

## How JA Solar's premium modules benefit Europe's residential, commercial and utility PV segments

Presented by:



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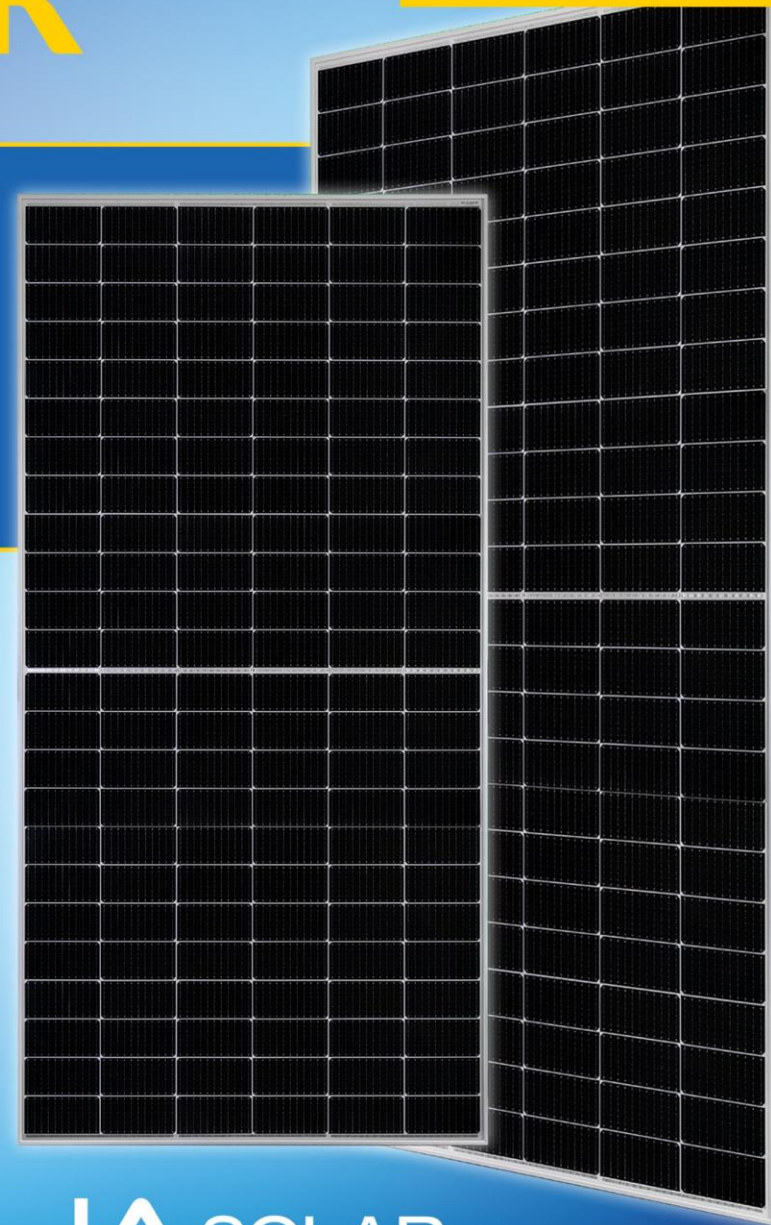
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**JA SOLAR**





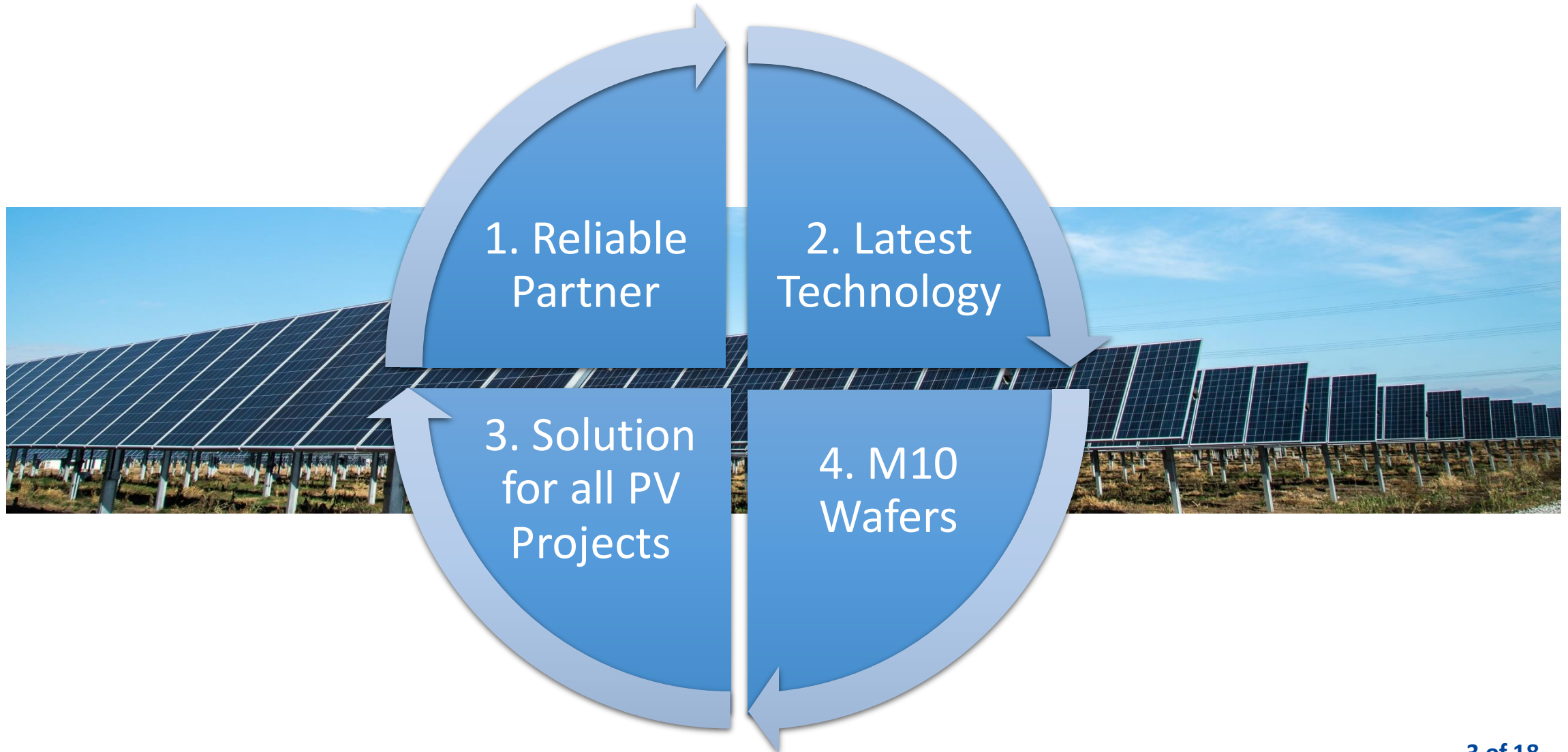
# “HOW JA SOLAR'S PREMIUM MODULES BENEFIT EUROPE' S RESIDENTIAL, COMMERCIAL AND UTILITY SEGMENTS ”

AUGUST 26<sup>TH</sup>, 2021

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Senior Technical Manager



# How JA Solar's premium modules benefit Europe's residential, commercial and utility segments



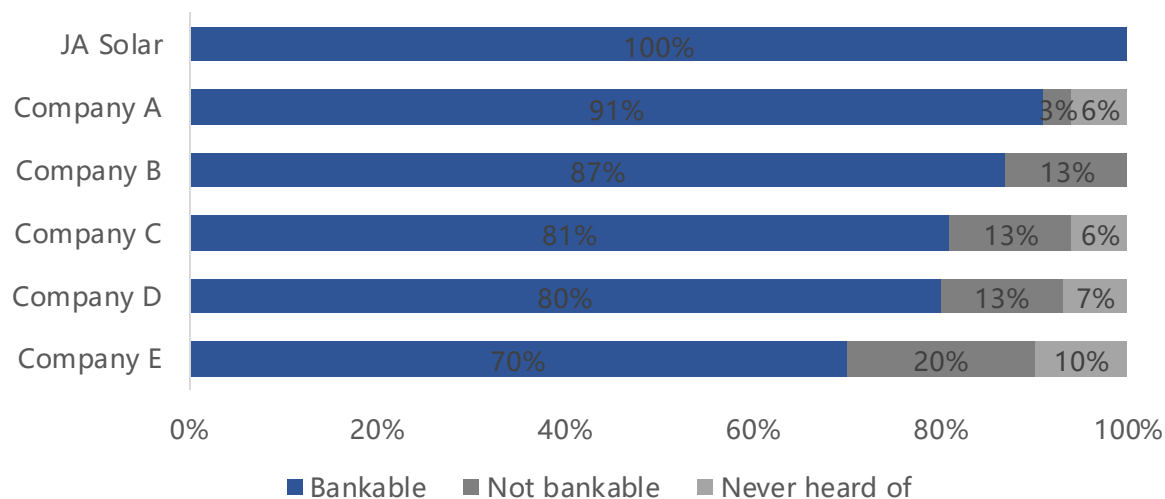


# 1.1 Reliable Partner

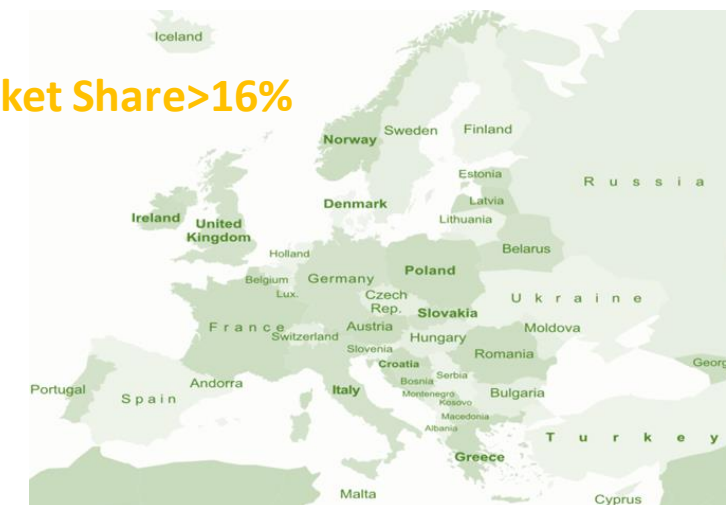
- Long Term Player
- Strong EU Presence
- Strongest Bankability in the Industry



2020 Top Bankable Module Brands by BNEF Survey

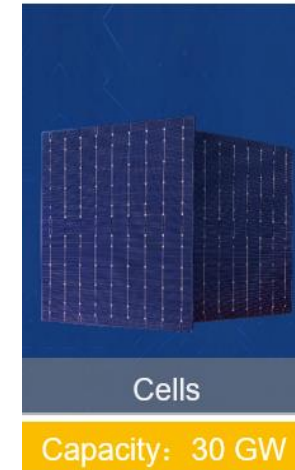
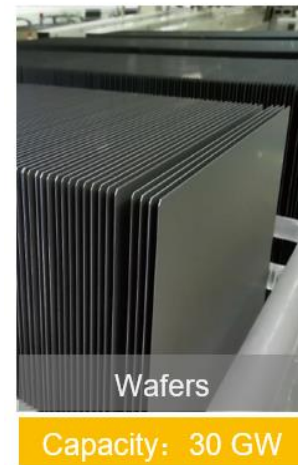


Market Share > 16%

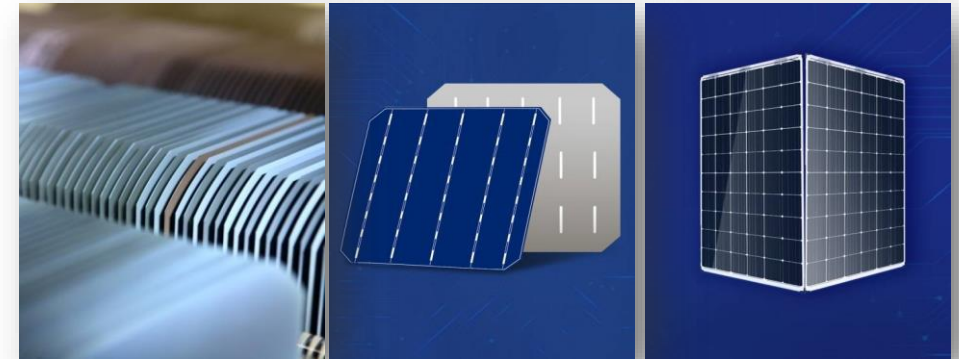
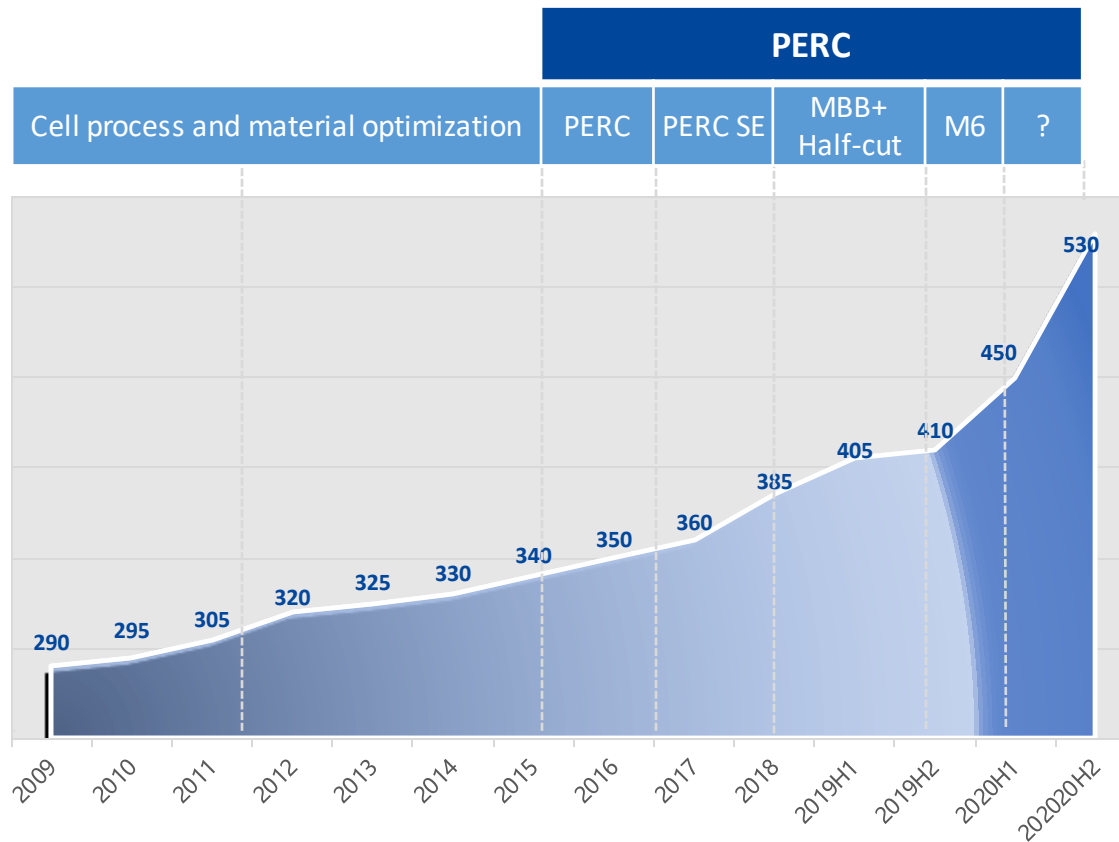


## 1.2 Reliable Partner

- High Level of Vertical Integration
- Significant increase in production capacity (+20GW)
- More than 50GW Field Data
- Top 3 largest capacity deployed
- Manufacturing Bases
- Always at the forefront of technology: M10 wafers



## 2.1 Latest Technology



### TECHNOLOGY CHANGES

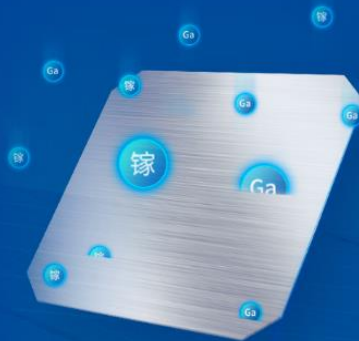
- Poly to Mono
- PERC Technology
- Half-Cut Technology
- MBB Technology
- ARC Glass
- Wafer Sizes

## 2.2 Latest Technology

### Gallium-doping

The first Module Supplier to apply Ga-doped wafer on all high-eff. cells

IP rights granted in October 2019



2%/0.55%

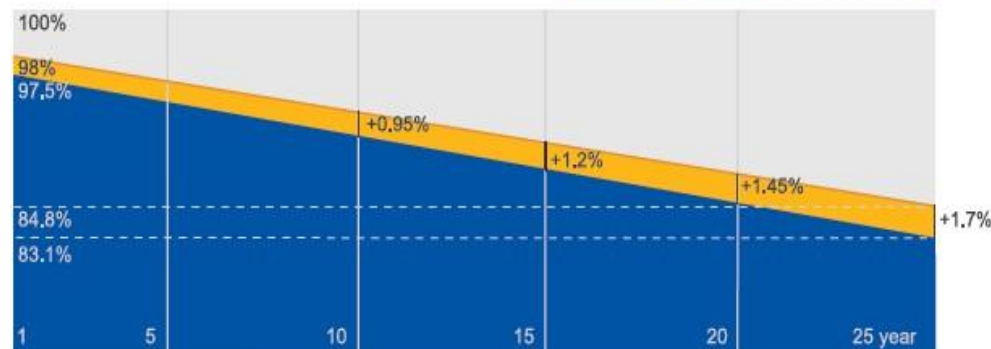
Warranty  
(single glass)  
84.8%

2%/0.45%

Warranty  
(double glass)  
85%

- 12-year product warranty
- 25-year linear power output warranty

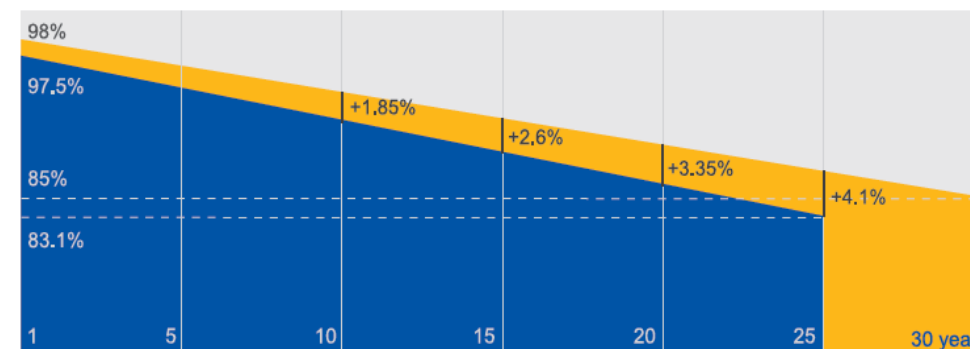
0.55% Annual Degradation  
Over 25 years



■ New linear power warranty ■ Standard module linear power warranty

- 12-year product warranty
- 30-year linear power output warranty

0.45% Annual Degradation  
Over 30 years



■ Bifacial double glass module linear power warranty ■ Standard module linear power warranty

## 3.1 Solutions for all PV Projects





## 3.2 Solutions for all PV Projects

WHICH IS THE RIGHT PRODUCT FOR MY PROJECT?

	RESIDENTIAL	C&I	UTILITY SCALE
158-60c	✓	✓	
158-72c	✓	✓	✓
166-60c	✓	✓	
166-72c		✓	✓
182-54c	✓	✓	
182-72c		✓	✓
182-78c		✓	✓



SUITABLE PRODUCTS  
FOR ALL PV PROJECT



## 3.3 Solutions for all PV Projects

### SMALL FORMATS PRODUCTS

158

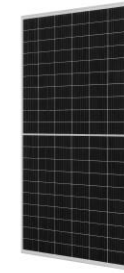
WAFER

#### 345W MBB Half-cell PERC Module

- JAM60S10/MR – 345W
- Full Black
- 1.000V / 1.500V
- Small – Fit all Roofs
- Light Product – Easy handling
- Largest Track Record
- Outstanding Aesthetics at Full Black Version



JAM60S17



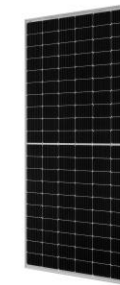
JAM60S10

166

WAFER

#### 385W MBB Half-cell PERC Module

- JAM60S20/MR – 385W
- Full Black
- 1.000V / 1.500V
- Most selling product in the European distribution channel
- Good Balance Size/Power



JAM60S20



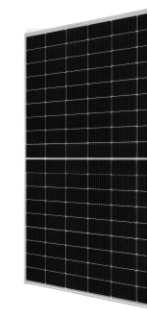
JAM60S21

182

WAFER

#### 405W MBB Half-cell PERC Module

- JAM54S30/MR – 405W
- Full Black
- Voc 37.4V - String Length
- Light Product (30mm frame width)
- 1.94m<sup>2</sup>



JAM54S30

## 3.4 Solutions for all PV Projects

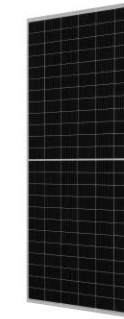
### LARGE FORMATS PRODUCTS

158

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#### 415W MBB Half-cell PERC Module

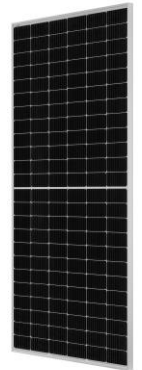
- JAM72S10/MR – 415W
- Full Black
- 1.000V/1.500V
- Balance Isc
- Wider Compatibility
- Light & Small Product
- Worldwide Track Record



JAM72S10



JAM72S17



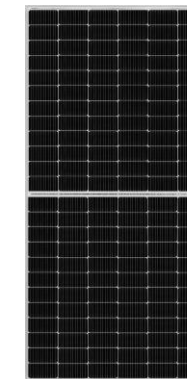
JAM72S20

166

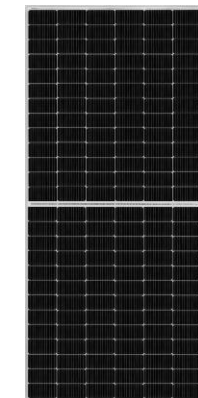
WAFER

#### 460W MBB Half-cell PERC Module

- JAM72S20/MR – 460W
- High Power Output
- Lower LCOE
- Most Demanded Module for Commercial
- Suitable High Wind Load Installation
- Good Balance Power/Size/Weight



JAM72S30



JAM78S30

182

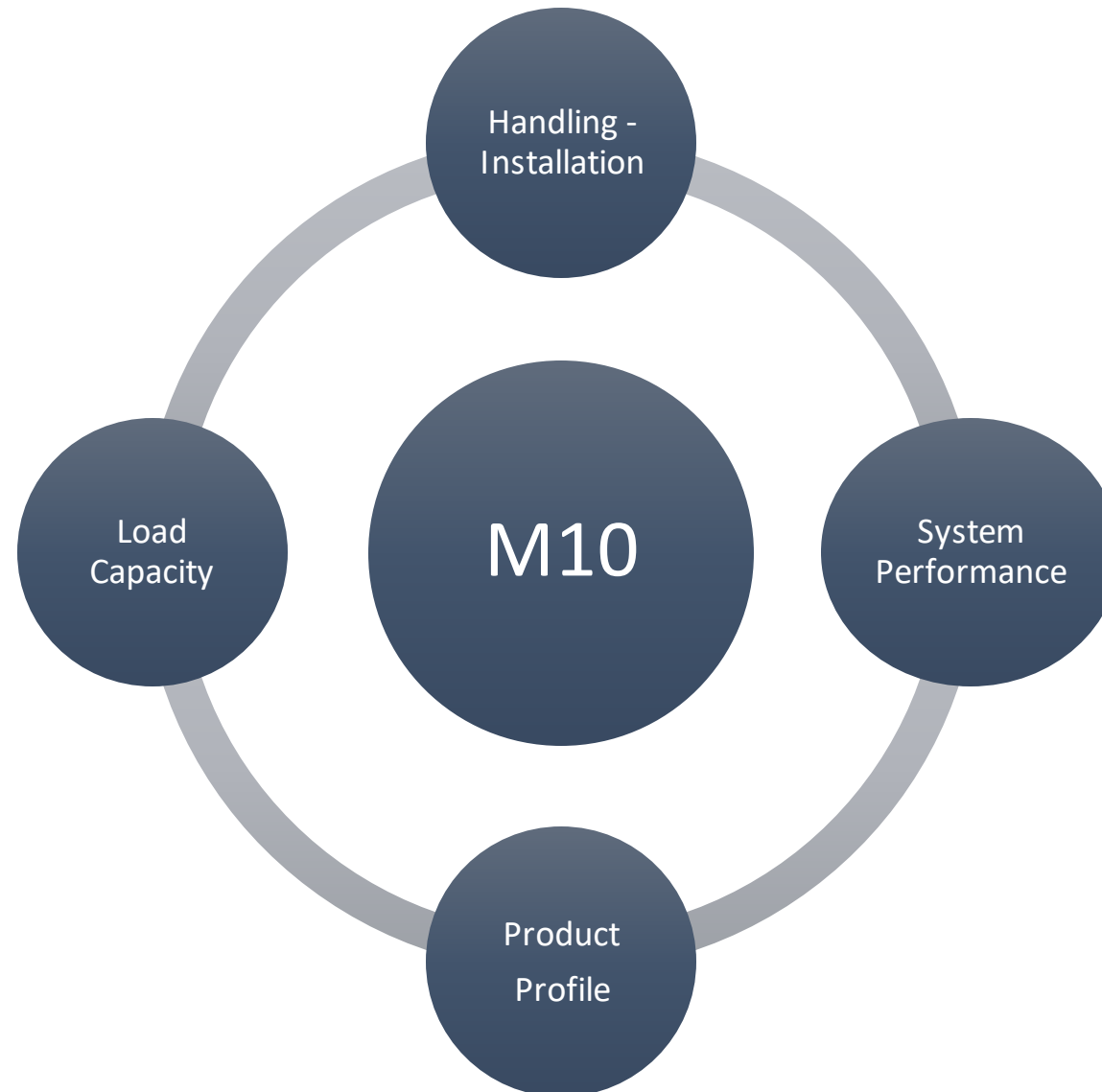
WAFER

#### 540W/585W MBB Half-cell PERC Module

- JAM72S30/MR – 540W
- JAM78S30/MR – 585W
- Isc = 14A
- Lower LCOE
- Most Demanded Module for Ground Mounted
- Maximum Power Output



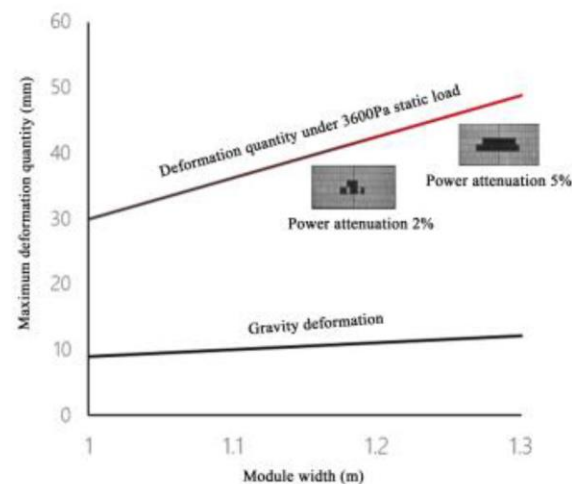
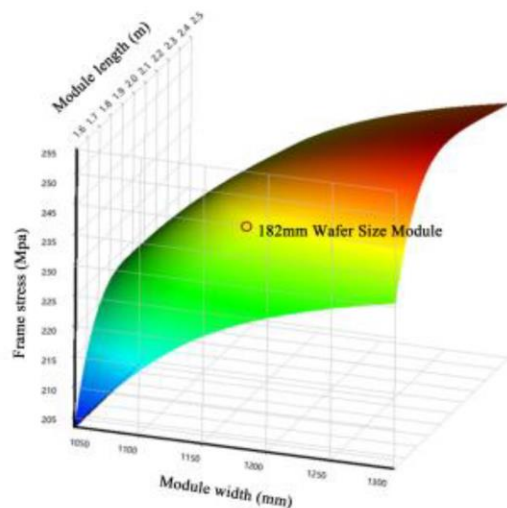
## 4.1 M10 Module Benefits for the European Market



## 4.2 M10 Module Benefits for the European Market

### LOAD CAPACITY OF MODULE

- Aim: Product Reliability
  - Critical Elements
    - Frame:  $\leq 1.2\text{m}$  width – Static Load 5400Pa
    - Glass – 2% power attenuation at  $3600\text{Pa} \leq 1.2\text{m}$
- 1.13m width (reduce the deformation)



### HANDLING INSTALLATION

- Handling
  - 1.13m can be handled by one person
- Weight Limit
  - 1 person: 20-25Kg
  - 2 people:  $25\text{Kg} \times 2 \times 0.666 = 33.3\text{Kg}$



## 4.3 M10 Module Benefits for the European Market

### PRODUCT PROFILE

- Dimensions, weight, electrical parameters
- Mass Production

M10 – 182mm	M12 – 210mm
100GW	50GW

*Lower capacity risk for projects using M10*

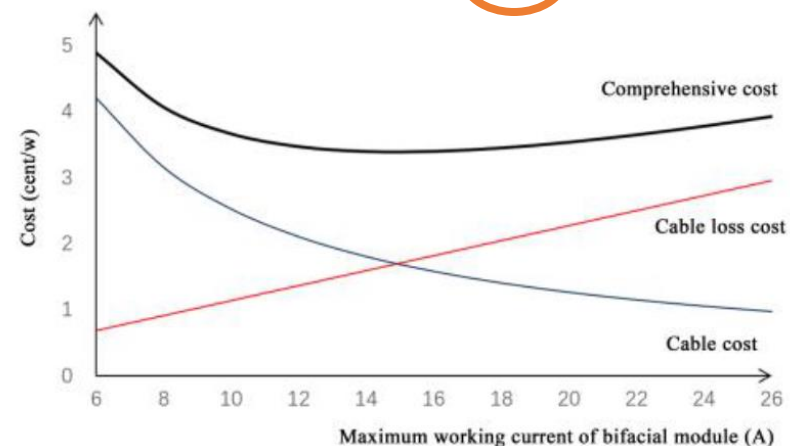
- Manufactured in line with established practises

### SYSTEM-SIDE VALUE

- BOS Cost Savings
  - Racking System
  - Cost/eff Cabling
  - Labour

2P fixed rack, centralized inverter (cost unit: \$/Wp)

Product	72c-182	55c-210	60c-210
Power	540Wp	540Wp	590Wp
DC capacity	3.96576MW	3.969MW	3.9648MW
String length	27	35	32
Number of strings on a single rack	8	6	6
Pile spacing	3.5m		
Rack & foundation costs	0.065	0.066	0.067
Total cable cost	0.016	0.016	0.016
Electrical equipment	0.045	0.045	0.045
Floor area	54941 m <sup>2</sup>	56381 m <sup>2</sup>	55348 m <sup>2</sup>
Land cost	0.035	0.036	0.035
BOS cost	0.161	0.163	0.163



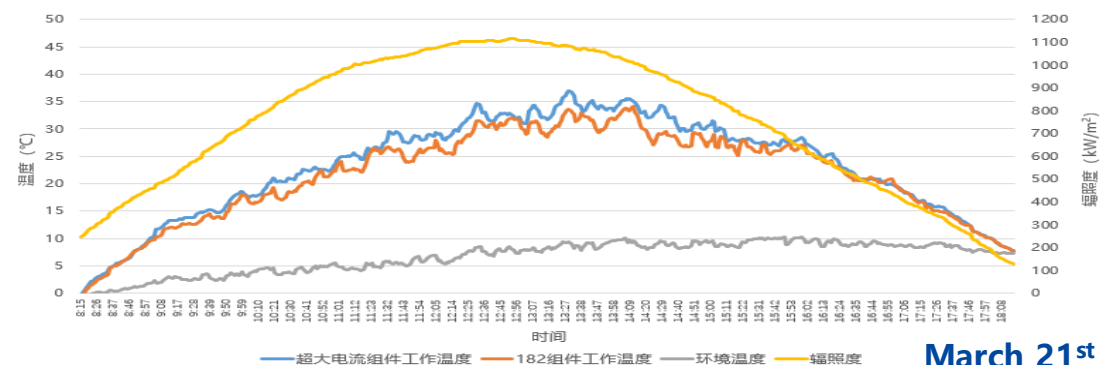
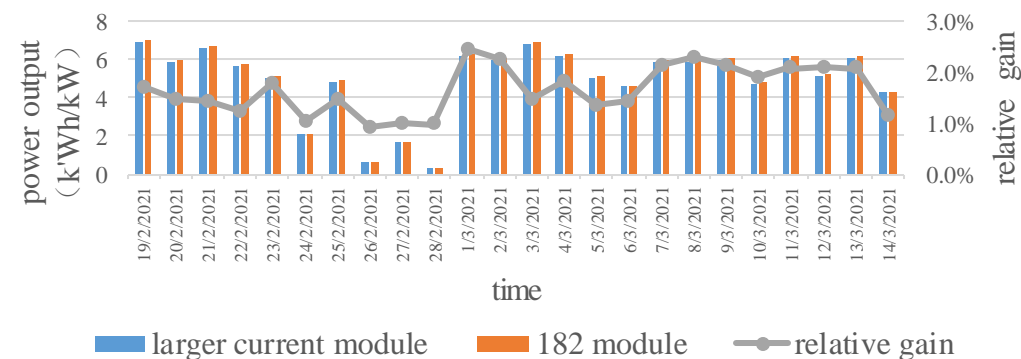


## 4.4 M10 Module Benefits for the European Market

JA solar cooperated with TÜV NORD conducting one-year (Feb,2021 ~ Feb,2022) outdoor solar project monitoring plan at National PV experimental center, Yinchuan (North west China) for detecting various kinds of module power generation properties and operational temperature difference.



- According to data records at the project site, the power generation of the 182 module (per watt) is about 1.7% higher than module operating with higher current module.
- In high irradiance periods, the average module operation temperature gap between 182mm module and higher current module is about 1.7°C, and the maximum temperature gap is up to 5 °C.



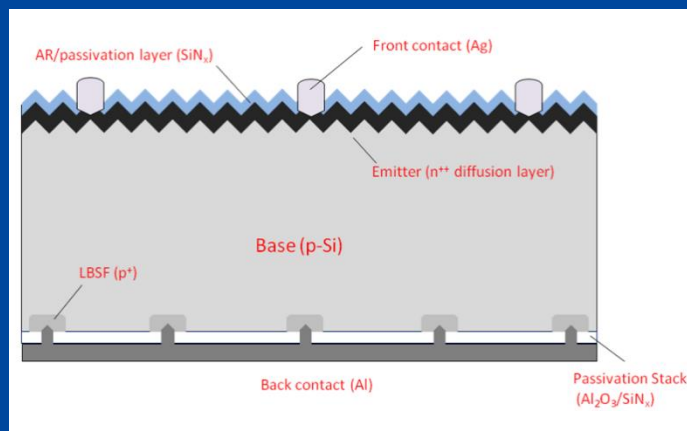
March 21<sup>st</sup>, 2021

## 5.1 Deep Blue Product Series - Vision of The Future

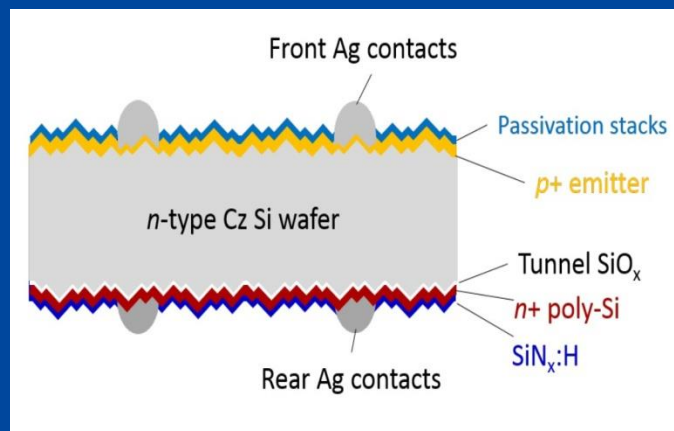
- New Type Solar Cell Technology
- High Efficiency Sealing Technology
- Better LCOE Solutions



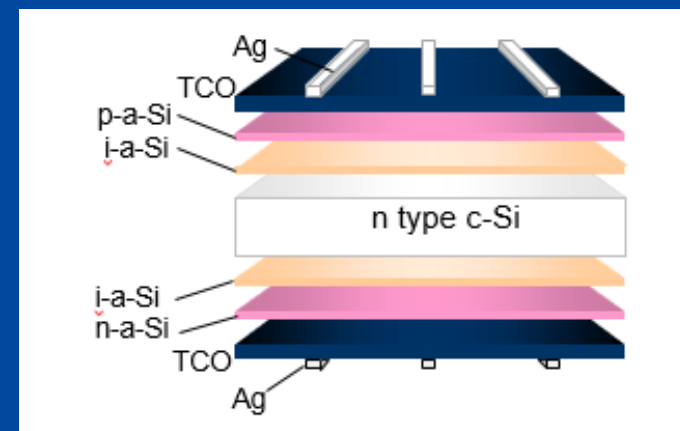
### P Type PERCIUM+ Module Efficiency >22%



### N Type PERCIUM Module Efficiency >22.8%



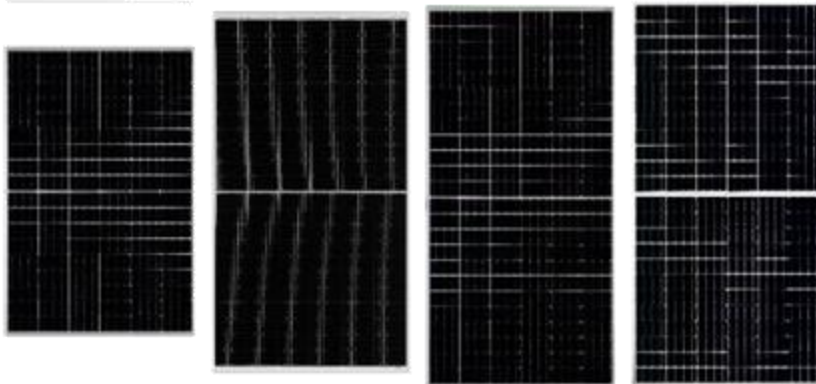
### HJT Module Efficiency >23%



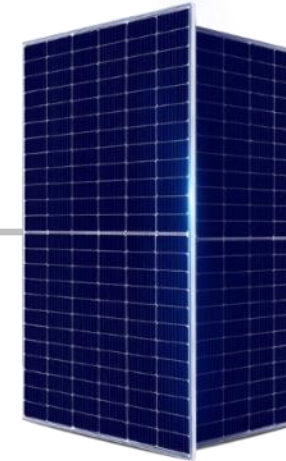
## 5.2 Deep Blue Product Series Vision of The Future

**DeepBlue 4.0 module** - mass production  
(based on Bycium cell)  
module power > 620W

**n-type module** (based on HJT cell) - pilot line



2022



2023

**Next generation high power module**  
(HJT or perovskite + crystalline silicon  
tandem cell Tech)



# THANK YOU FOR YOUR ATTENTION

**Harvest the Sunshine**  
Premium Cells, Premium Modules

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