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**25 April 2022**

10:00 am – 11:00 am | CEST, Berlin

9:00 am – 10:00 am | BST, London

11:00 am – 12:00 pm | EEST, Athens



**Emiliano Bellini**

Editor  
pv magazine

pv magazine  
**webinars**

# M10 options for the European market



**Ignacio Espinosa**

Senior Technical Manager  
JA Solar



**Henning Schulze**

Corporate Assistant President  
JA Solar

# 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.  

# Global and European PV Market Outlook

# Content

**01** Global PV Market Demand Forecast

**02** Europe PV Market Demand Forecast

**03** Supply and Demand Analysis

**04** China Covid-19 Policies and Impact on PV

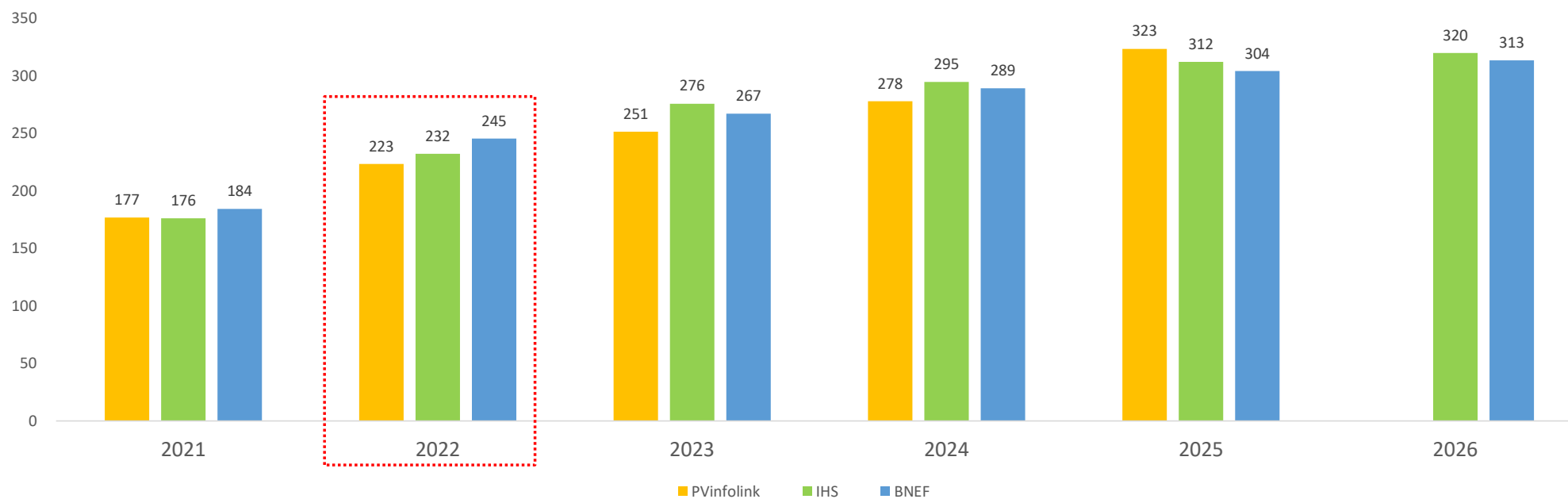
# Global PV Market Demand Forecast

## PART 1

# Global PV Installations

- The three analysing companies (Infolink, IHS, BNEF) predict that the total installation capacity will be 223-245GW in 2022, implying a year-on year growth of 26%-33% and all three predict a global market size of more than 300GW in 2025.

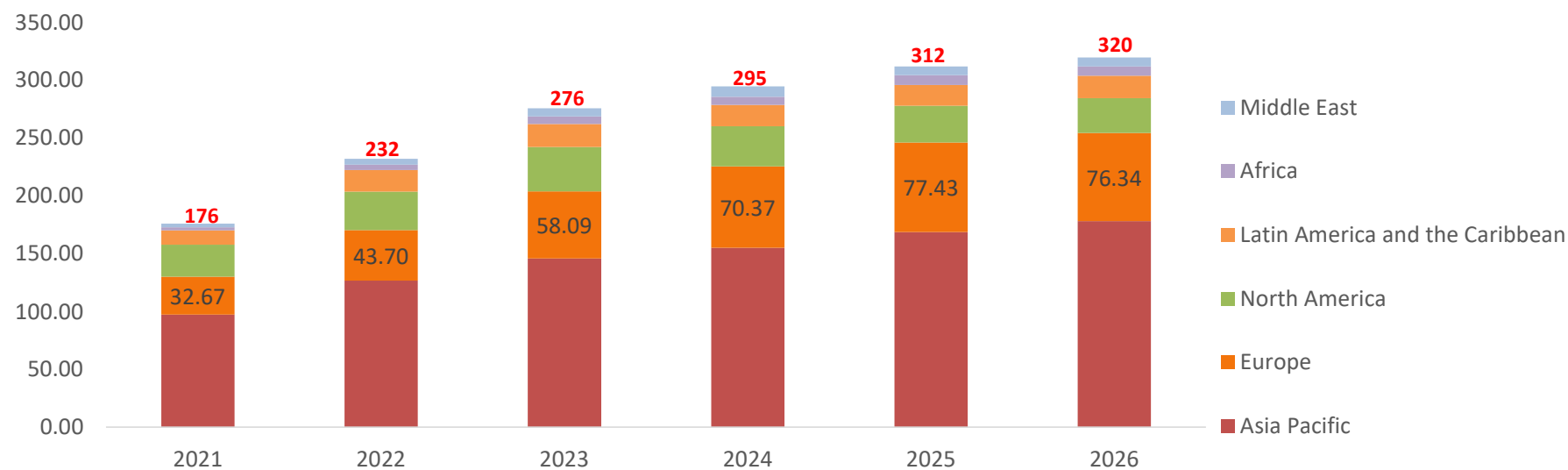
2021-2025 Global PV Installations forecast(GW)



## Global Forecast by Major Region

- 2022 is forecast to have the highest annual growth rate of 32%.
- Asia Pacific (China, India, Australia, Japan) are forecast to make up 55% of global demand in 2022.
- Europe is forecast to install 43GW and make up close to 20% of global demand in 2022. Annual installations are seen to reach about 60GW in 2023 and to surpass 70 GW per year in 2024 and beyond.

Global PV Installations by Major Region(GW)



# Europe PV Market Demand Forecast

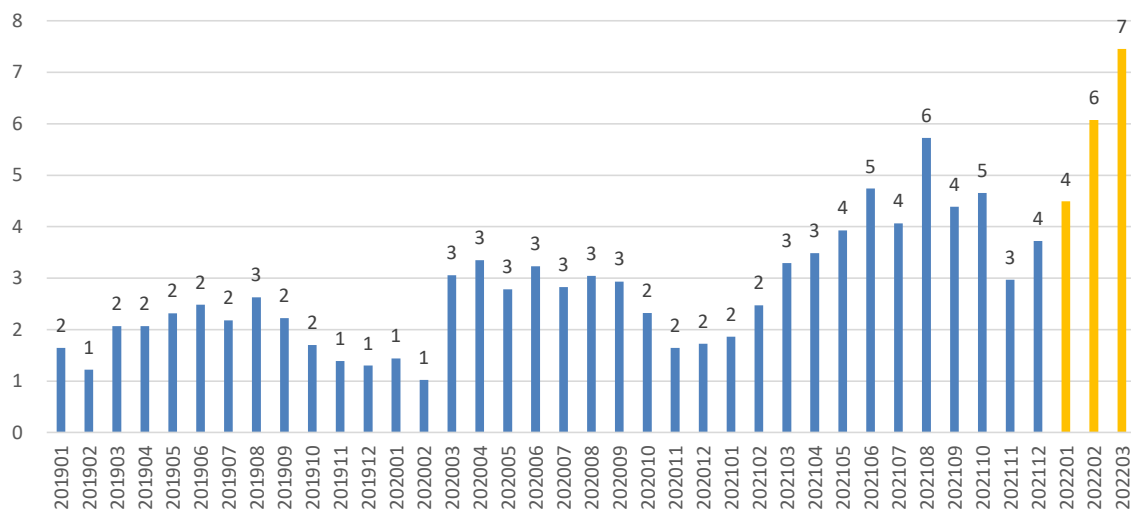
## PART 2



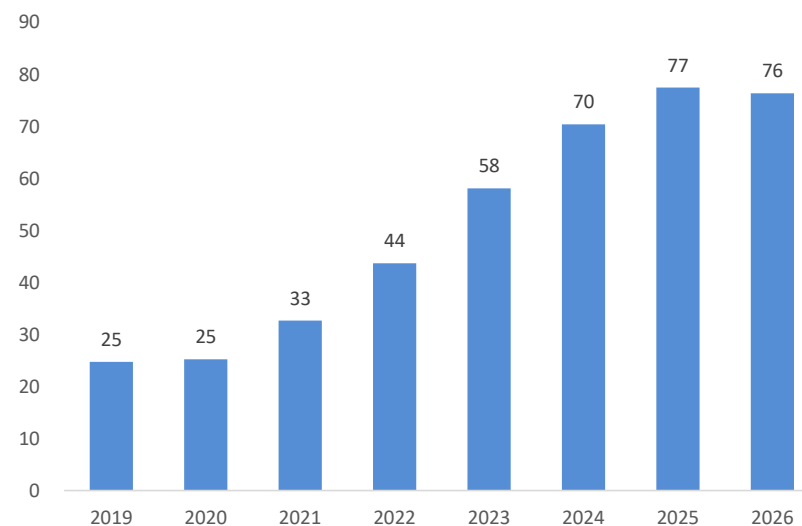
# PV Installations in Europe

- From January to March 2022, Chinese customs exported about 18GW to Europe, higher than 8GW in the same period in 2021, with an increase of 125%.
- On March 8, 2022, the European Commission proposed the scheme REpower EU to free the Union of energy dependence on Russia. This will accelerate deployment of PV in Europe in addition to policies and targets that had already been set by the Commission or national governments.
- According to IHS Markit, PV installations in Europe will grow rapidly in the coming years.

China Customs Data - Export to Europe(GW)

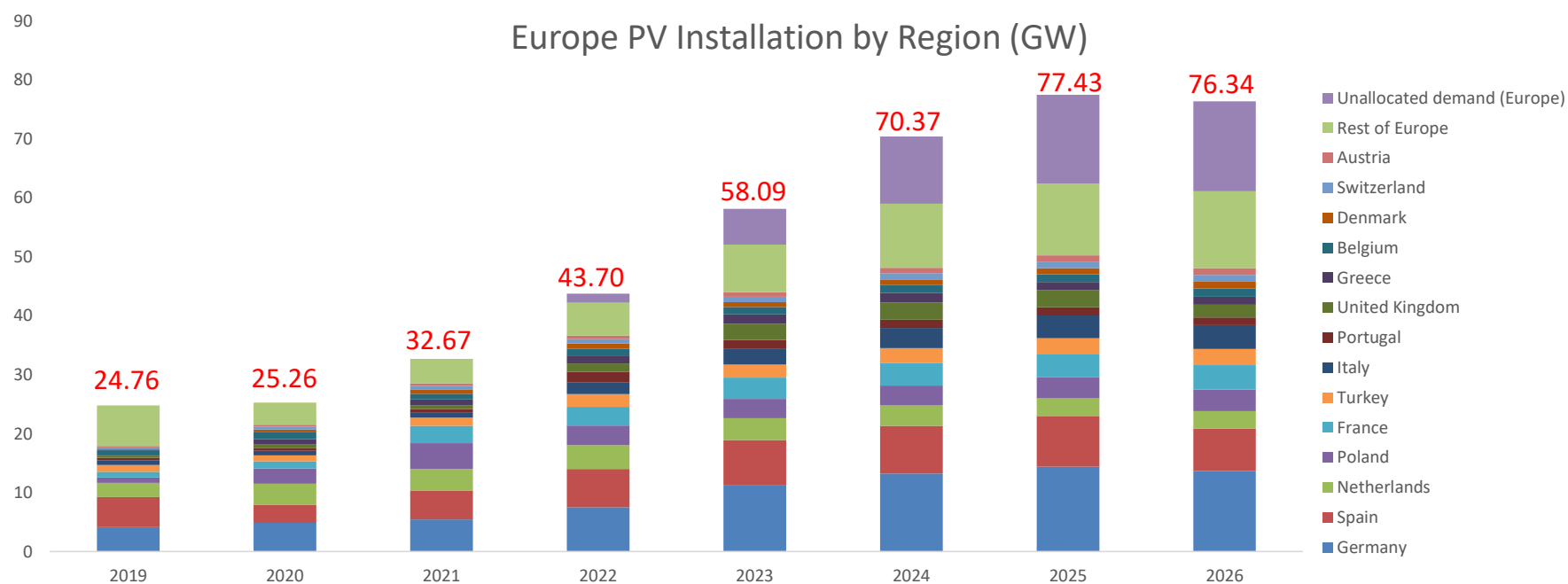


Forecast PV Installations in Europe(GW)



# Europe PV installations

- Germany ranks first in Europe and is expected to install more than 7GW in 2022, Spain ranks 2<sup>nd</sup> with 6.5GW in 2022.
- Markets in the Netherlands, France and Poland maintain steady growth, with an estimated installation capacity of more than 3GW in 2022 separately.
- Italy, Greece, Belgium and UK forecast to install 1-2GW in 2022 separately.

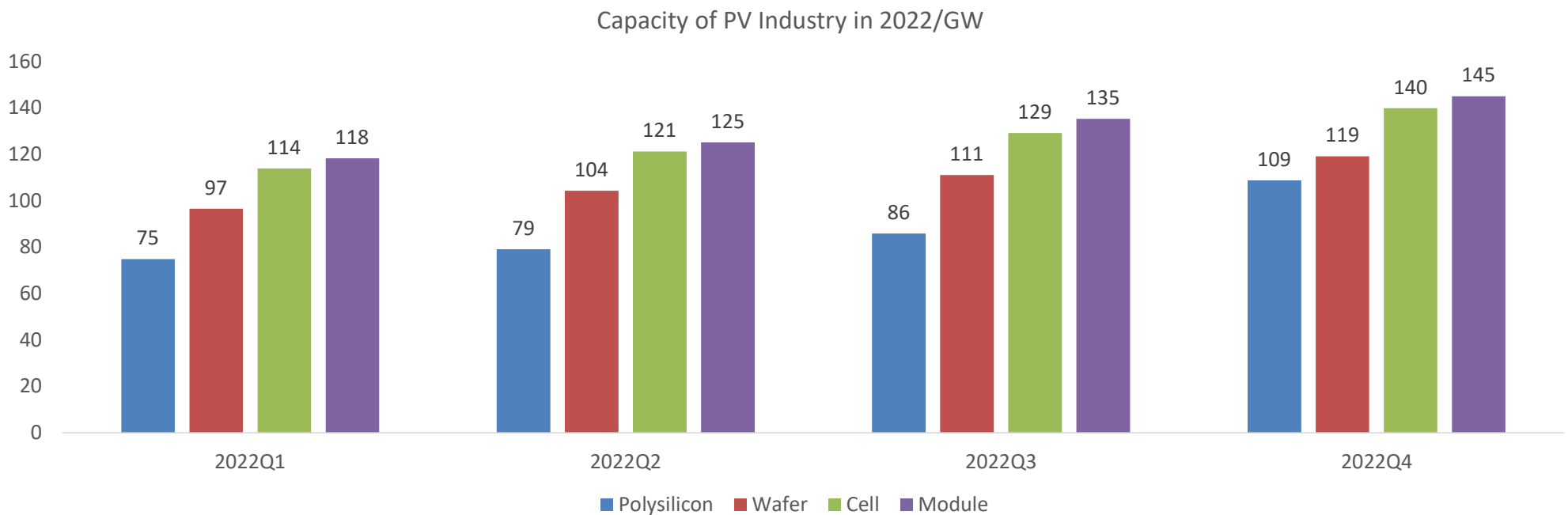


# Supply & Demand Analysis

## PART 3

## Capacity of PV Industry

- The PV industry value chain mainly means polysilicon, wafers, cells and modules.
- From polysilicon to module, the production capacity increases gradually. Polysilicon, with the smallest capacity, is the bottleneck of the industrial chain.

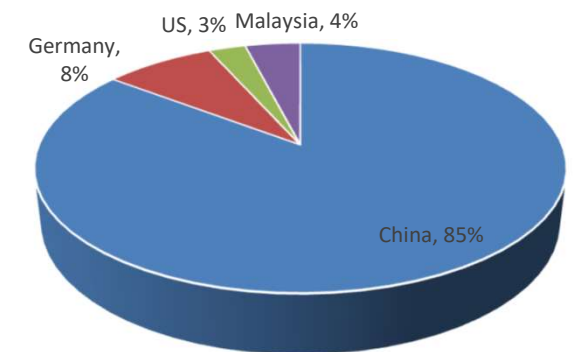
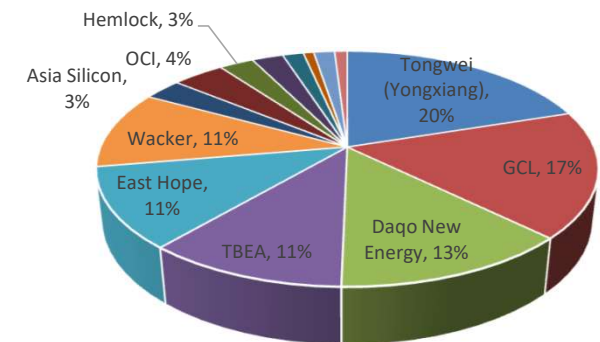


# Polysilicon Output

- In 2022 Q1, the total output of polysilicon was 185,000 tons, equivalent to 67.6GW. Of which China's output was 158,000 tons, accounting for 85%;
- In 2022, polysilicon manufacturers mainly include Tongwei Yongxiang, GCL, Daqo, TBEA and East Hope, and these Top 5 accounted for 72% of the global total output in Q1.

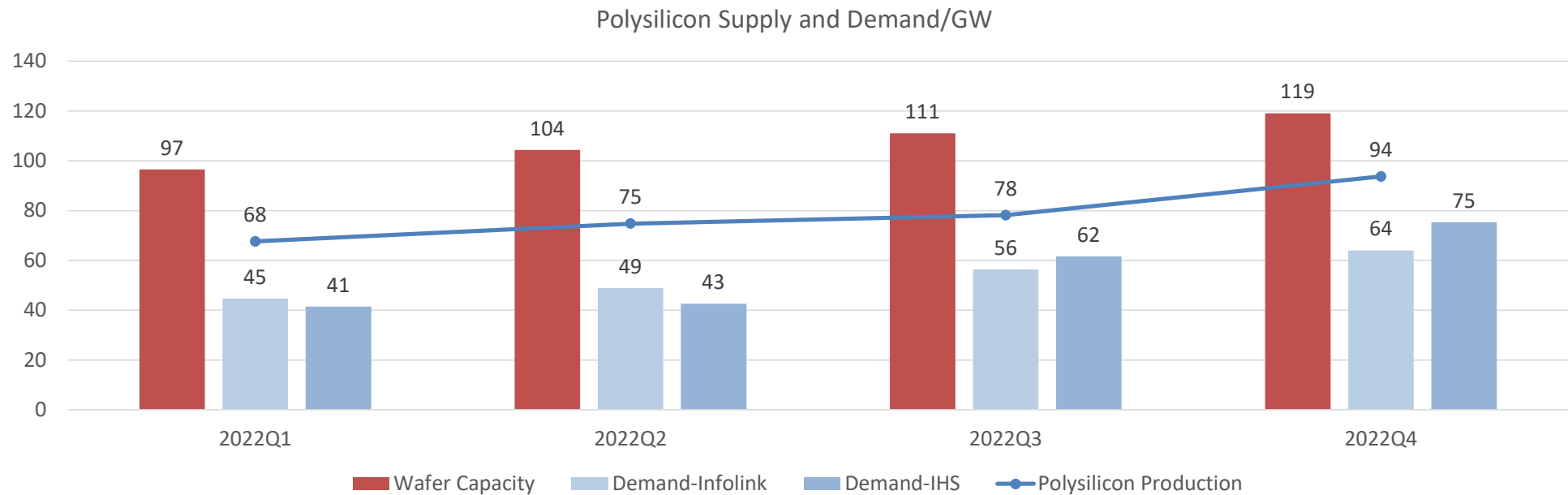
Output of Polysilicon in 2022/10000MT							
NO.	Company	Country	Province	2022Q1	2022Q2	2022Q3	2022Q4
1	Tongwei (Yongxiang)	China	Sichuan, Yunnan, Inner Mongolia	3.7	4.8	4.6	5.3
2	GCL	China	Jiangsu, Xinjiang, Sichuan, Inner Mongolia	3.2	3.2	3.3	4.2
3	Daqo New Energy	China	Xinjiang, Inner Mongolia	2.4	2.7	2.8	2.8
4	TBEA	China	Xinjiang, Inner Mongolia	2	2.3	2.6	3.4
5	East Hope	China	Xinjiang, Ningxia	2	2.2	2.2	2.8
6	Wacker	Germany		1.5	1.5	1.5	1.5
7	Wacker	US		0.5	0.5	0.5	0.5
8	Asia Silicon	China	Qinghai	0.5	0.6	0.8	1.1
9	OCI	Malaysia		0.7	0.7	0.8	0.8
10	Hemlock	US		0.5	0.5	0.5	0.5
11	Youser (FBR)	China	Shanxi	0.4	0.4	0.5	0.5
12	DL Silicon	China	Inner Mongolia	0.3	0.3	0.3	0.3
13	Dunan	China	Inner Mongolia	0.1	0.3	0.3	0.3
14	Erdos	China	Inner Mongolia	0.3	0.3	0.3	0.3
	Others			0.2	0.5	0.7	1.6
	Total			18.5	20.4	21.3	25.6
	Total/GW			67.6	74.8	78.1	93.7

Proportion of Polysilicon Output in 2022 Q1



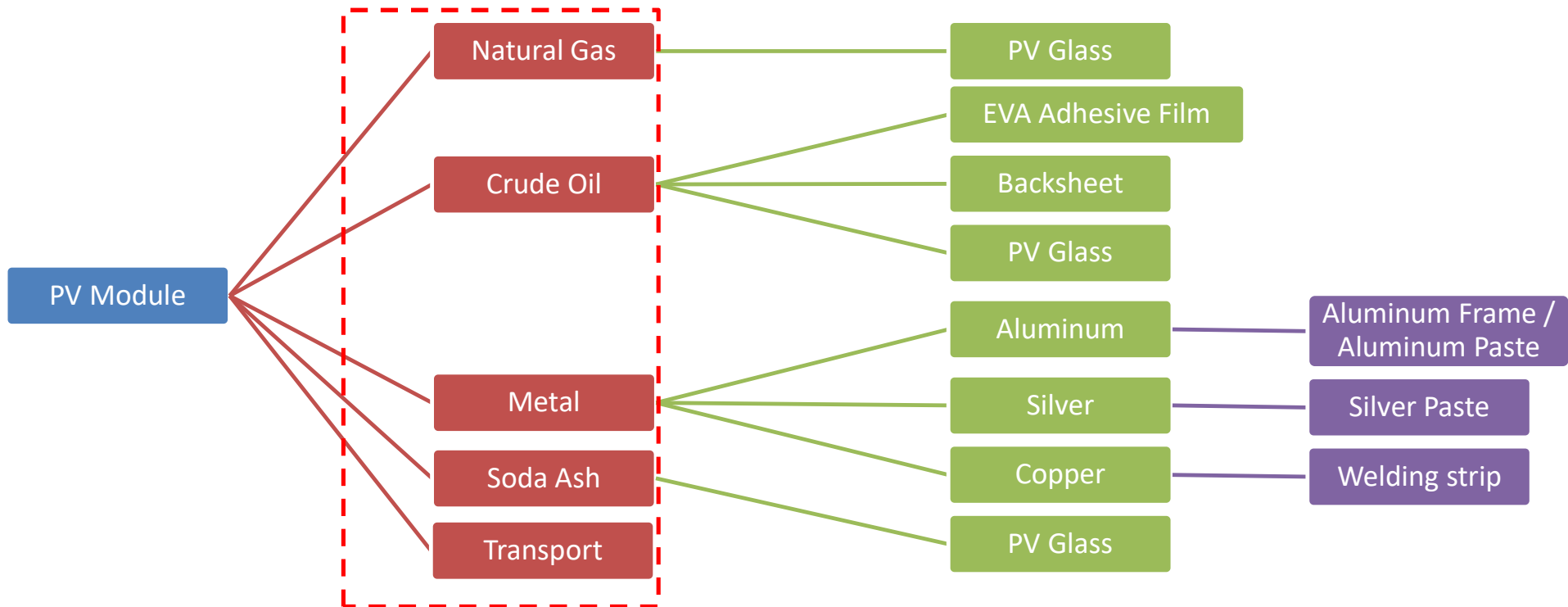
## Global Market Supply and Demand

- The polysilicon output from Q1 to Q4 in 2022 is 68, 75, 78 and 94GW respectively;
- In each quarter of 2022, the output of polysilicon will always be greater than the downstream installation demand;
- In 2022, the output of polysilicon is always less than the wafer production capacity. Therefore, there will be idle wafer lines across the whole year.



## Raw Materials of PV Modules

- Silver paste, EVA adhesive film, backsheet, PV glass and other raw materials are used in the production process of PV modules;
- As direct or indirect raw materials, the price of natural gas, oil, metal and soda ash affects the price of PV modules.



## Module BOM Cost

- From the beginning of 2022 to the beginning of the second quarter, the silicon price increased by 6.5%, the price of metal aluminum increased by 24.4%, and the total cost of components increased by 5.72%.

Raw Material	Proportion	Price Rise	Module Cost Rise
Silicon	38%	6.5%	2.48%
PV Glass	7%	4.0%	0.28%
Aluminum Frame	10%	24.4%	2.48%
EVA	9%	1.1%	0.10%
Silver	5%	8.1%	0.37%
Module Cost	-		5.72%



# China Covid-19 Policies and Impact on PV

## PART 4

# Covid-19 impact on supply and demand in China

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## Impact on Supply

- Starting from March, the Covid-19 situation in China has become more severe, solar raw material production and supply is affected to different degrees. There is a shortage of materials such as quartz crucibles, cell printing paste, EVA, glass, junction boxes etc. If the logistics situation will not ease, it may happen that the operation rate of solar facilities will be forced to reduced in late April.
- In April, due to supply shortage, material price such as glass, EVA film, backsheet and junction box has risen, while the price of aluminum dropped significantly in 1H April. It is estimated that non-silicon module costs will be about RMB 0.68-0.7/W in April.
- To avoid being forced to reduce production due to the impact of Covid-19 on the supply of raw materials, solar manufacturers are still actively purchasing raw materials and operating rate still at a high level.
- Due to the impact of the current epidemic in China, logistics is not smooth, and the supply shortage of materials leads to costs increase, forcing the cost of module to rise.

## Impact on Demand

- Q1 2022 China severe Covid-19 situation has affected the domestic logistics and raw material supply, which pushed raw materials and solar module price going up. In a short period of time, slow logistics can make part of solar projects delay, but China domestic demand is still strong and China's demand is expected to climb up along with the recovery of the pandemic situation.

# Harvest the Sunshine

Premium Cells, Premium Modules

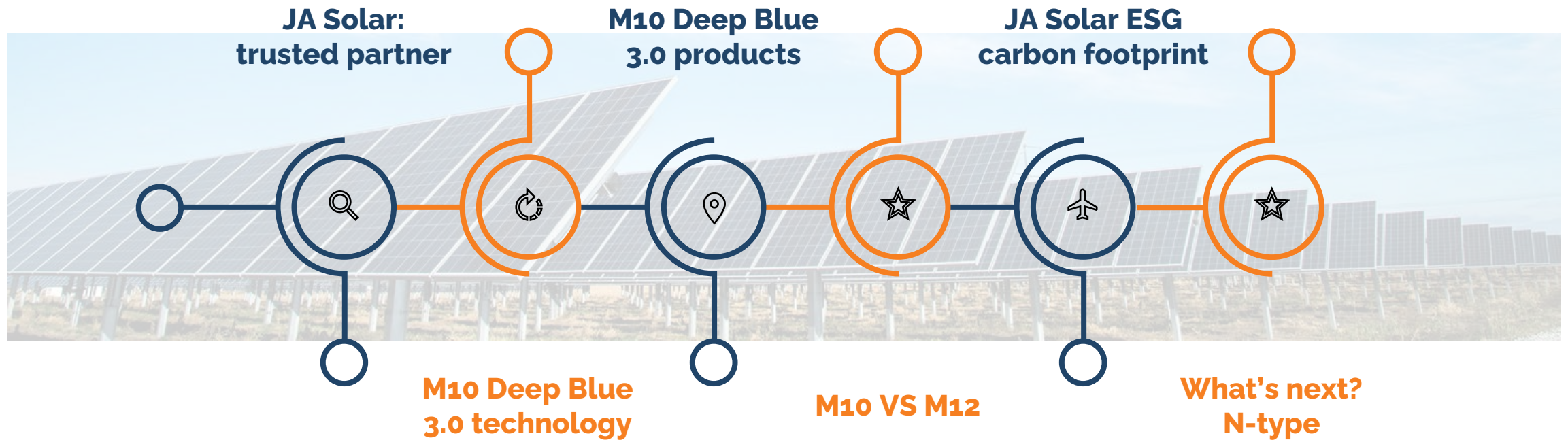
# **“M10 OPTIONS FOR THE EUROPEAN MARKET”**

APRIL 25<sup>TH</sup>, 2022

**Ignacio Espinosa**  
Senior Technical Manager



## M10 options for the European market





## **1. JA SOLAR: TRUSTED PARTNER**



# 1. JA Solar: Trusted Partner

- Long term player
- Strong EU presence
- Distribution channel
- Strongest bankability
- **High level of vertical integration**
- **Production capacity**
- More than 79GW field data

May 2005

Founded in

79GW

Cumulative shipments  
(As of Q3, 2021)

135

Covered countries  
and regions

12

Global manufacturing  
bases

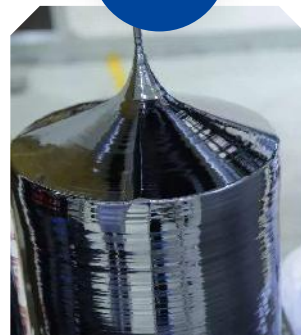
13.8%

Global market share

No.2 in global  
shipment ranking

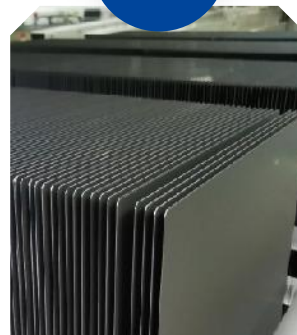
Module shipment (2021, PV InfoLink)

Ingots



Capacity: 30GW

Wafers



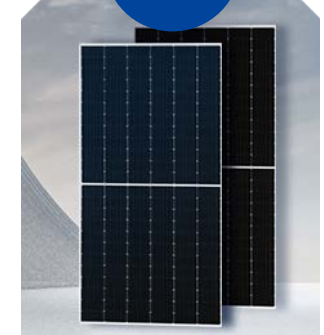
Capacity: 30GW

Cells



Capacity: 30GW

Modules



Capacity: 40GW



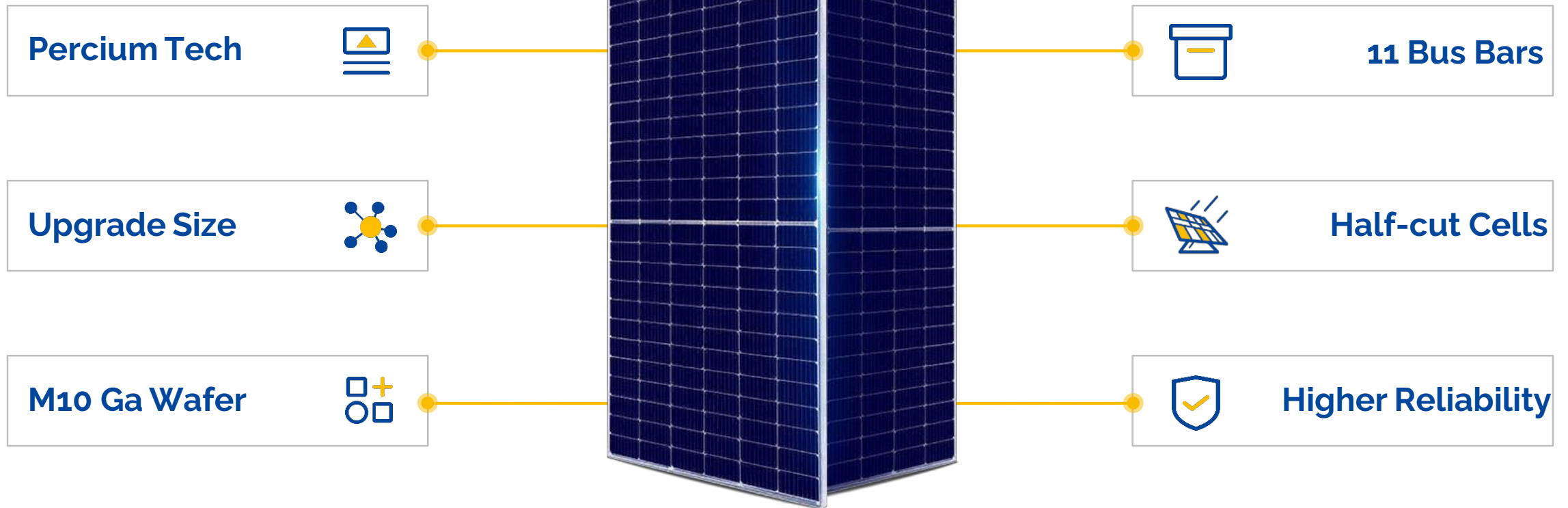
## 2. M10 DEEP BLUE 3.0 TECHNOLOGY





## 2. M10 Deep Blue 3.0 Technology

### DEEP BLUE 3.0

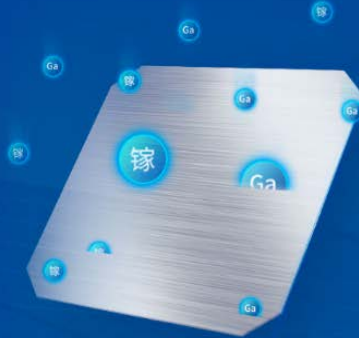


## 2. M10 Deep Blue 3.0 Technology

### 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%

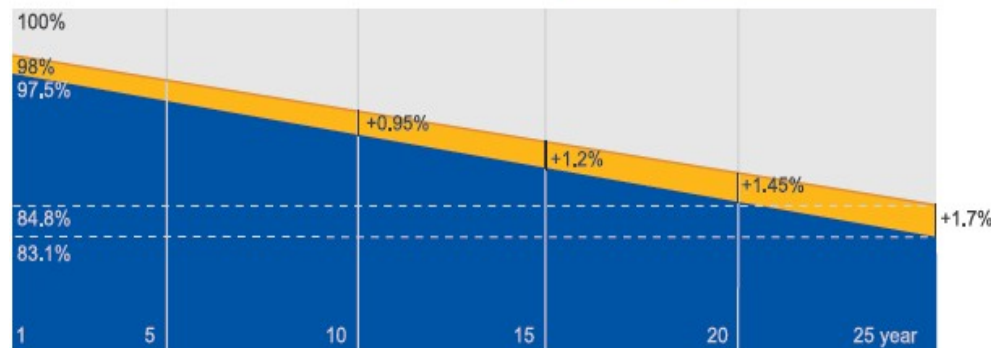
Warranty  
(single glass)  
84.8%

2%/0.45%

Warranty  
(double glass)  
85%

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

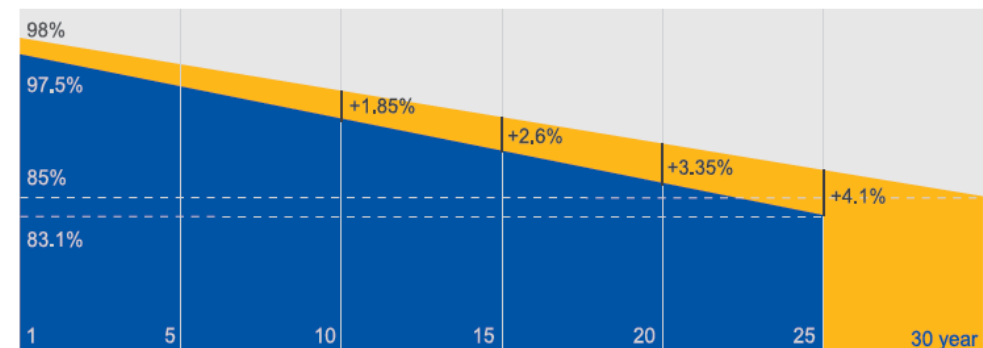
0.55% Annual Degradation  
Over 25 years



■ New linear power warranty ■ Standard module linear power warranty

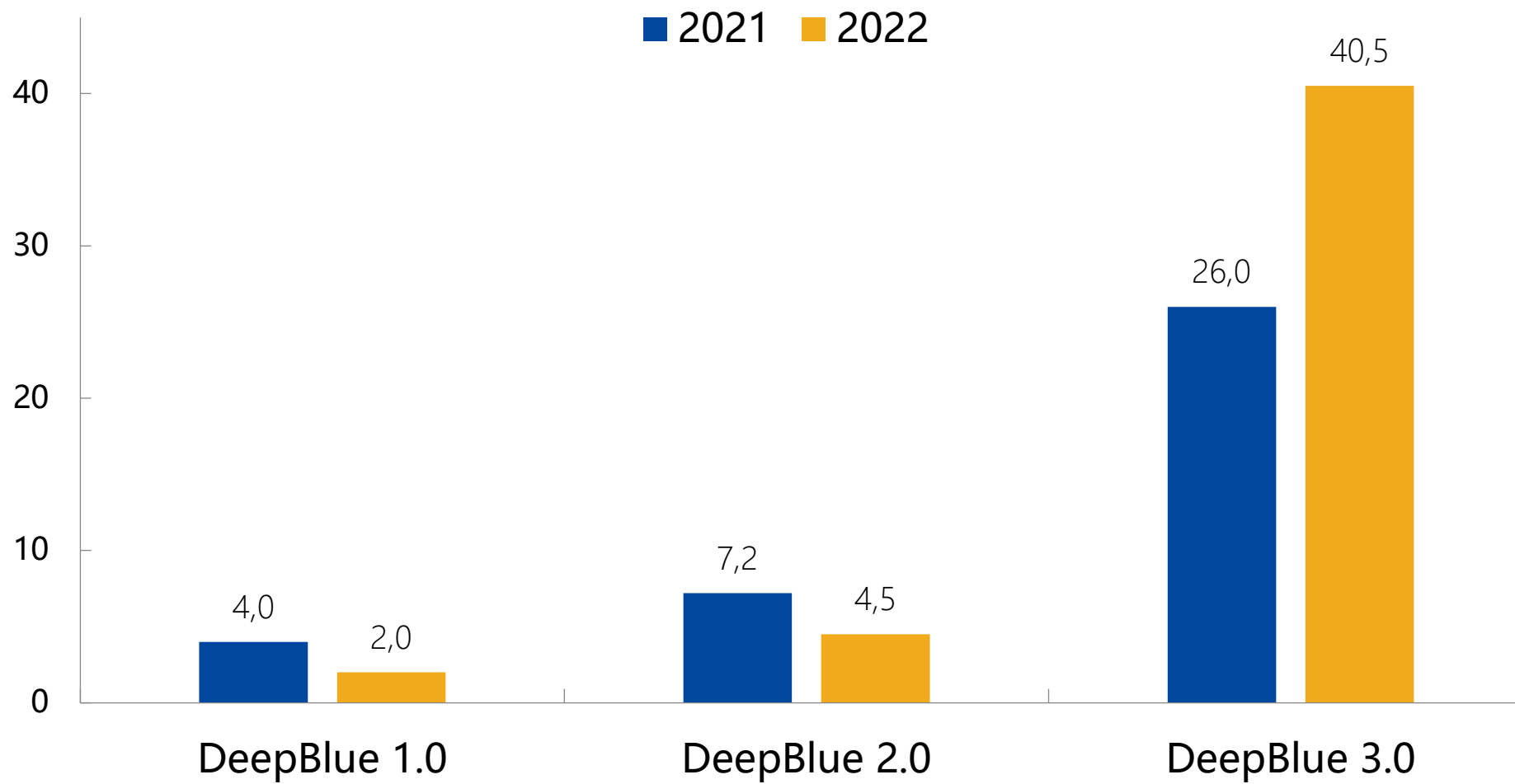
- 12-year product warranty
- 30-year linear power output warranty

0.45% Annual Degradation  
Over 30 years



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

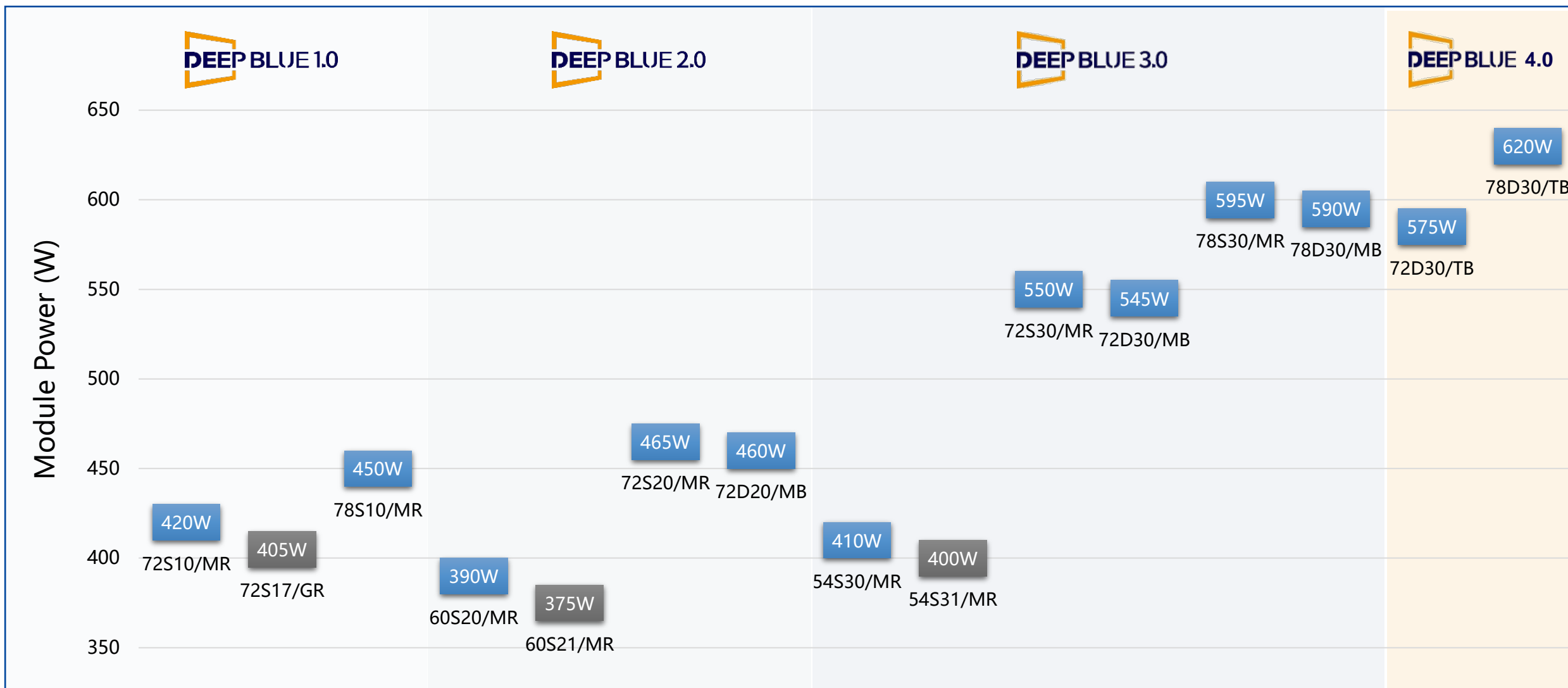
## 2. M10 Deep Blue 3.0 Technology



### 3. M10 DEEP BLUE 3.0 PRODUCTS






### 3. M10 Deep Blue 3.0 Products





### 3. M10 Deep Blue 3.0 Products

		RESIDENTIAL	C&I	UTILITY SCALE
 DEEP BLUE 1.0	158-72c	✓	✓	✓
 DEEP BLUE 2.0	166-60c	✓	✓	
	166-72c		✓	✓
 DEEP BLUE 3.0	182-54c	✓	✓	
	182-72c		✓	✓
	182-78c			✓



**SUITABLE PRODUCTS  
FOR ALL PV PROJECT**



### 3. M10 Deep Blue 3.0 Products

## DEEP BLUE 1.0

#### High efficiency & power

Up to 20.7% in efficiency with maximum power of 415W (72c)

#### Suitable for rooftop applications

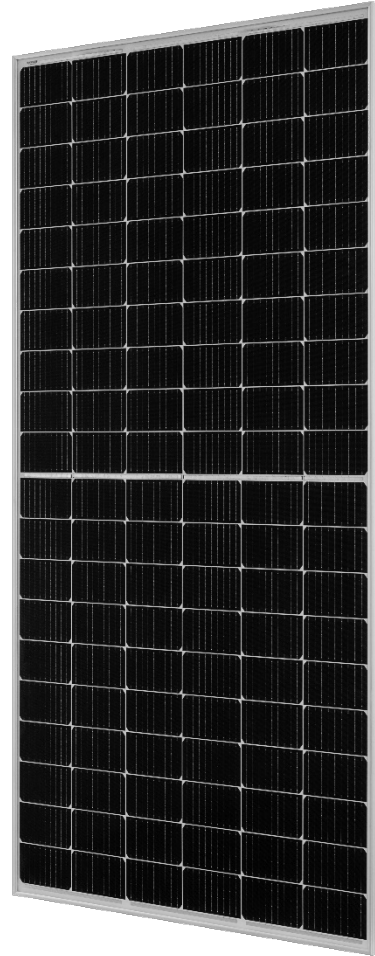
Light product

**Full black** product

High compatibility

#### Largest track record

High compatibility



## DEEP BLUE 2.0

#### High efficiency & power

Efficiency up to 20.9%, power **465W**

#### Suitable for all applications

Residential, C&I, Utility Scale

**Full black** product

Best balance Size-Power

#### Mainstream product distribution

Huge track record

**Well known product**

High compatibility

### 3. M10 Deep Blue 3.0 Products



#### High efficiency & power (78c)

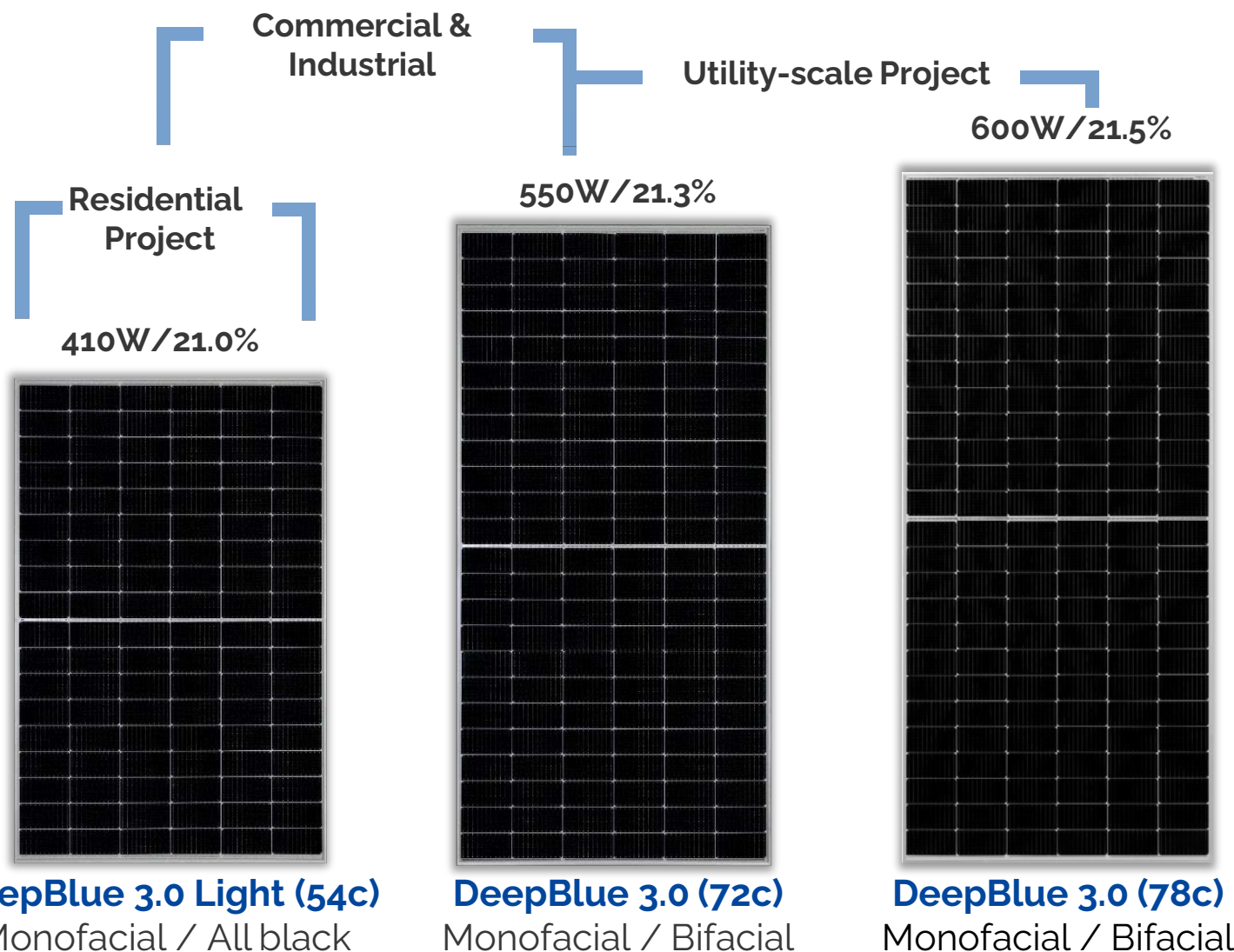
Up to 21.5% efficiency

**600W** power **reduces BOS and LCOE**

#### Upgraded Size

Well-established industry supply chain based on M10 (182-mm) wafers:

- Compatibility
- Module production
- Installation
- Transportation





## 4. M10 VS M12



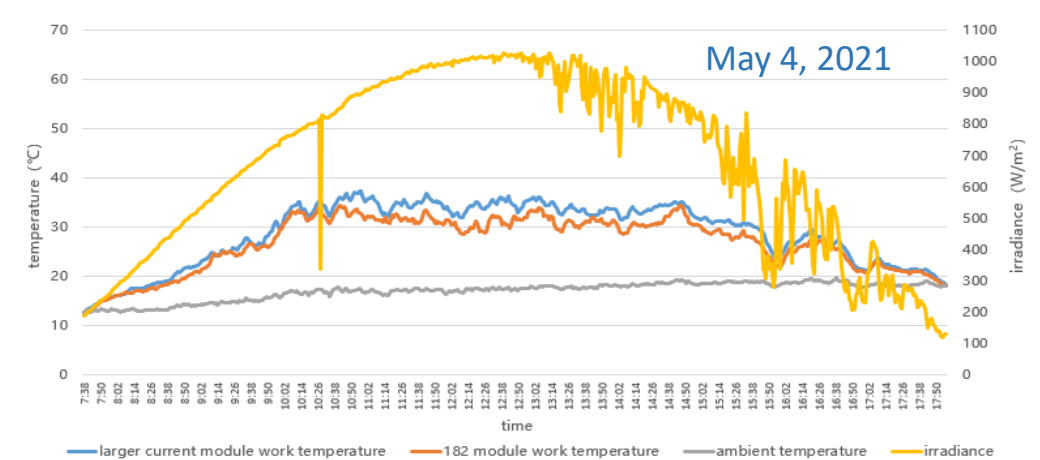
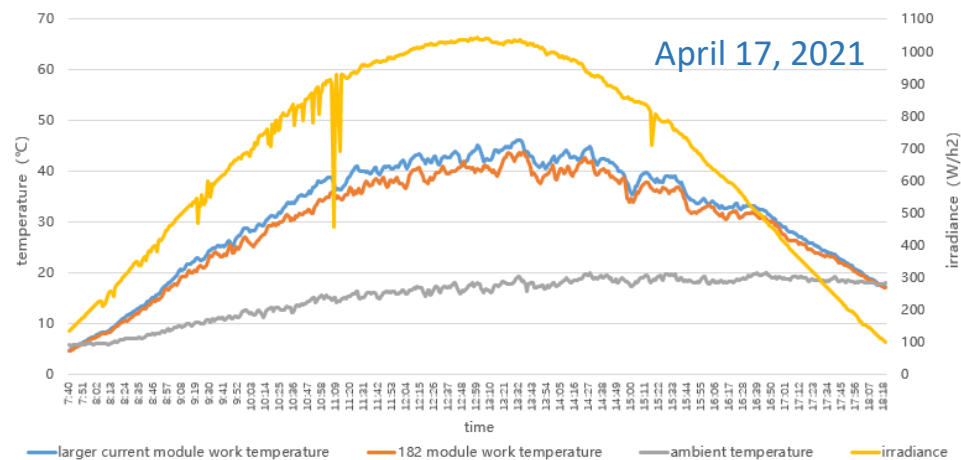
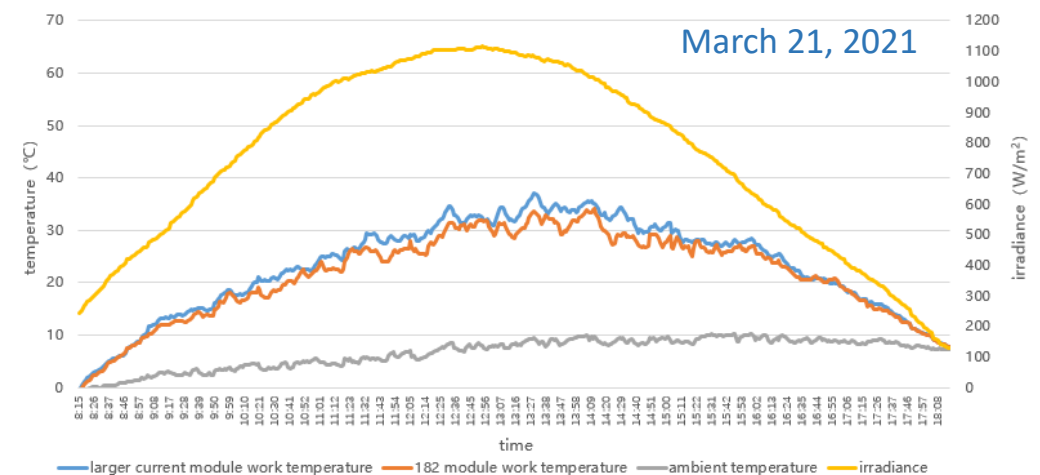
## 4. M10 VS M12 Modules

Module	Power	Efficiency	Weight (kg)	Length (mm)	Width (mm)	Area (m <sup>2</sup> )	Isc (A)	Voc (V)	Quantity / Container	Volume / Container (W)
182-72	545	21.1%	28.6	2278	1134	2.58	13.93	49.75	620	337900
182-78	590	21.1%	31.1	2465	1134	2.80	13.93	53.3	496	292640
210-60	590	20.8%	30.9	2171	1303	2.83	18.47	41.3	558	329220

### □ 182-78 VS 210-60:

1. The main power of 182-78 and 210-60 is the same, up to **590W**
2. 182 module with low current & high voltage; 210 module with low voltage & high current
3. Larger current brings risks and hazards in terms of power generation, electrical safety, etc.

## 4. M10 VS M12 Modules

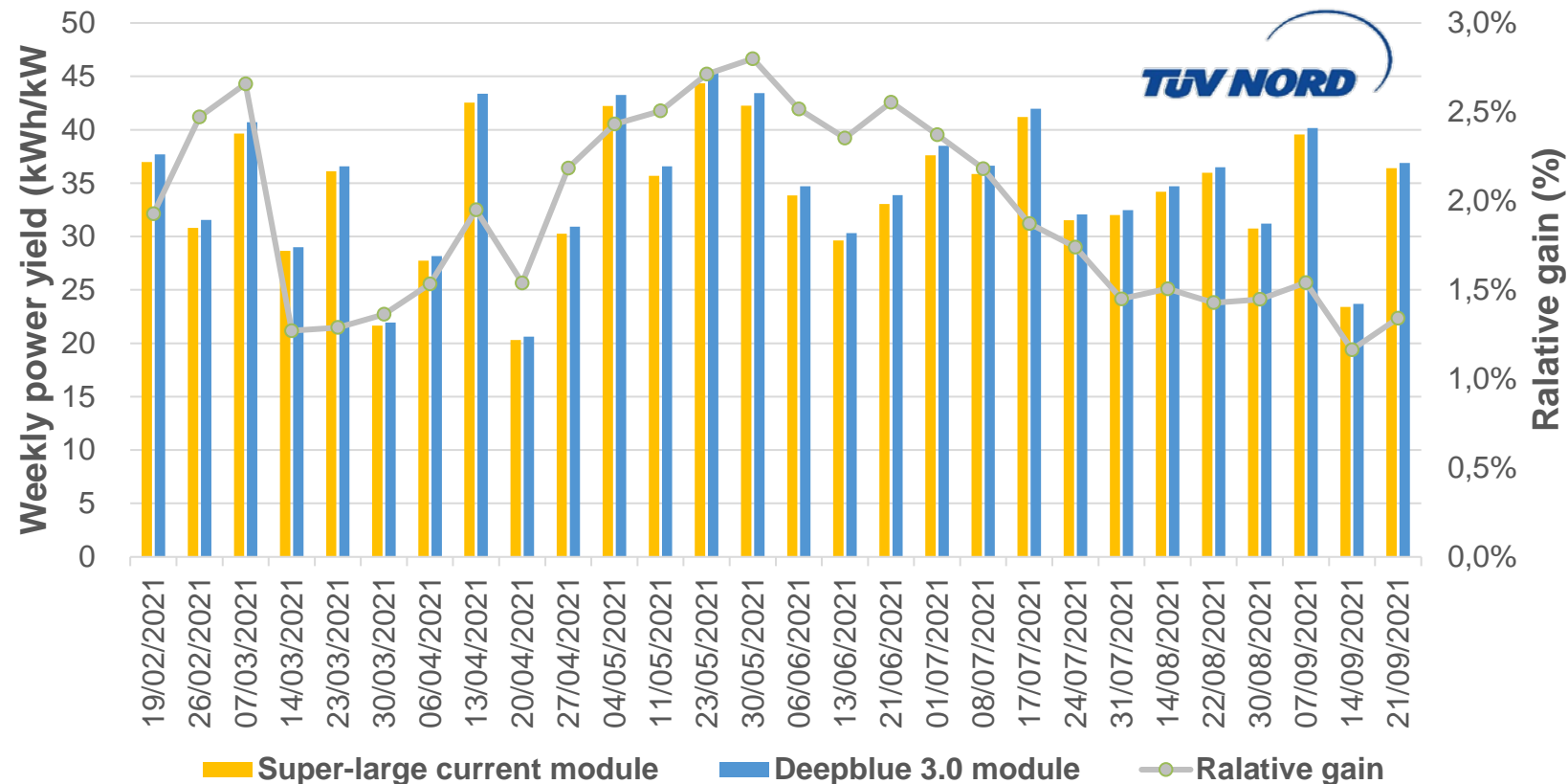


During times of high irradiance, the average difference of the module operating temperature between 182mm modules and high-current modules is about **1.7 °C**, and the maximum temperature difference is up to **4 - 5 °C**.

## 4. M10 VS M12 Modules

### Performance Demonstration

**Power yield** of DeepBlue 3.0 modules **is more than 1.5% higher** than high-current modules (Feb.~Sep.,2021)



Demonstration project by JA and TÜV NORD at empirical test base (Yinchuan) of China Photovoltaic Test Center.



## 5. JA SOLAR ESG – CARBON FOOTPRINT



## 5. JA Solar CSR



- EPD: cradle to grave
- ISO 14025
  - EN 50693
  - EN 15804:212+A2:2019



- REACH Compliance
- WEEE Compliance



- 7 module products received **Carbon Footprint** certifications for France Market
- All M10 products



- CSR (Corporate Social Responsibility)
- Awarded ECOVADIS Survey 2021
  - Environment
  - Labor & Human Rights
  - Ethics
  - Sustainable Procurement

## 6. WHAT'S NEXT? N-TYPE





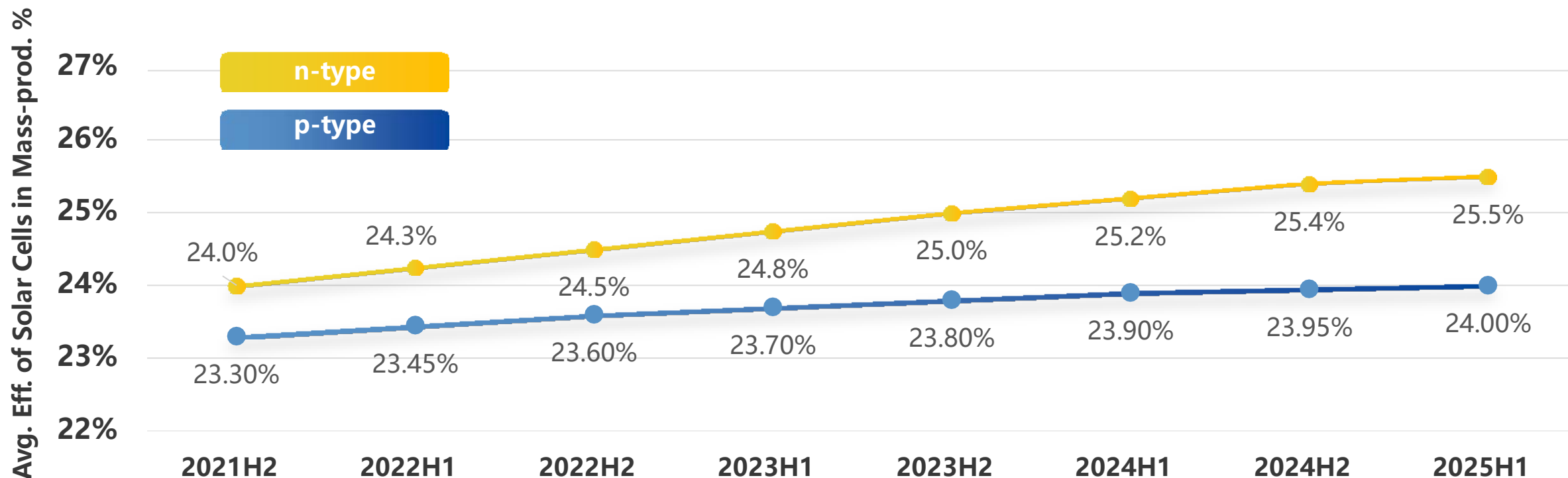
## 6. What's next? N-type

### Benefits

- Higher cell efficiency
- Technology improvement space
- Lower degradation
- Better Temp. Coefficient

### Considerations

- Unmature technology
- Production process complexity
- Higher production costs than p-type





## 6. What's next? N-type

### DEEP BLUE 4.0

#### Key Parameters

**Model** : JAM72D30/TB

**Weight** : 31.8 kg

**Size** : 2278 × 1134 × 35 (mm)

**Power** : 555 - 575 W

**Efficiency** : **21.5% - 22.3%**

**Model** : JAM78D30/TB

**Weight** : 33.4 kg

**Size** : 2465 × 1134 × 35 (mm)

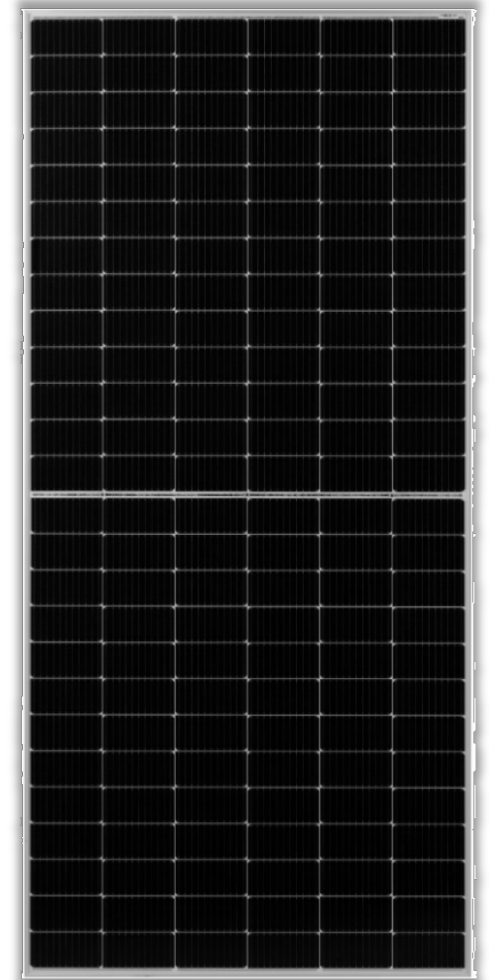
**Power** : 600 - 620 W

**Efficiency** : **21.5% - 22.2%**

**Low Temperature Coefficient**: -0.3%/°C (Pmax)

**Low Degradation**: 1% 1st-year degradation, 0.4% annual degradation over 30 years

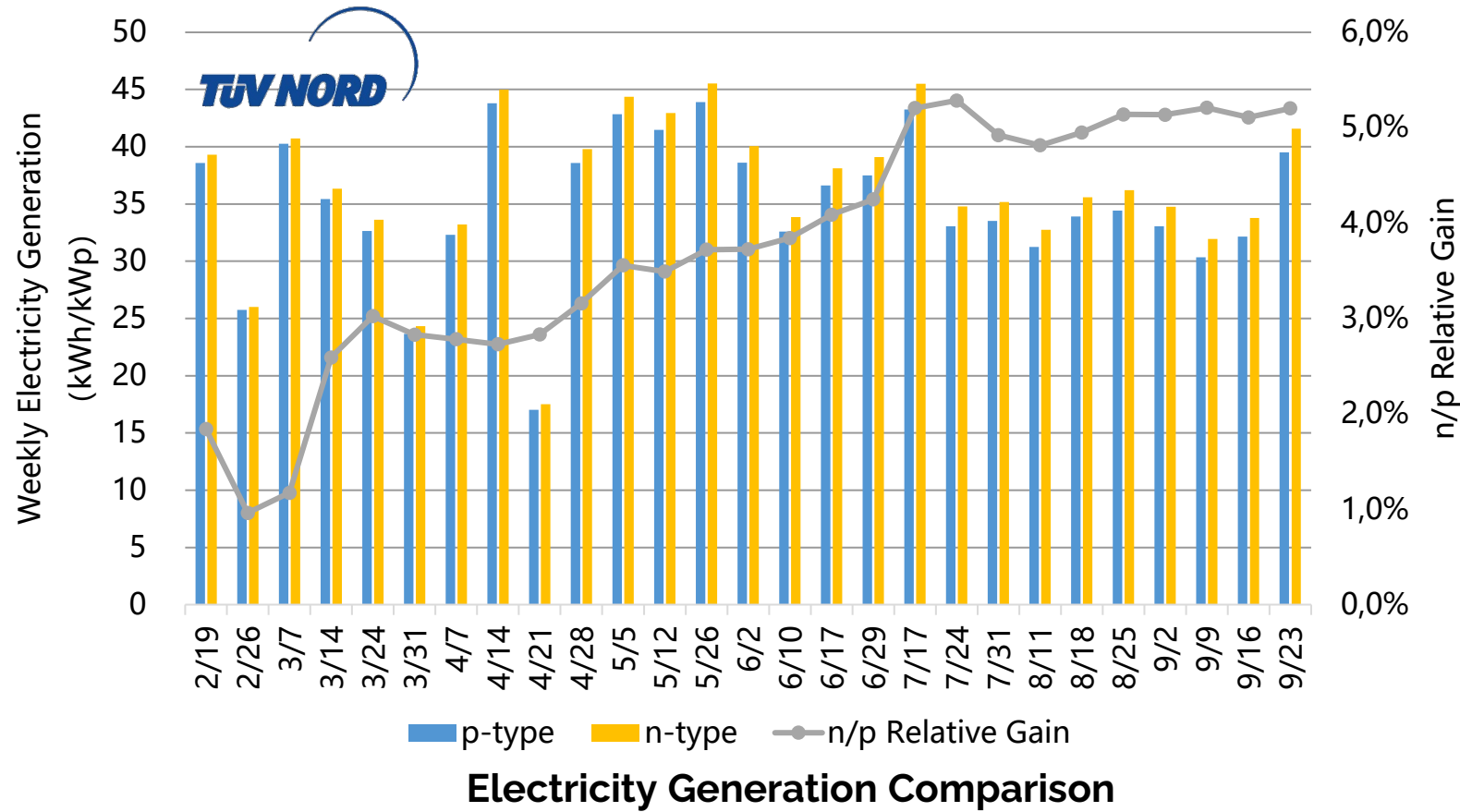
**Reliable Bifacial Benefits**: bifaciality 80%±10%



## 6. What's next? N-type

### Performance Demonstration

n-type modules averagely generate 3.8% more electricity than p-type modules.



Demonstration project by JA and TÜV NORD at Empirical Test base (Yinchuan) of China Photovoltaic Test Center.

## 6. What's next? N-type





**THANKS FOR YOUR ATTENTION**

APRIL 25<sup>TH</sup>, 2022

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Senior Technical Manager

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[marketing@jasolar.com](mailto:marketing@jasolar.com)

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# M10 options for the European market

## Q&A



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**Thursday, 28 April 2022**

11:00 am – 12:00 pm CEST, Berlin

2:30 pm – 3:30 pm IST, Delhi

**Many more to come!**

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or stowing? – A  
financial  
analysis of stow  
strategies**

**How automation  
can deliver  
sustainable solar  
project O&M in an  
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environment**

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Editor  
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