

LONGI Solar

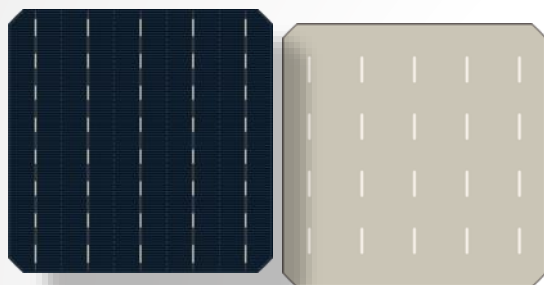
Bifacial PERC

Better LCOE Solution

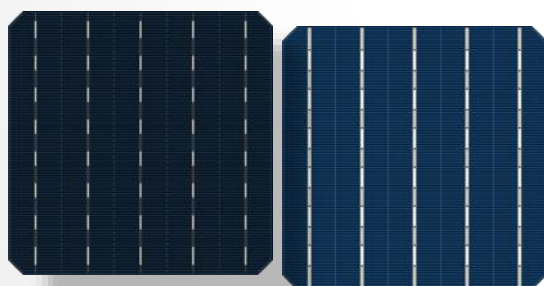
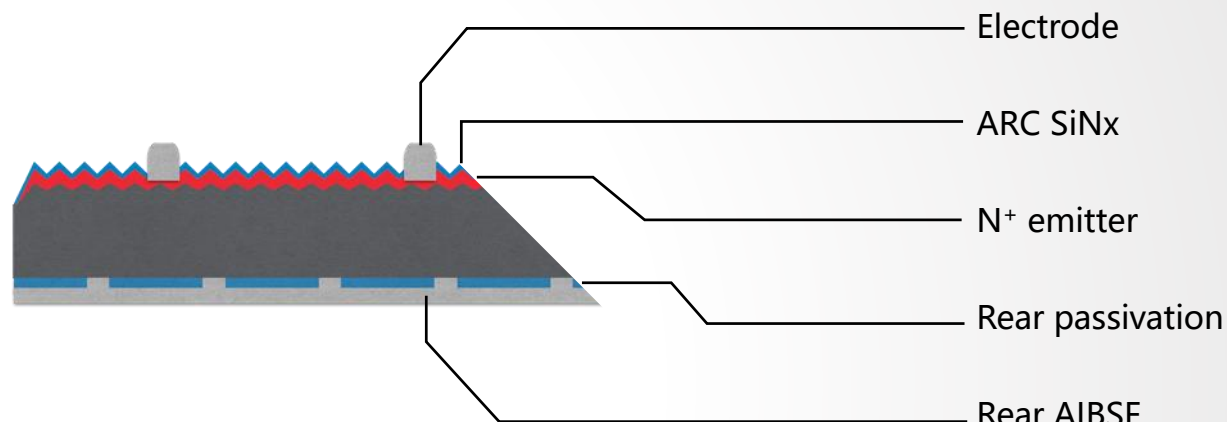


Hongbin Fang
Director of Product Marketing
Denver, September 10, 2018

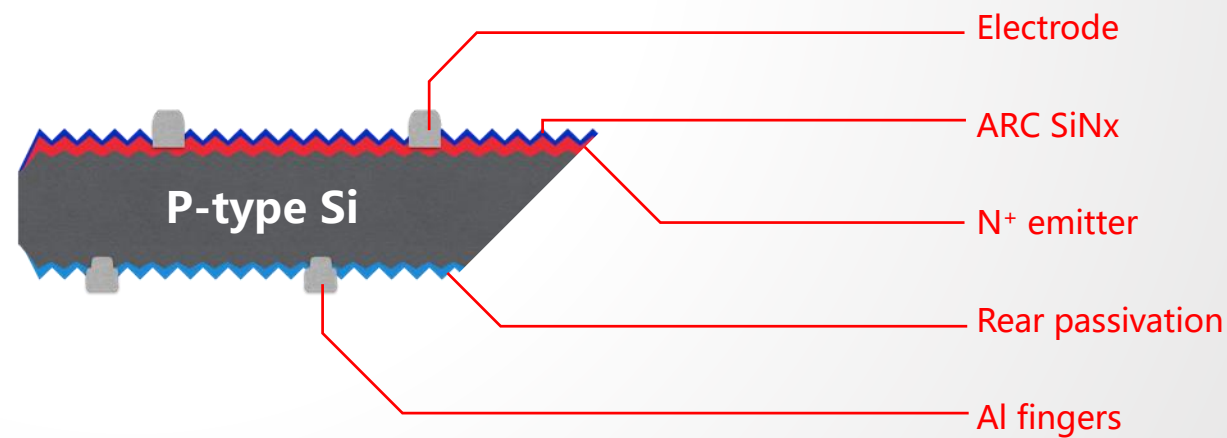
Mono PERC and Bifacial PERC



PERC



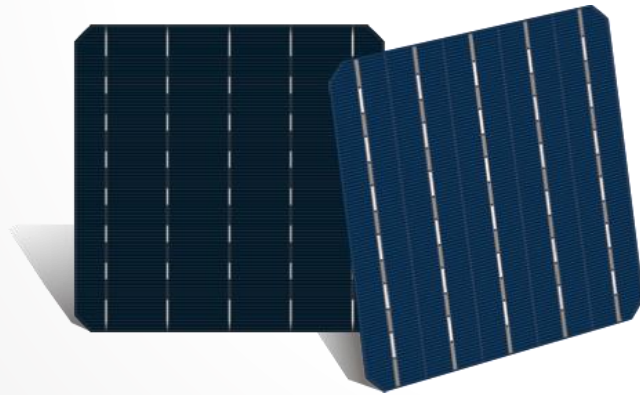
Bifacial PERC



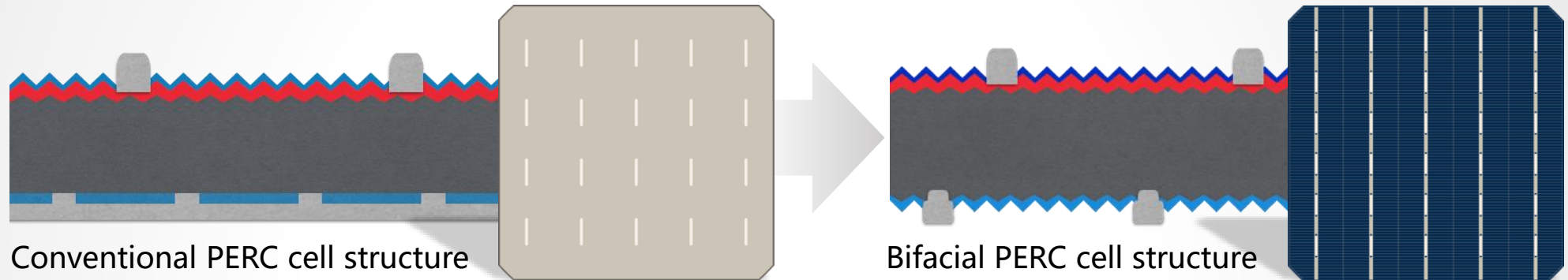
Bifacial Technology

Mono-facial to Bifacial power generation

- LONGi Solar Bifacial PERC Hi-MO2 cell and module bifaciality >75%
- Significant increase on energy yield
- Double glass lamination, 30 year power degradation warranty



Product Feature



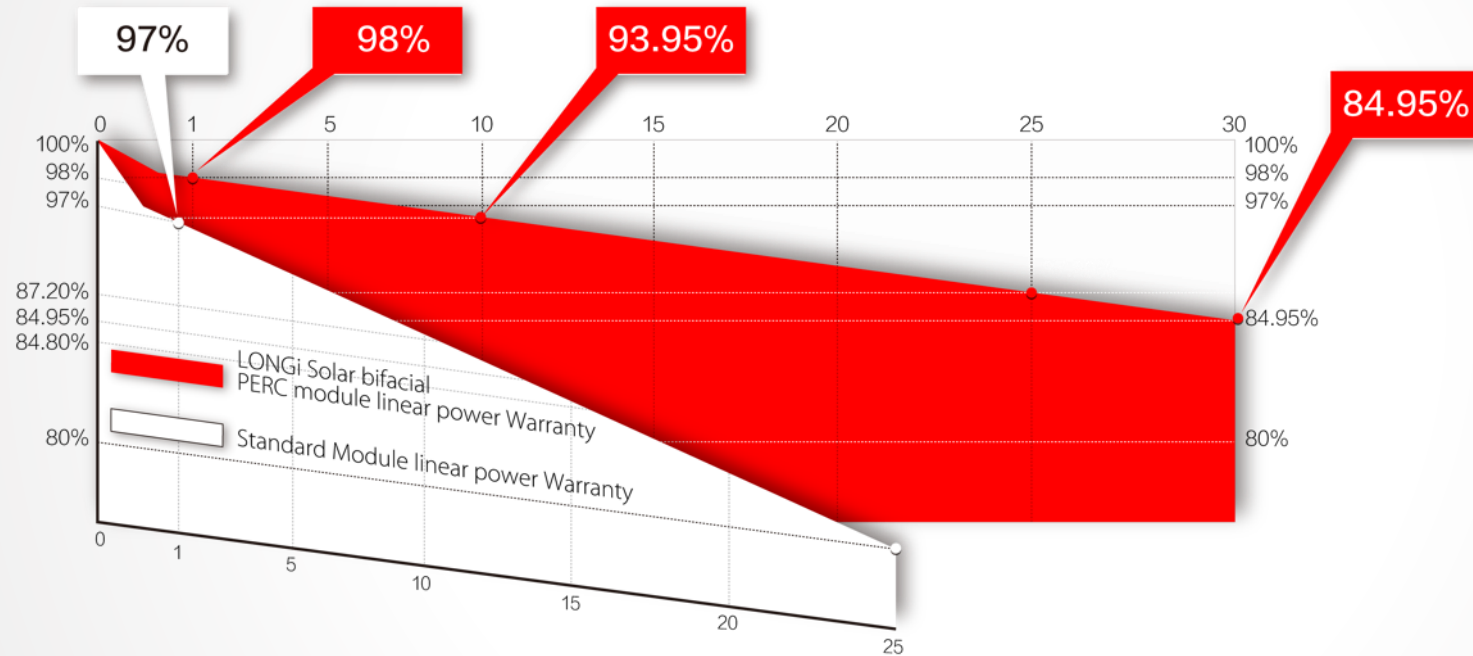
Performance and cost

- Front side efficiency equivalent to conventional PERC
- Manufacturing cost comparable to conventional PERC
- Bifacial light harvesting, 8%-25% power gain from rear side

Application

- Utility
- Commercial rooftop and carport

Module Power Degradation Warranty



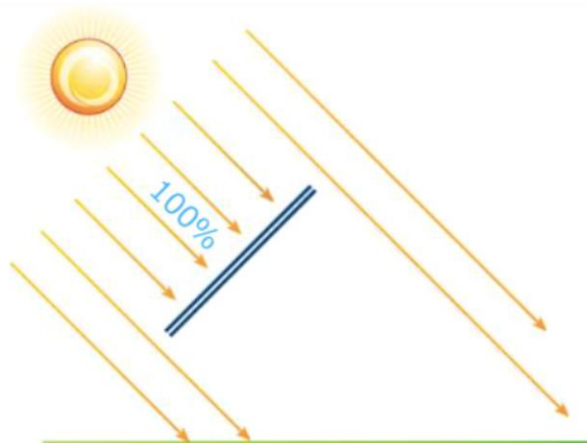
WARRANTY

- 10Y** MATERIAL & CRAFTWORK
- 10Y** POWER-OUTPUT > 93.95%
- 30Y** POWER-OUTPUT > 84.95%

Optimize System Design to Improve Bifacial **Energy Yield**

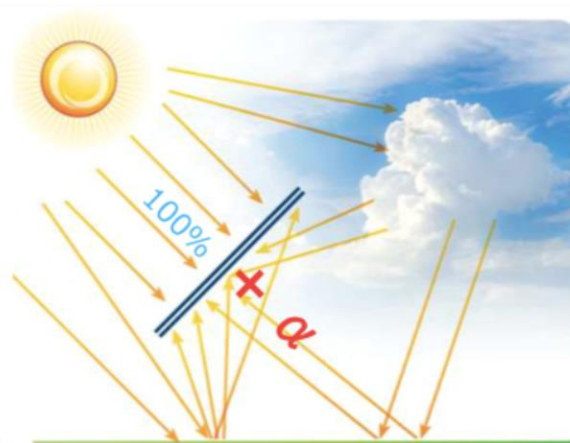
Backside Energy Yield

Mono facial module

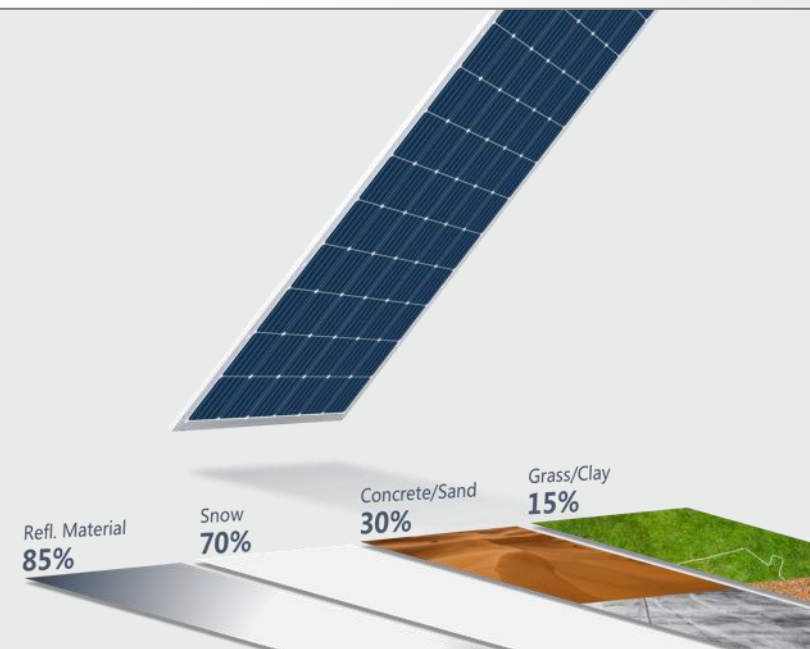


Direct sunlight

Bifacial module

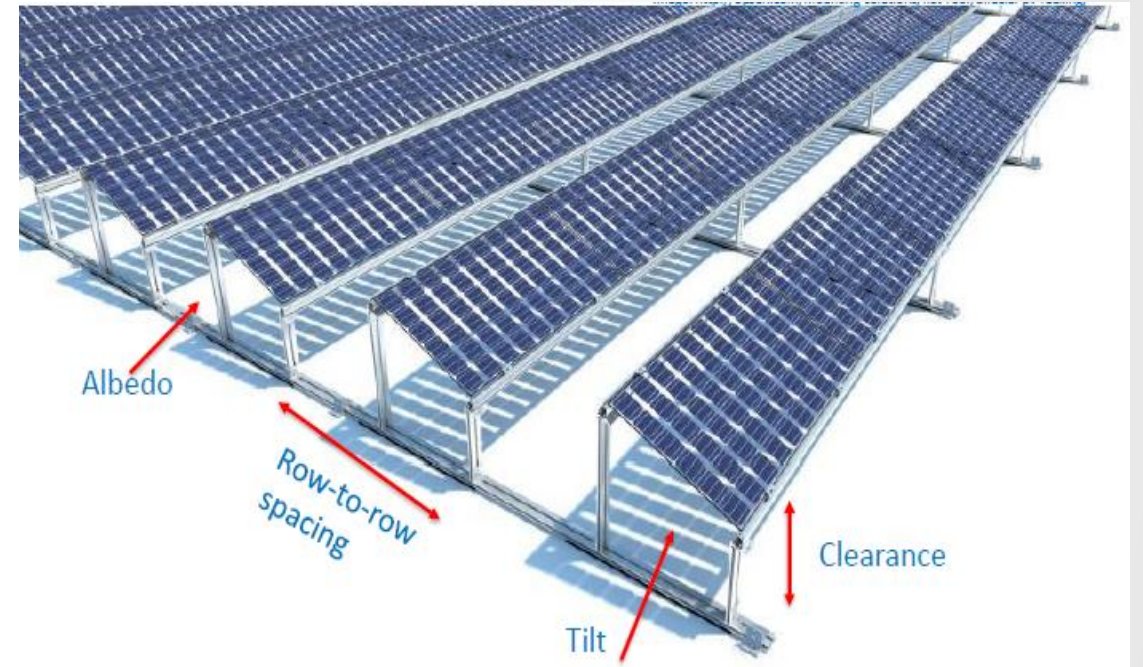


Direct sunlight + Reflection + Scattered light



System Design with Bifacial Module

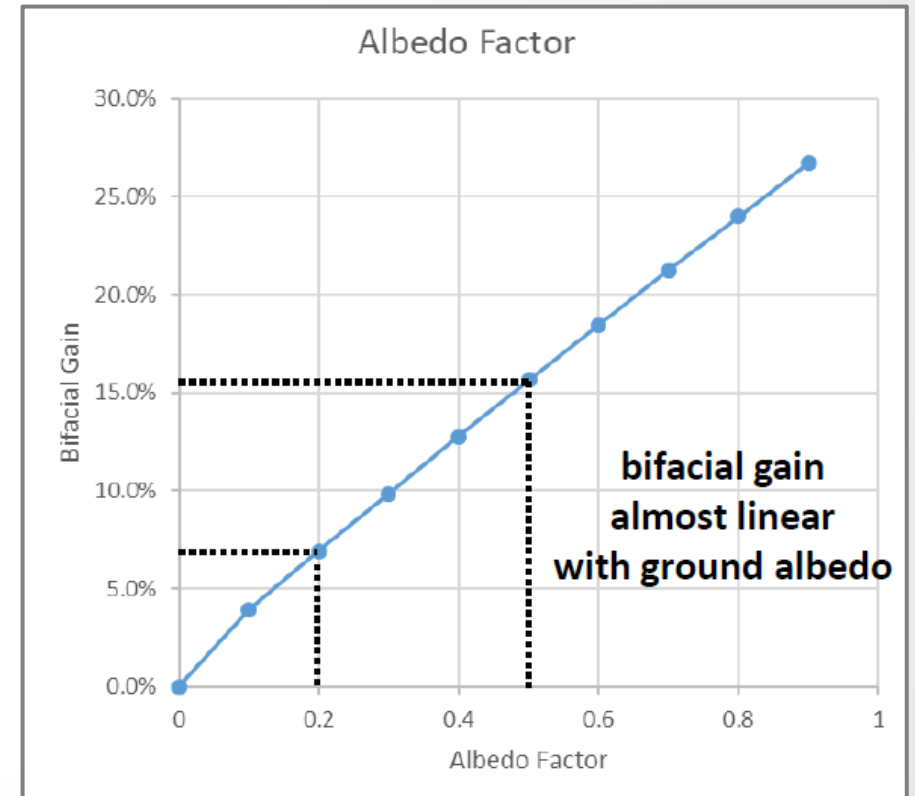
Main Parameters to consider:	
Albedo	↗
Clearance/height	↗
Racking	No backside shading
Row spacing (GCR)	↗ (↘)
Inverter DC/AC ratio	↘



Backside Energy Yield: **Albedo**

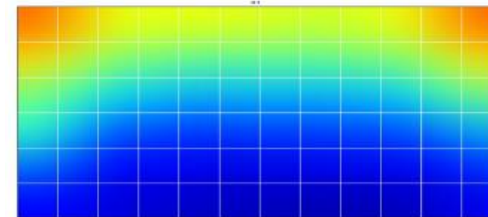
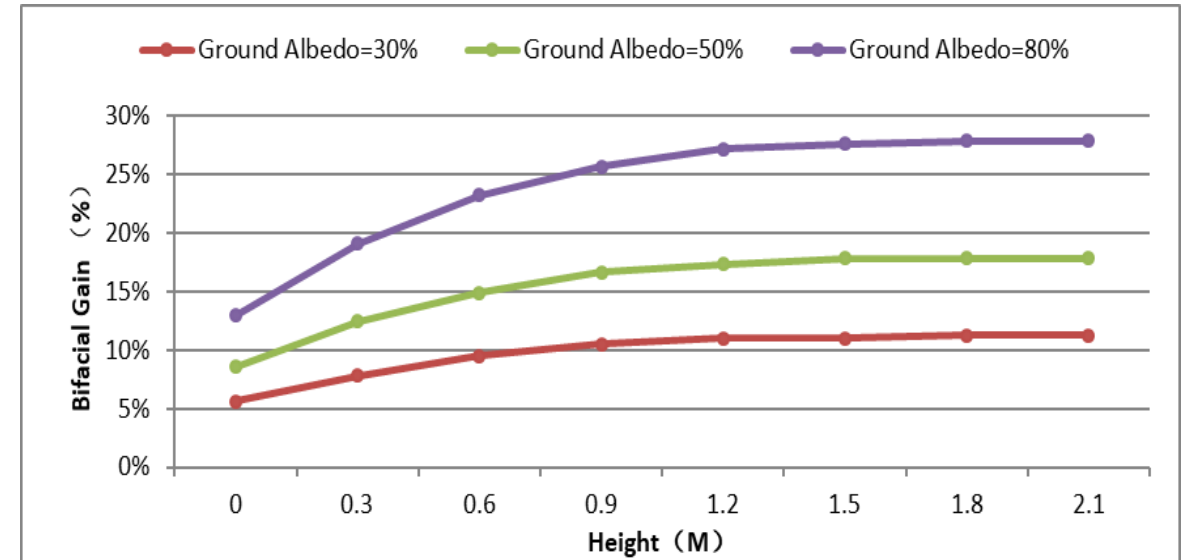
Bifacial gain improves with increasing ground Albedo

Surface type	Albedo
Green field (grass)	23%
Concrete	16%
White-painted concrete	60%–80%
White gravel	27%
White roofing metal	56%
Light-gray roofing membrane	62%
White roofing membrane	>80%

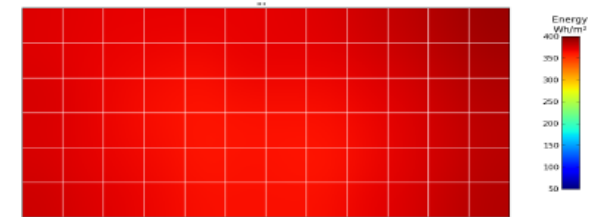


Backside Energy Yield: Albedo and Height

- Bifacial module backside energy yield improves with increasing Albedo (background reflectivity). Selecting site with more reflective background can improve overall system energy yield
- Increasing module height improves backside energy yield, as well as backside irradiance uniformity
- Module height (clearance from ground) of 1m and above is recommended

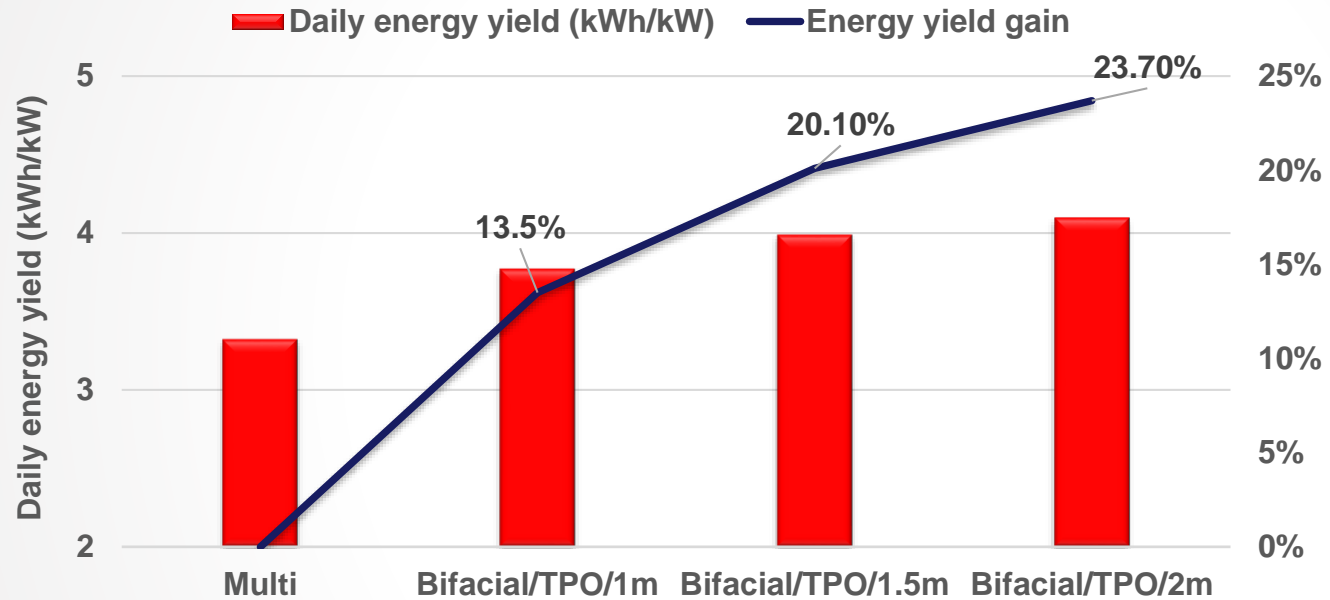


Irradiance at backside - Clearance 8 cm



Irradiance at backside - Clearance 108 cm

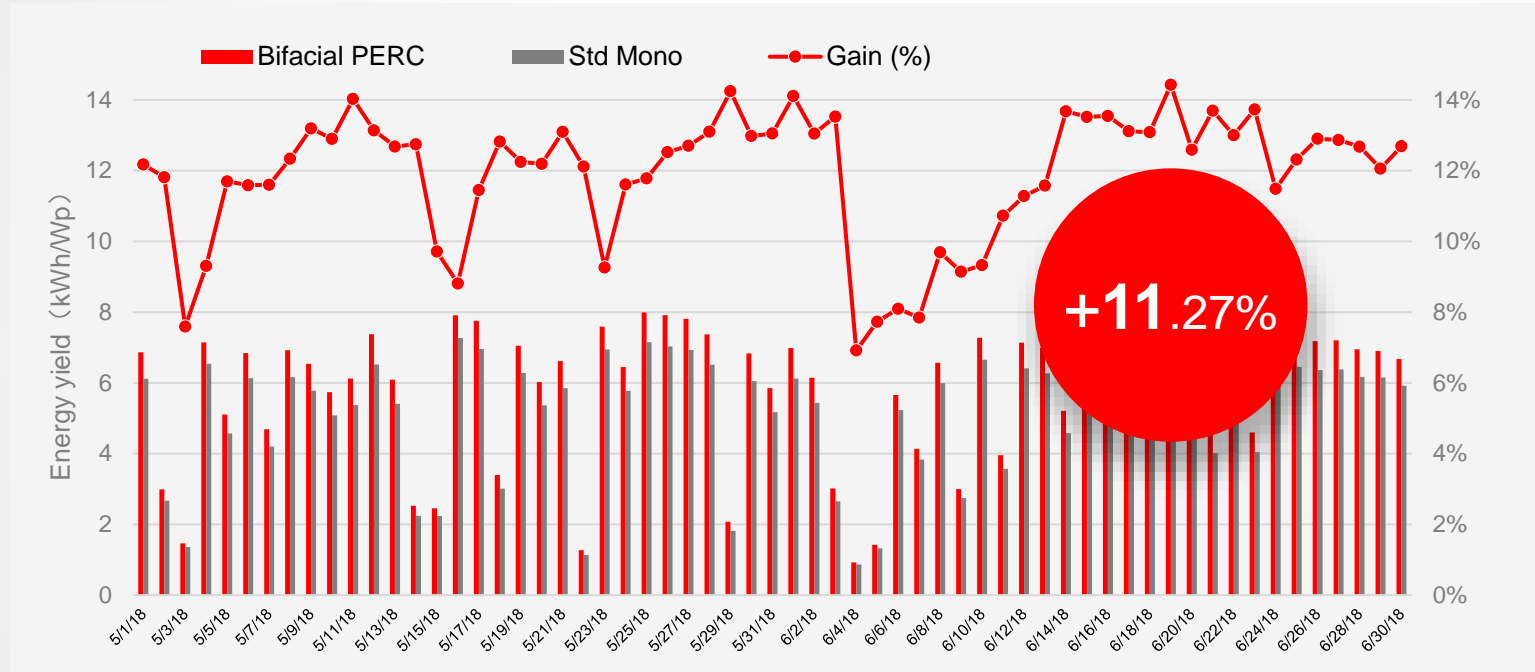
Bifacial PERC Module Field Monitoring Data



Data from Taizhou test site (N32.5° / E119.9°)

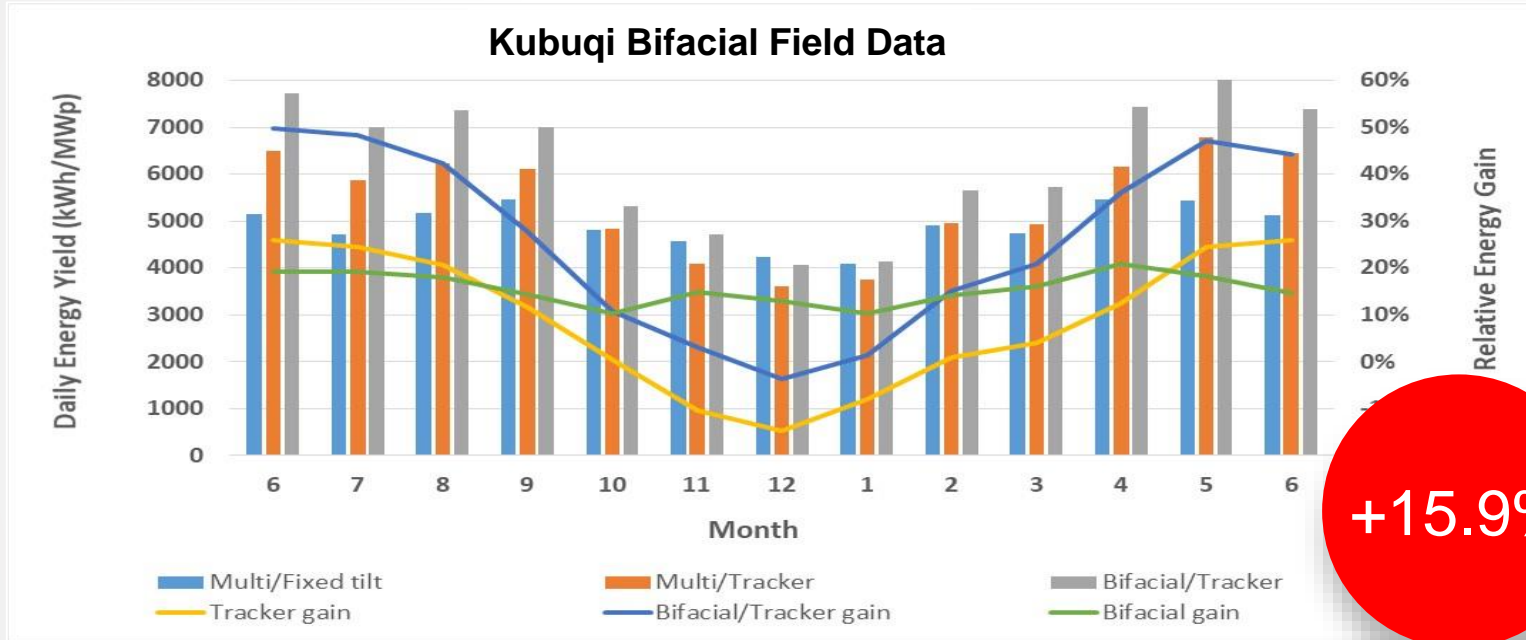
- Bifacial PERC Capacity 2.8kw, multi capacity 2.7kw, project located in Taizhou test site (N32.5° / E119.9°), China
- Fixed tilt configuration
- With same background condition, increasing backside energy yield with increasing racking height

Bifacial PERC Module Field Monitoring Data



- Bifacial PERC Capacity 18.9kw, std. mono capacity 18.25kw, project located in Pucheng, Shaanxi (N34.97°/E109.59°), China
- Fixed tilt configuration (15 degree), distance to ground 1.6m
- Three month monitoring data showed 11.27% energy yield from backside

Bifacial PERC Module Field Monitoring Data

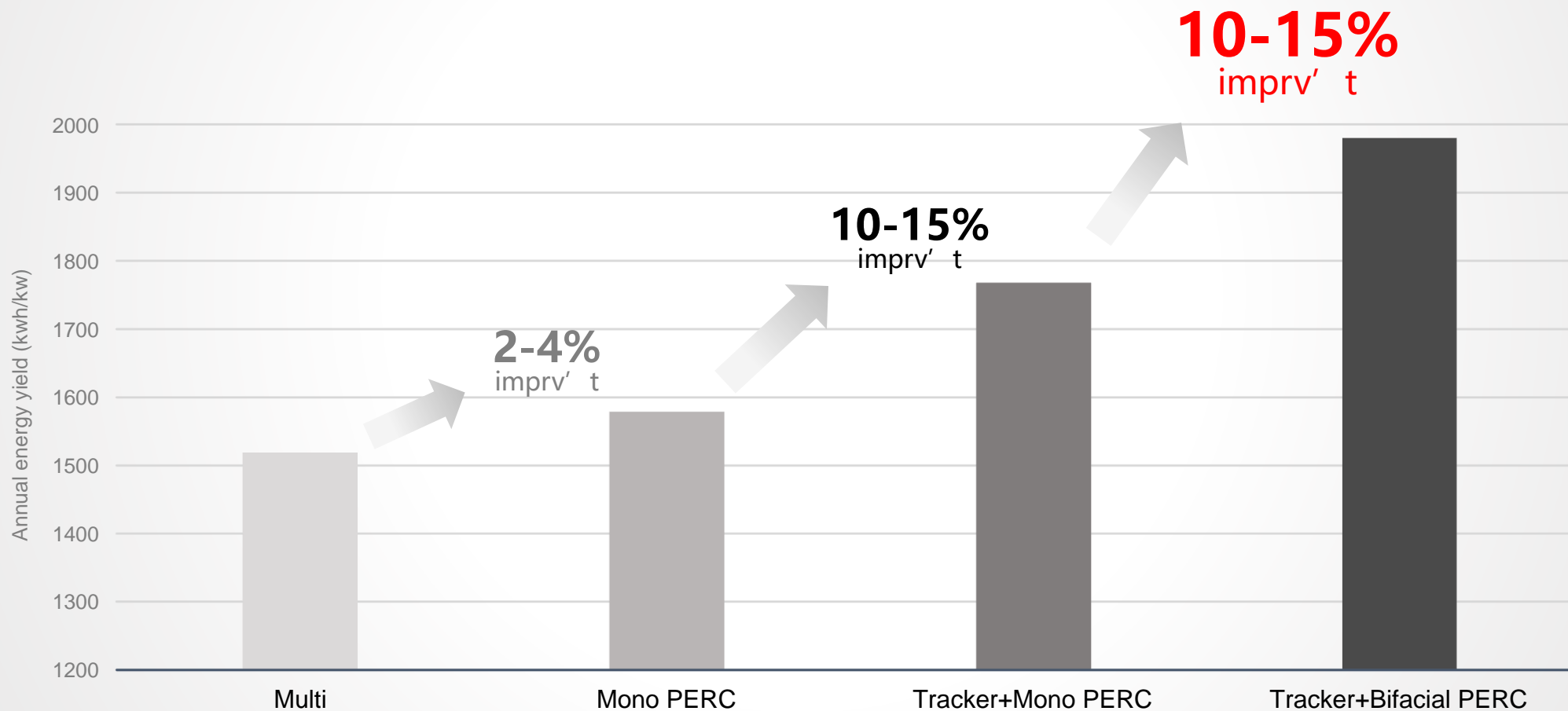


+15.9%



- Bifacial PERC project (336kw on single axis tracker) in Kubuchi, Inner Mongolia (N45.36°/E118.36°), China
- 1Yr energy yield by Bifacial module + tracker is 26.7% higher than Multi module/fixed tilt and 15.9% higher than Multi/tracker

Higher Energy Yield with PERC and Bifacial PERC



PERC Efficiency Improvement Potential

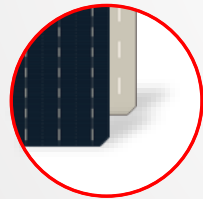
2017.10

Cell Efficiency

23.60%
Dec. 2017



22.71%

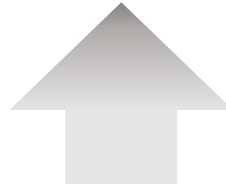


PERC Cell

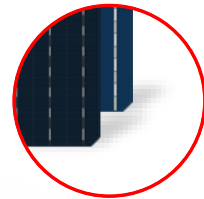
2017.11

Cell Efficiency

23.68%
Dec. 2017



22.41%
82.15%
(Bifaciality)

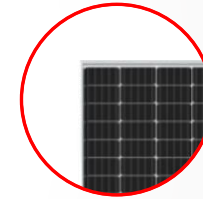


Bifacial PERC Cell

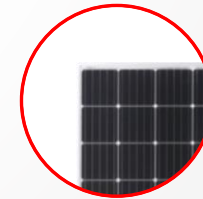
2018.01

Module Power

360.3W
(Half-cut) Apr. 2018

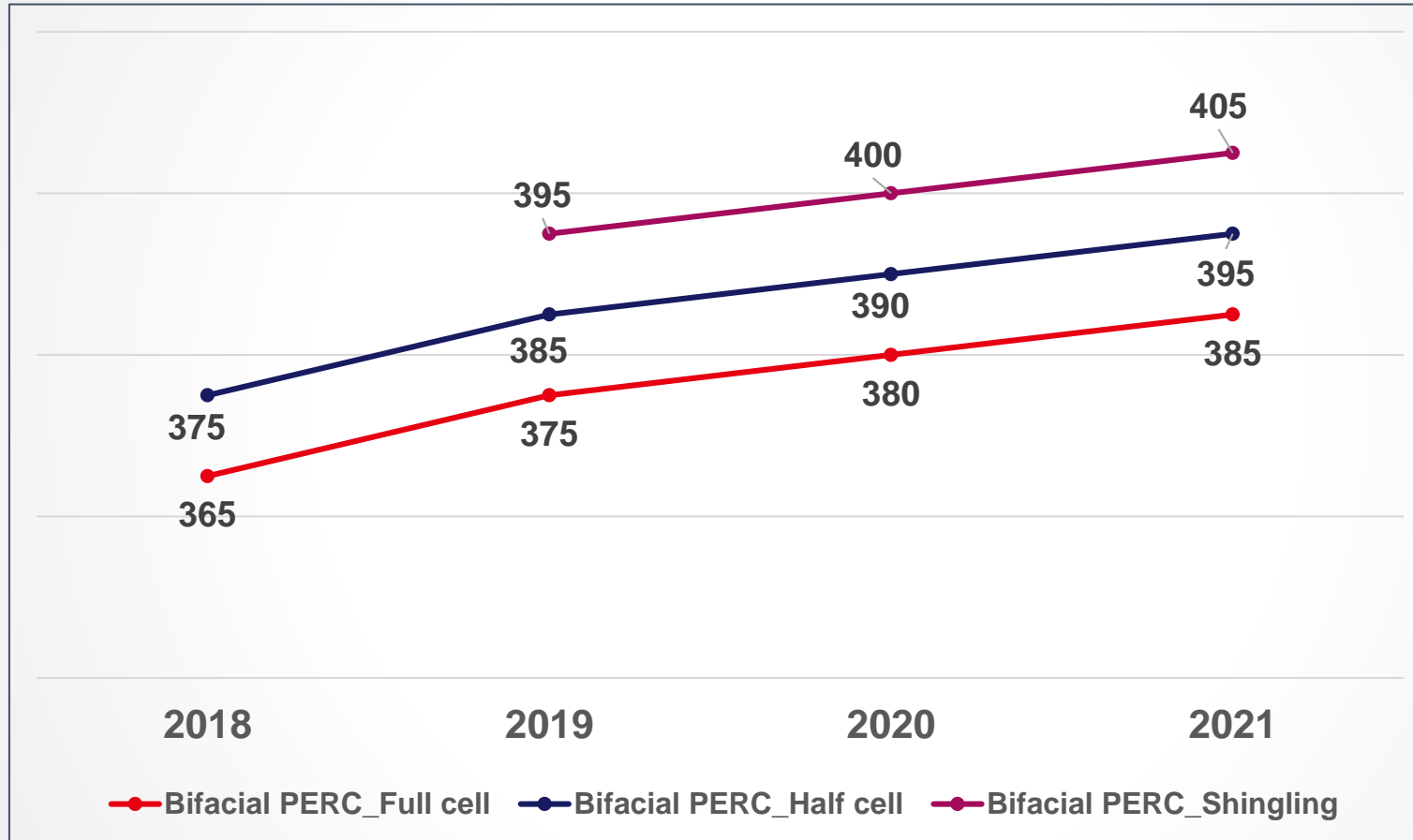


333.7W / 20.41%
Jan. 2018



PERC Module

Bifacial PERC Technology Roadmap



Technology Strength

Through Consistent R&D Investment

\$379 M

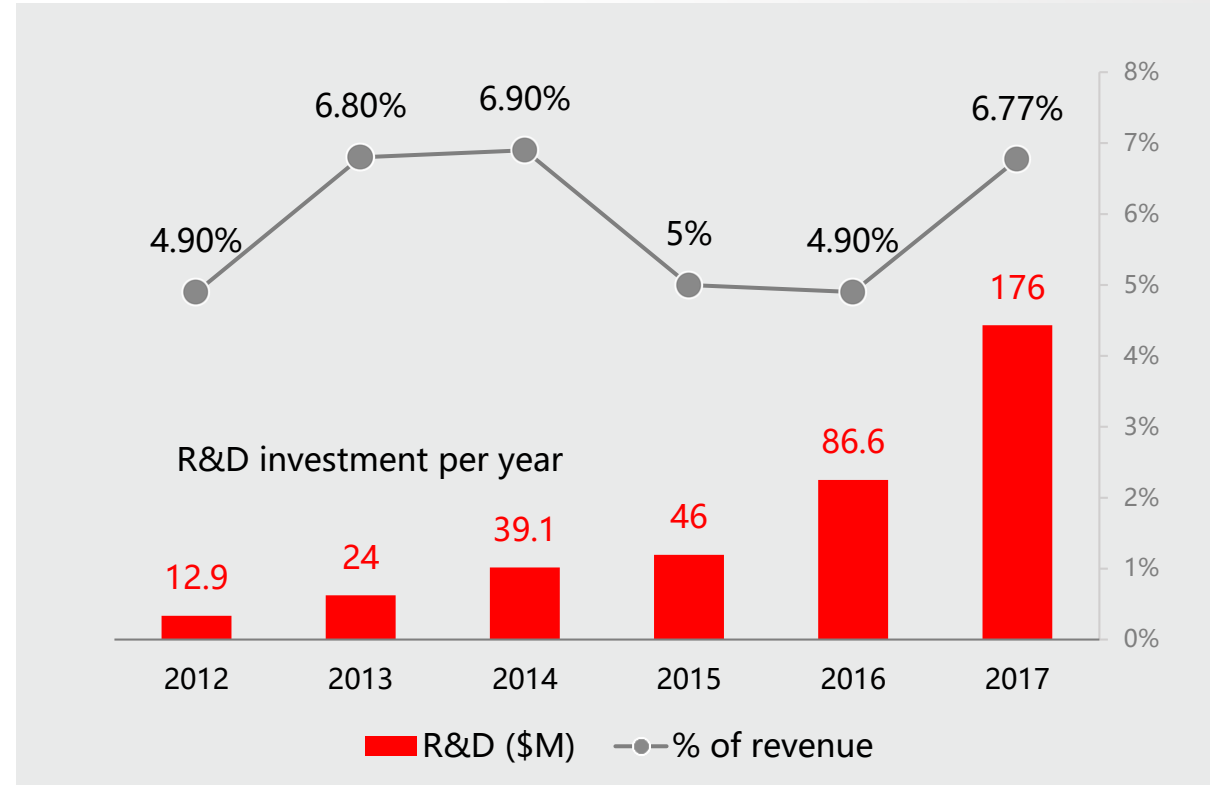
2012-2017 accumulated

R&D spending

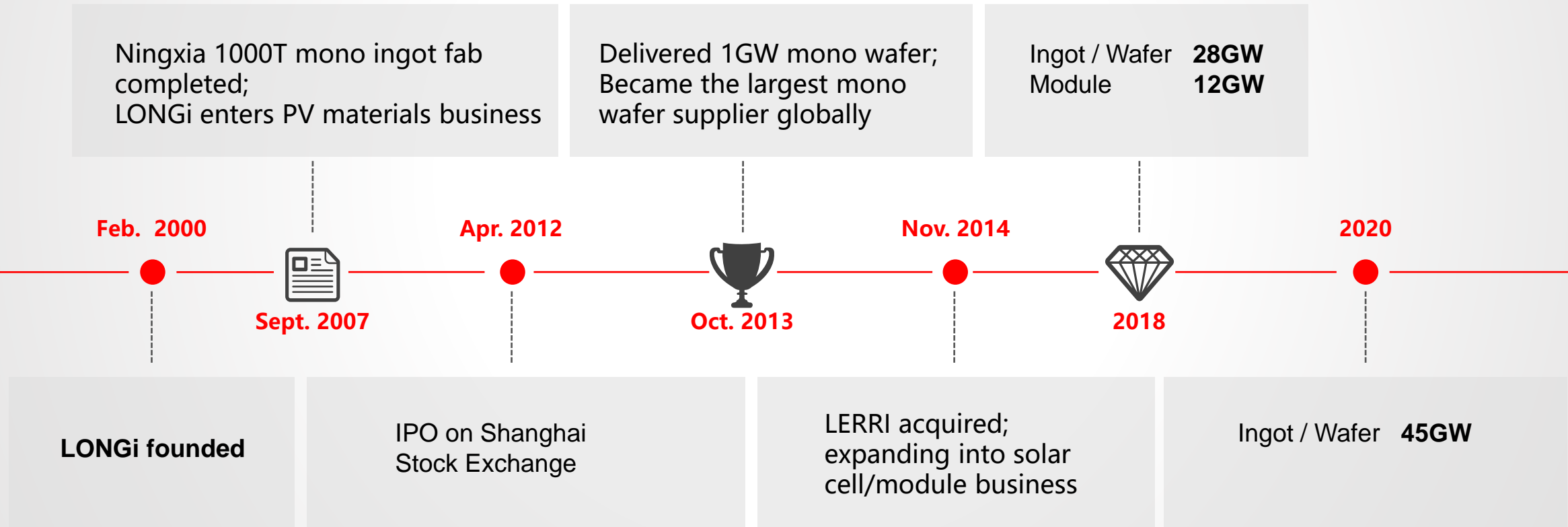
5-7% (of revenue)

260 patents awarded

460 staff member



LONGi Solar: Dedicated in Mono *18 years*



Diamond Wire Slicing Technology

\$3B

Annual savings using
DWS technology



Wafer Cost Reduction

\$0.16 /pcs

Non-Si mono wafer cost
by 2020



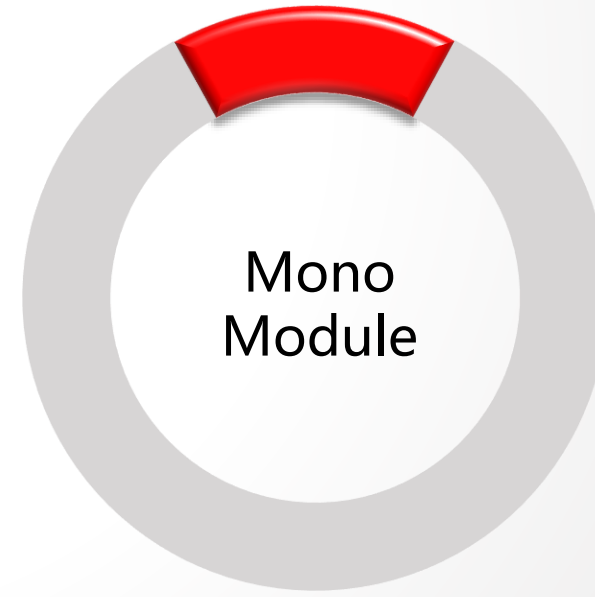
Largest Mono Wafer and Module Manufacturer

Global market share by LONGi

35%

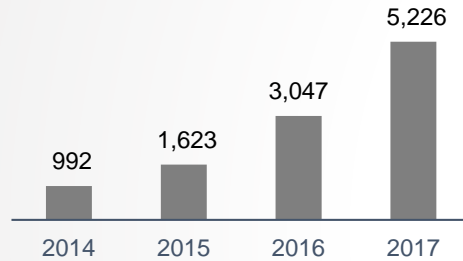


16%

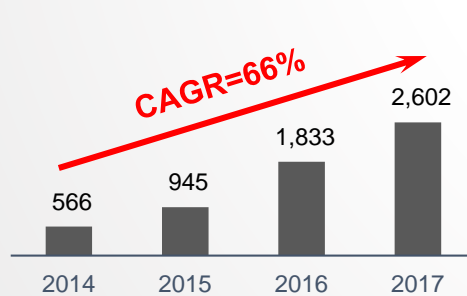


Strong Financial Performance

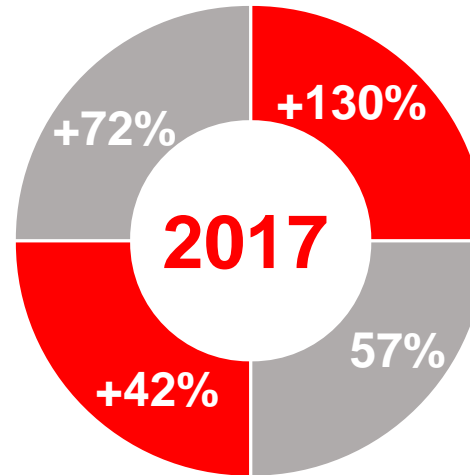
Total assets (Million USD)



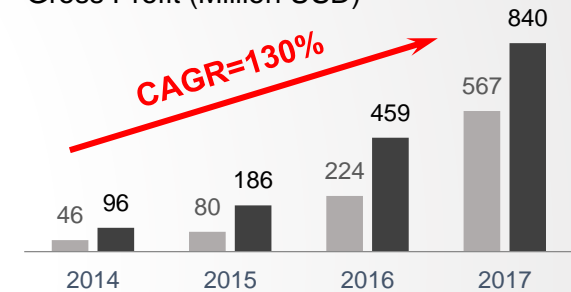
Revenue (Million USD)



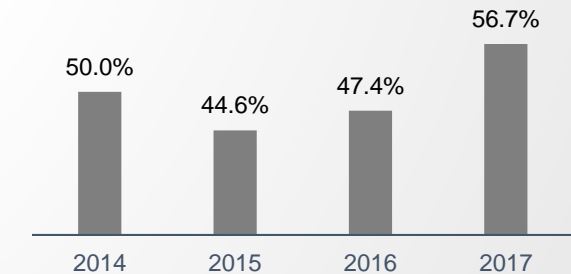
Market Cap
~US\$7B
 as of 6/30/2018



Net Profit (Million USD)
 Gross Profit (Million USD)



Debt Ratio

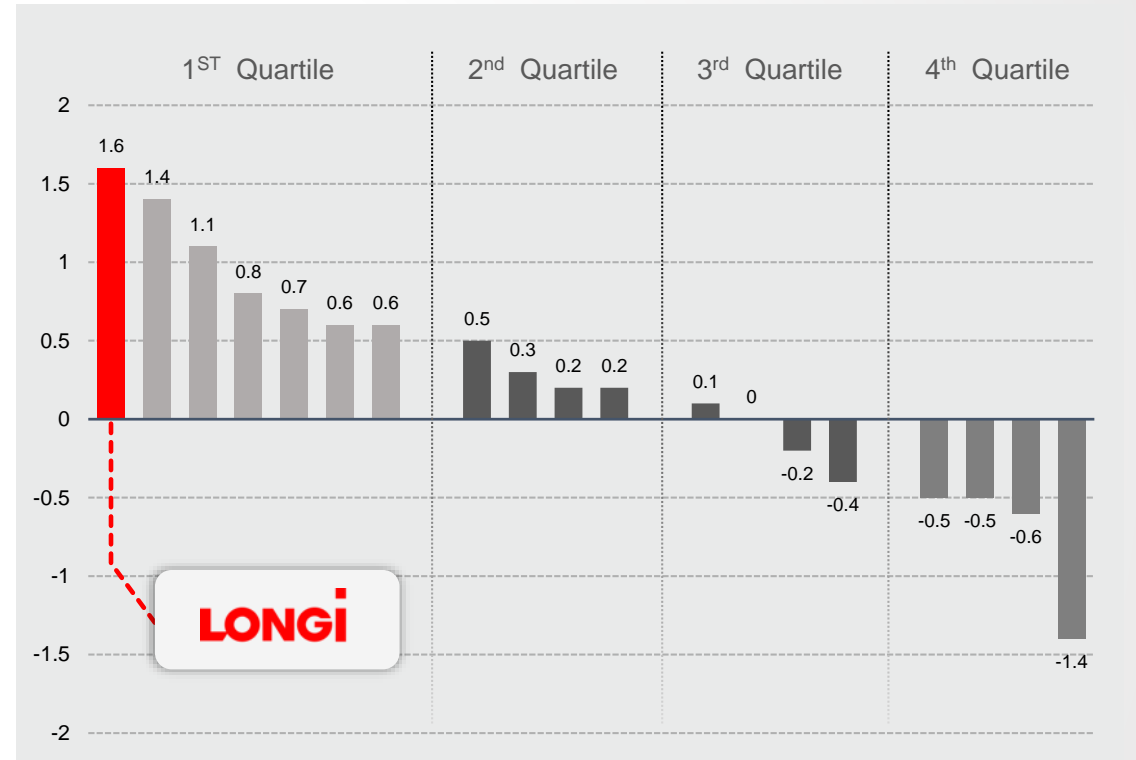


Financial Health

Financial Health **No. 1** among all PV Manufacturers

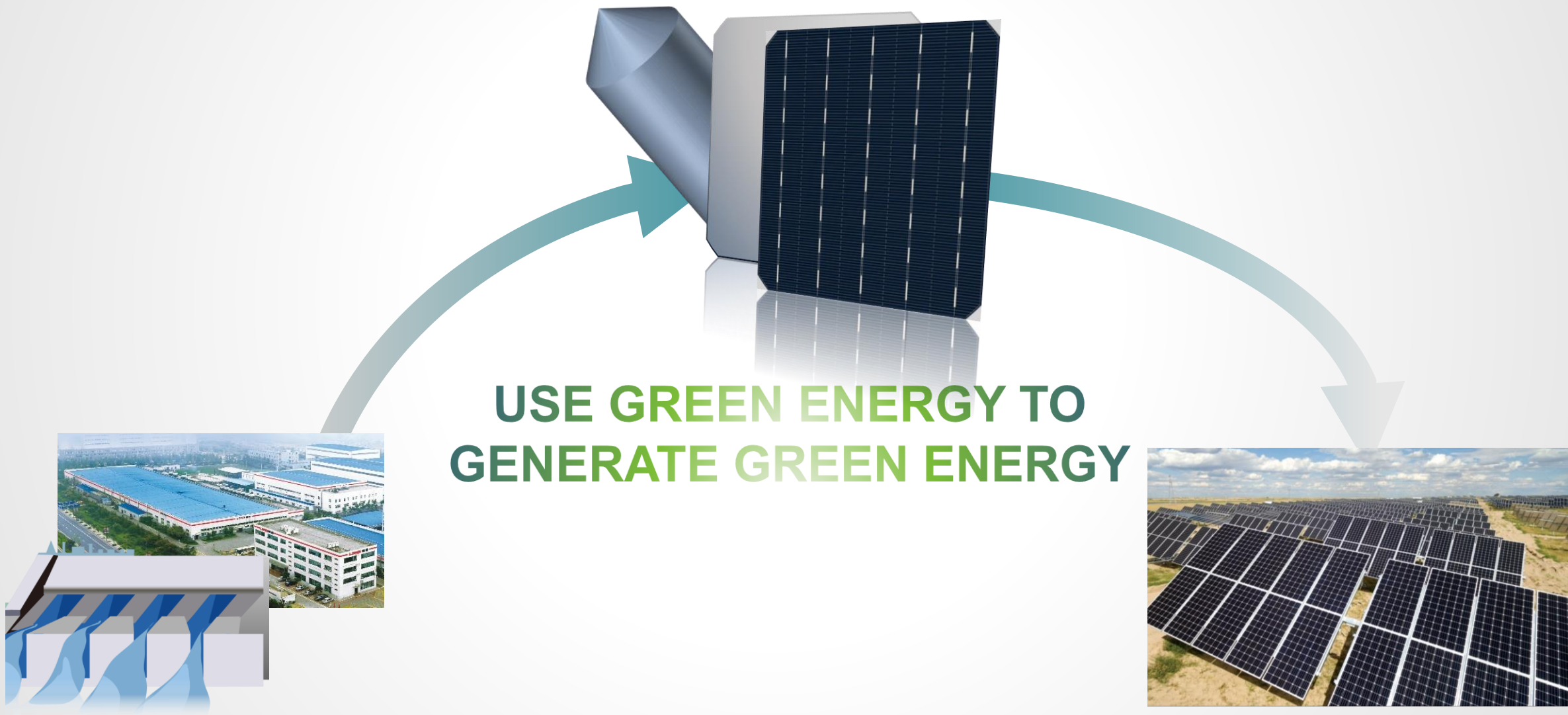
Strong financial performance recognized by industry:

- Financial health **No.1**
- Profitability and cost leadership **top 3**
- Overall score **top 5**



Major PV module manufacturers

Green Manufacturing



LONGI Solar

RELIABILITY
CREATES
VALUE

As certain as the sunrise

***Thank You
for Your Attention***

World's No. 1 monocrystalline module manufacturer • Solar's most bankable company • PV industry highest R&D investments • High power, high yield, high reliability