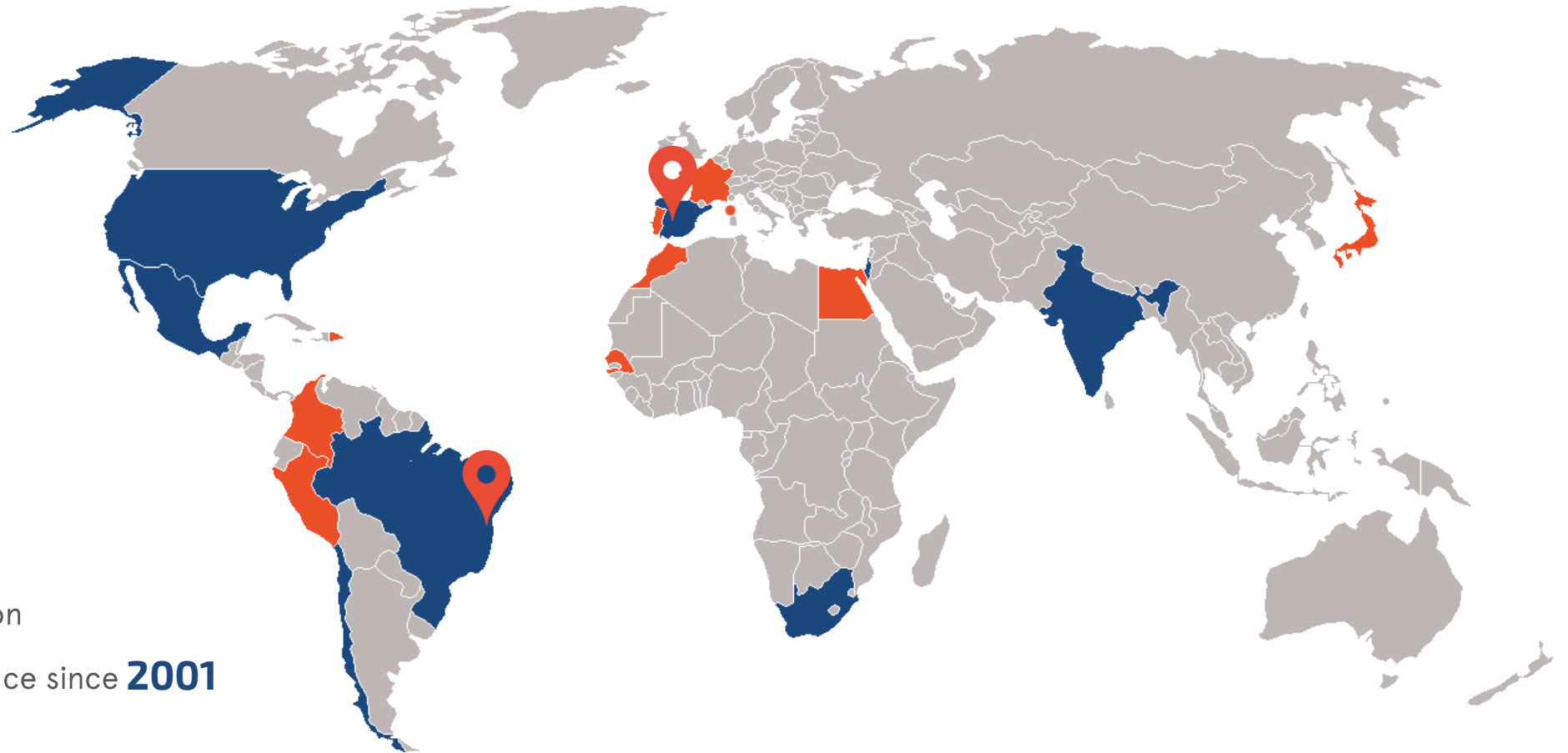
March 24, 2020

Speaker

Álvaro Achaerandio




Business Development Director, STI Norland

STI Norland



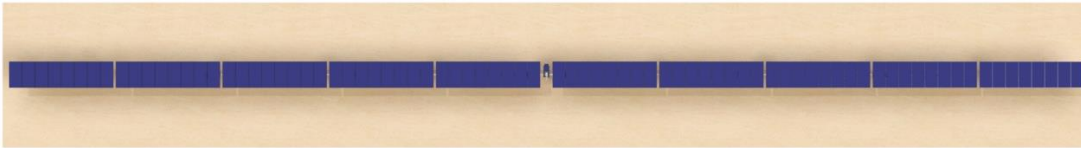
> **2 GW** under construction

Ground-mount PV experience since **2001**

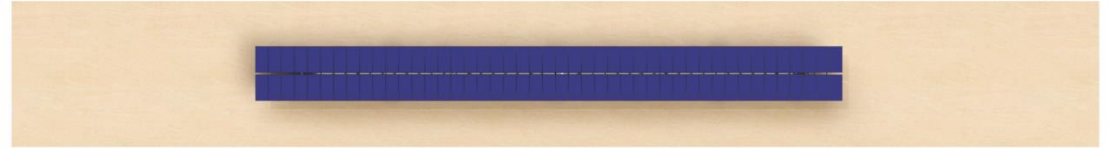
-  STI Norland's projects
-  STI Norland's subsidiaries
-  STI Norland's factories

Single-Axis Tracker Evolution

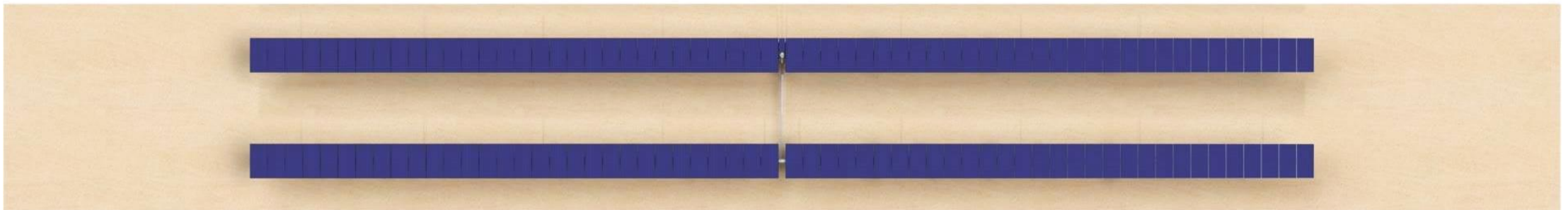
1P single-row 90



2P single-row 2x45

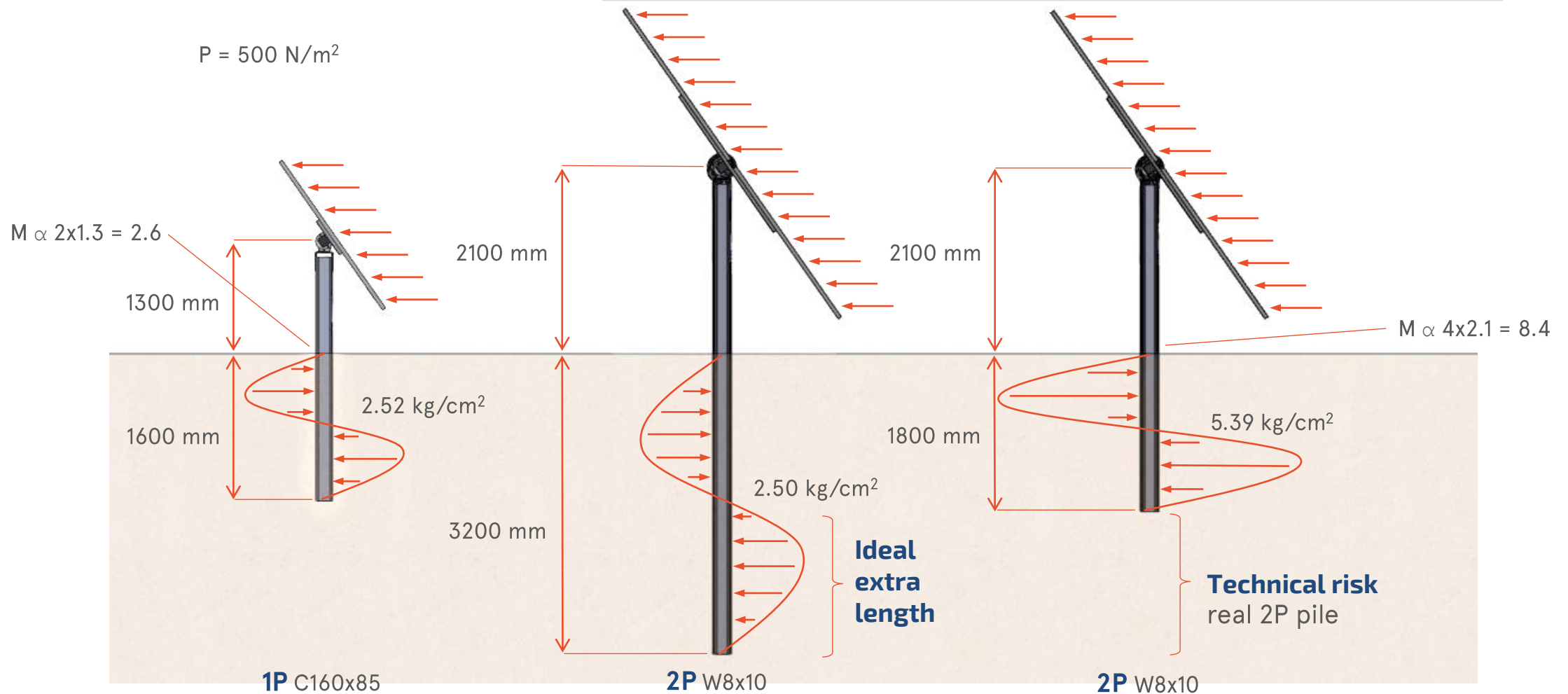


1P dual-row 60x2 STI-H250™

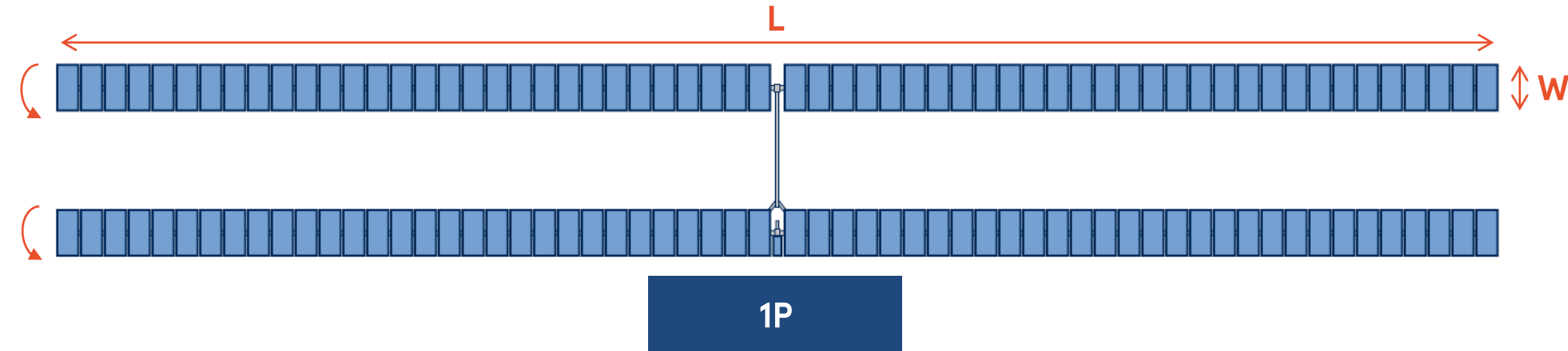


Geotechnical Risk

Soil capacity	Stress	Deformation	Cross-section	Foundation
1P	90%	14.3 mm	C160x85	1.6 m
2P (real)	194%	29.1 mm (1Px2.03)	W8x10	1.8 m
2P (ideal)	89%	16.2 mm (1Px1.13)	W8x10	3.2 m



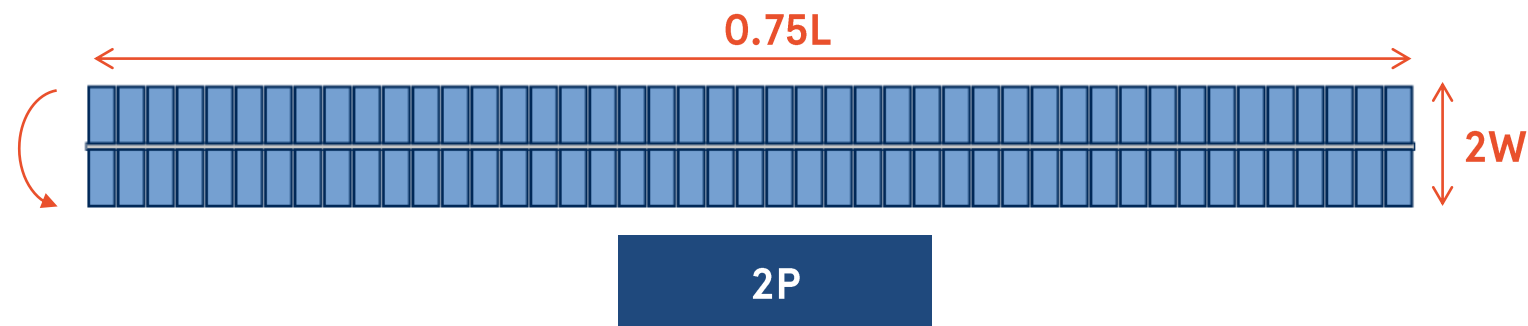
Torsion



$$T_{1Ps} \begin{cases} \propto 0.25 \cdot L \cdot W^2 \\ \propto 1 \cdot L \cdot W^2 \end{cases}$$

$$T_{1Pm} \propto 1 \cdot L \cdot W^2$$

$$T_{1P} \begin{cases} \propto 1.25 \cdot L \cdot W^2 & \text{Wind tunnel} \\ \propto 2 \cdot L \cdot W^2 & \text{No wind tunnel} \end{cases}$$



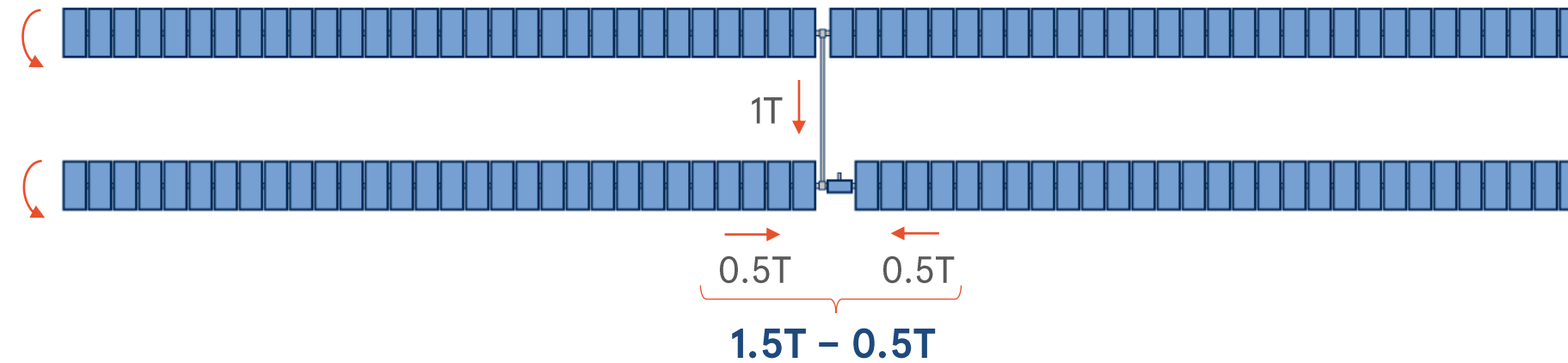
$$T_{2P} \propto 0.75 \cdot L \cdot (2W)^2 = 3 \cdot L \cdot W^2$$

Difference $T_{1P} - T_{2P}$

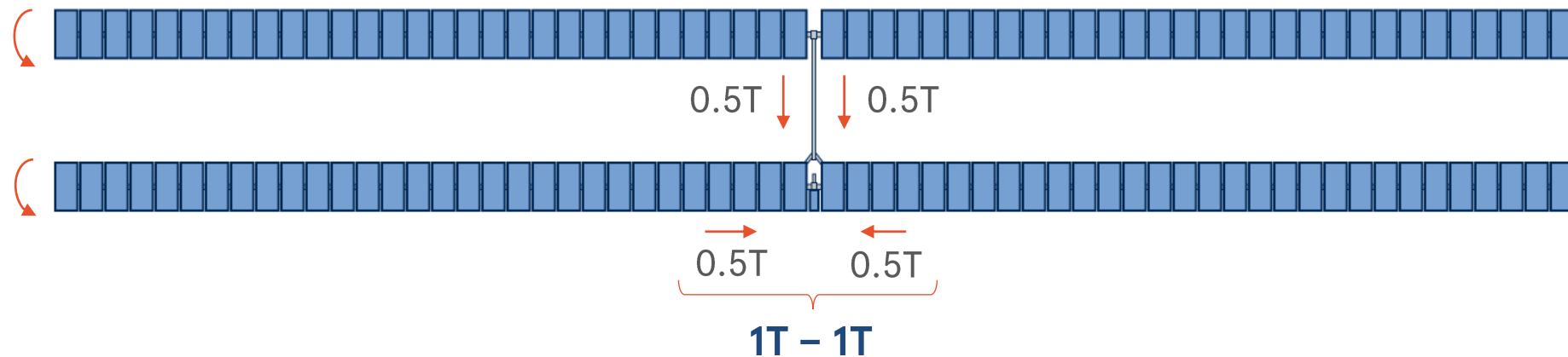
Wind tunnel	+240%
No wind tunnel	+50%

Dual-Row Tracker Symmetry

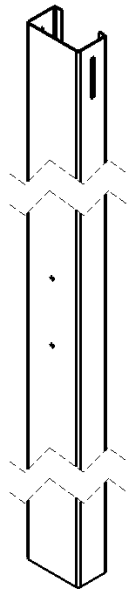
Asymmetric



Symmetric (STI-H250™)

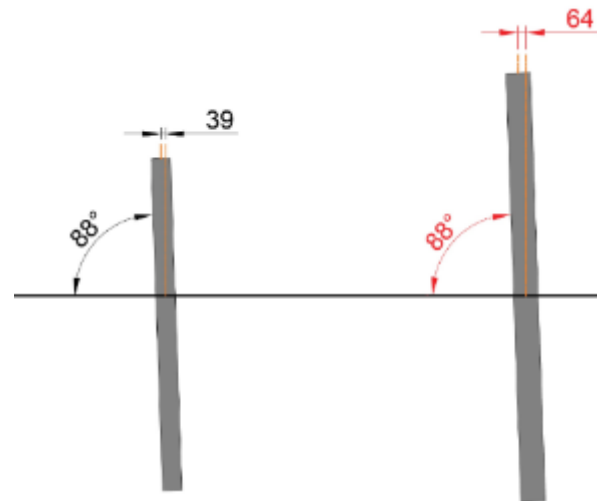


Foundations



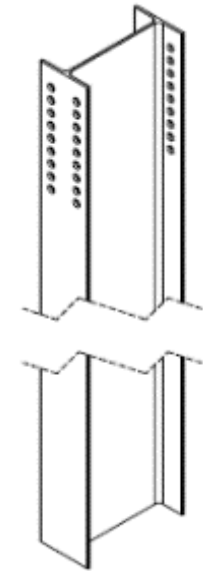
1Px60x2

SOP002	22.5 kg	2.7 m
SAC 001	55 kg	



1P

2P



2Px45

SOP002	60 kg	3.8 m
SAC 001	[70 & 85] kg	

Installation



1P

1.3 m / 4.3 ft
Pile height



2.1 m / 6.9 ft
Pile height

2P

Cleaning and O&M



Corridor for O&M works every two rows

Automated water-free cleaning



1P



2P



Bifacial



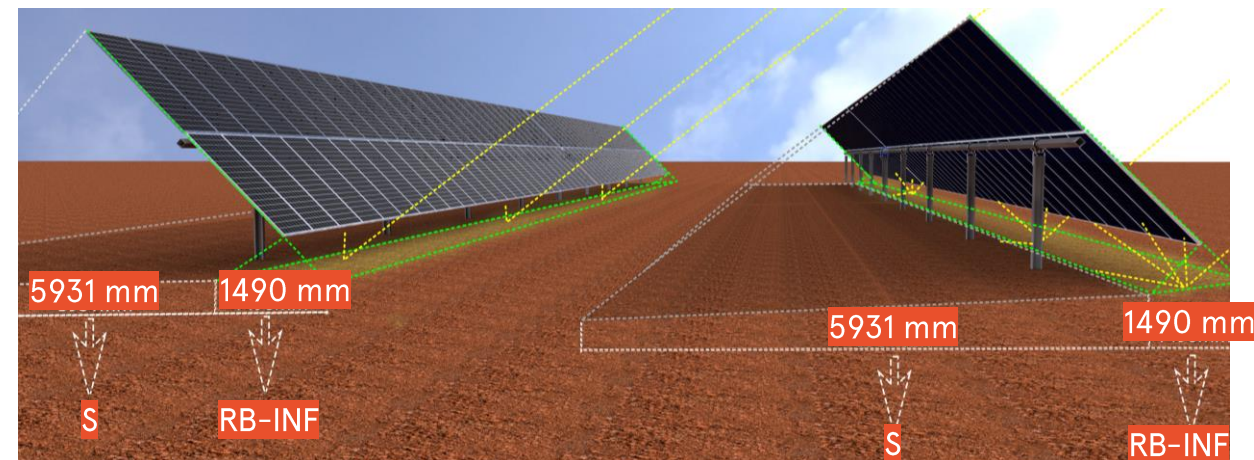
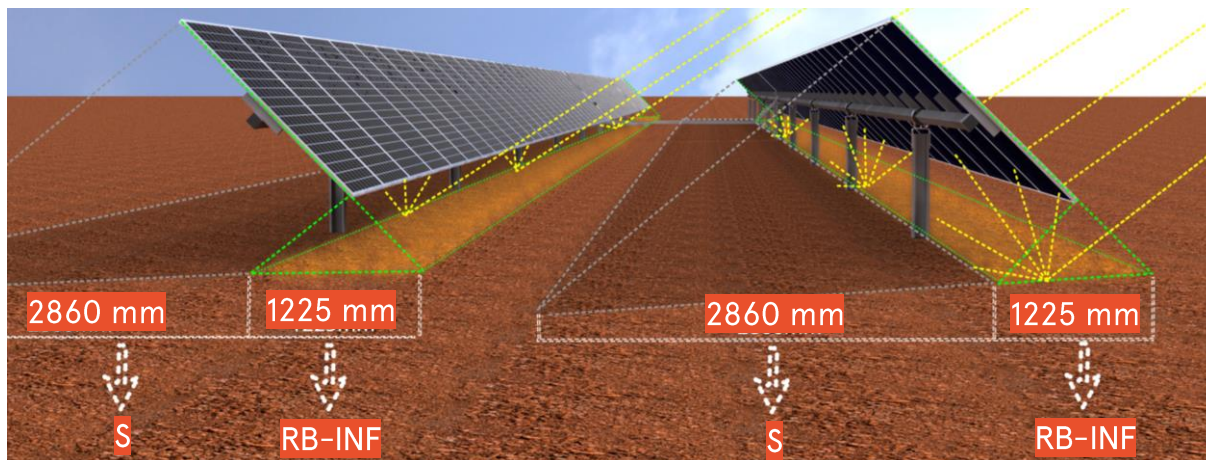
1P

$$H = 1.5/2 = 0.75$$



$$H = 2.4/5 = 0.6$$

2P



Summary

Potential LCOE deviations	1P	2P	Notes
Wind resilience	✓✓	✗✗	25-year time window
Actuator integrity	✓	✗	25-year time window
Racking system	✓	✗	25-year time window
Safety	✓	✗	Low height favors safety
Foundations (hard soil)	≈	✓	25-year time window
Foundations (medium soil)	✓	✗	25-year time window
Foundations (soft soil)	✓	✗✗	25-year time window
Robot panel cleaning	✓	✗	Low height favors positioning
General maintenance	✓	✗	Dual-row implies less critical items
Lay-out adaptability	✓	✓✓	Plot contours
PV modules size adaptability	✓	✗	Large PV modules trend

