All Back Contact (ABC) Technology

Combining material merits, high reliability, and superior aesthetics

Jimmy Melskens

Senior Product Manager

12th Back Contact Workshop 2024

Delft, 4-5 December 2024

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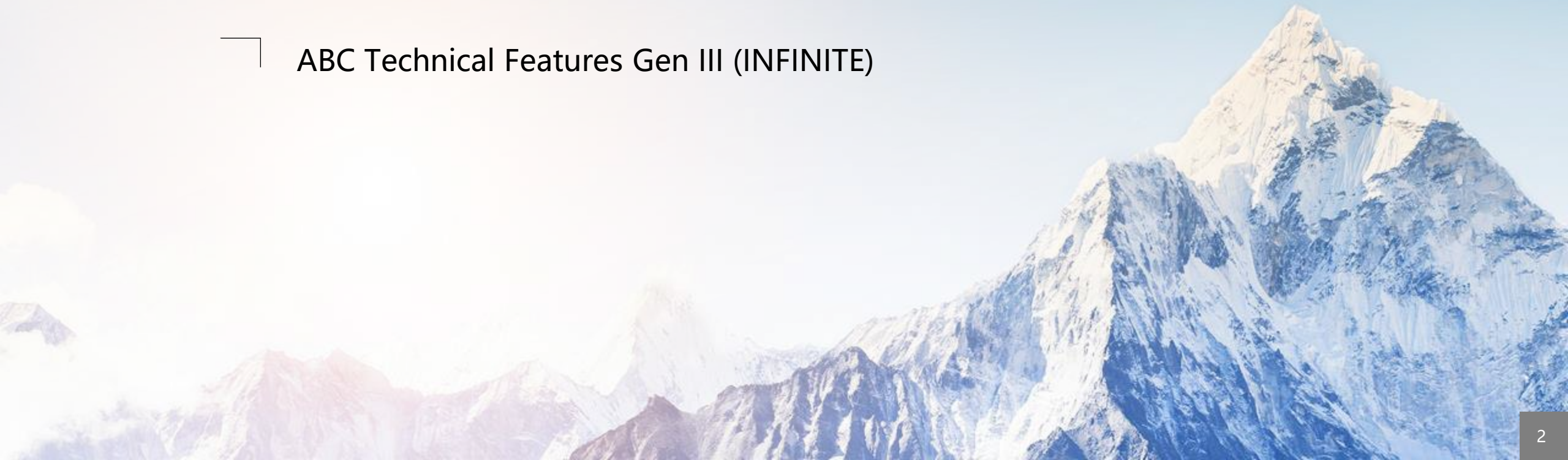


About AIKO

Through continuous innovation of product technology and manufacturing engineering,

to be a global leader in the PV industry.

140GW+

Accumulative Shipments

15,000+

Employees Globally

20%

R&D Ratio

20

Global Branches

3

R&D Centers

TIER 1 BloombergNEF

reddot winner 2023

Manufacturing Engineering Innovation

AIKO
FIND YOUR POWER

Zero-Carbon Society

Zero-Carbon Green Factory

2024 ■ Jinan factory
100% green electricity I 90% water recovery I 30% waste heat recovery

2024 ■ Unveiled ABC INFINITE modules utilizing mass production technologies like hidden string collectors, overlap welding, 0BB cells, etc.

2022 ■ Smart factory integrating cell and module

2021 ■ Introduced silver-free metallization technology

2017 ■ Introduced 5GW automated PV cell factory

35GW TOPCon cell capacity
Yiwu I Tianjin I Chuzhou

Total Planned Capacity of ABC: **106GW**

36GW | Guangdong
- 10GW Production
- 26GW Preparation

30GW | Yiwu
- 15GW Ramping up
- 15GW Preparation

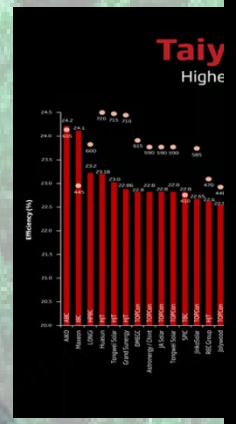
40GW | Jinan
- 10GW Under construction
- 30GW Preparation

AIKO Announces 24.6% Commercial Solar Module Efficiency

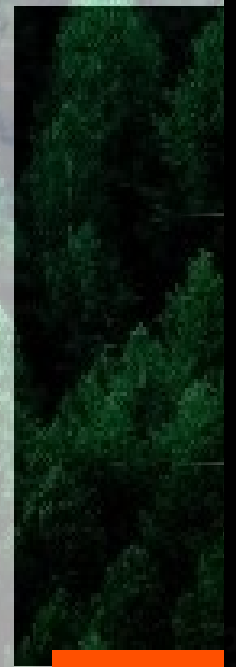
High-efficiency solar modules currently installed across first projects in China

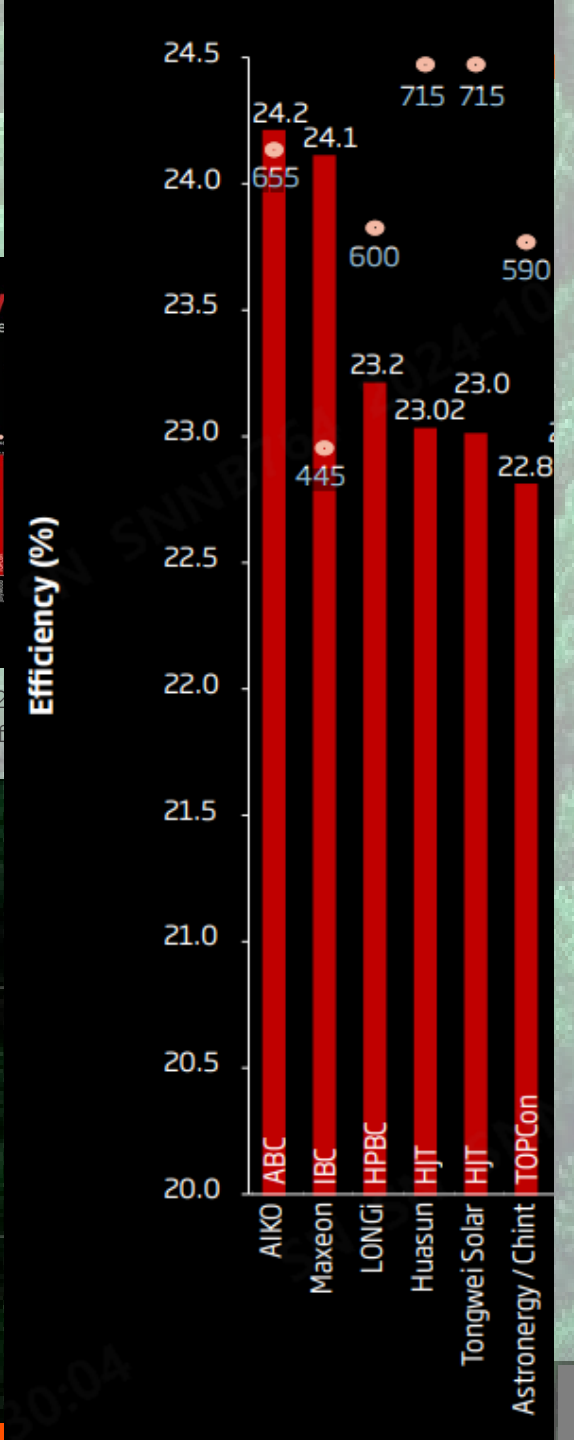
Anu Bhambhani

Published on: Nov 05, 2024, 2:45 pm



Ranking 1st for 2
Highest Ef





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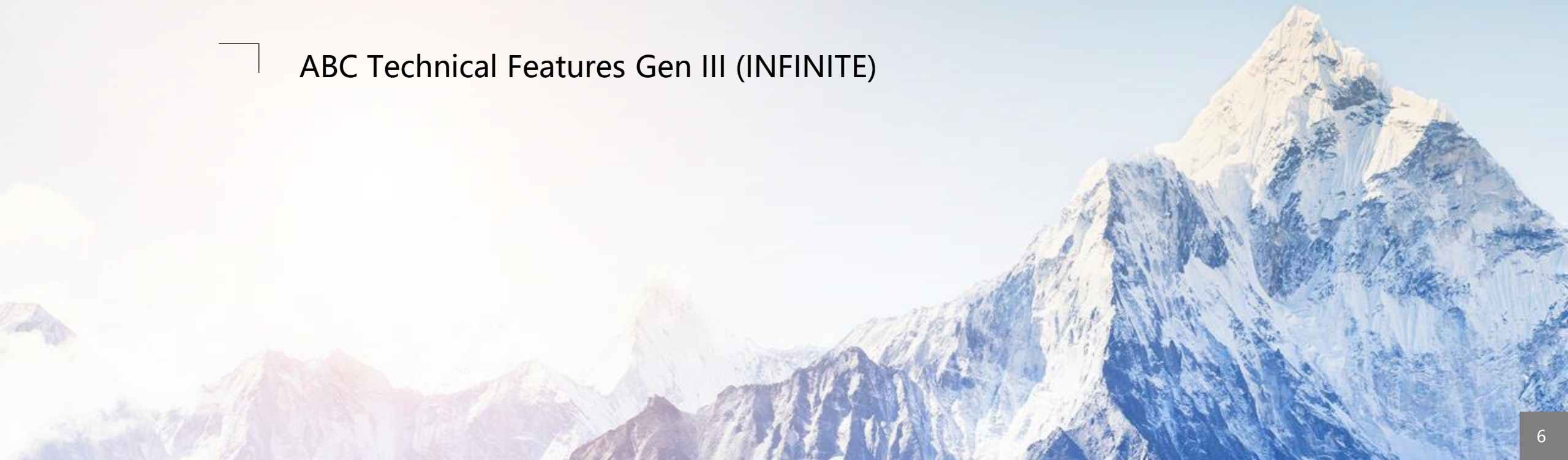
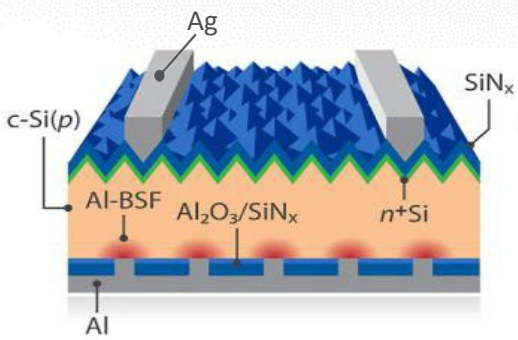
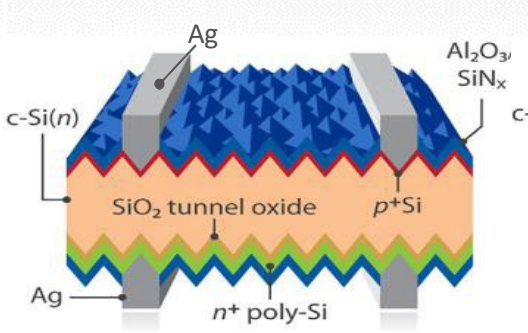
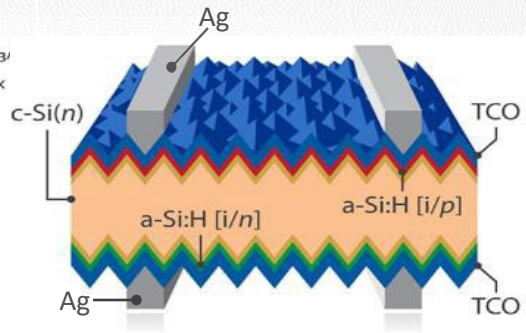
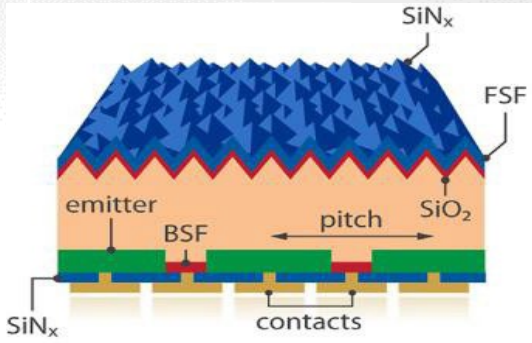


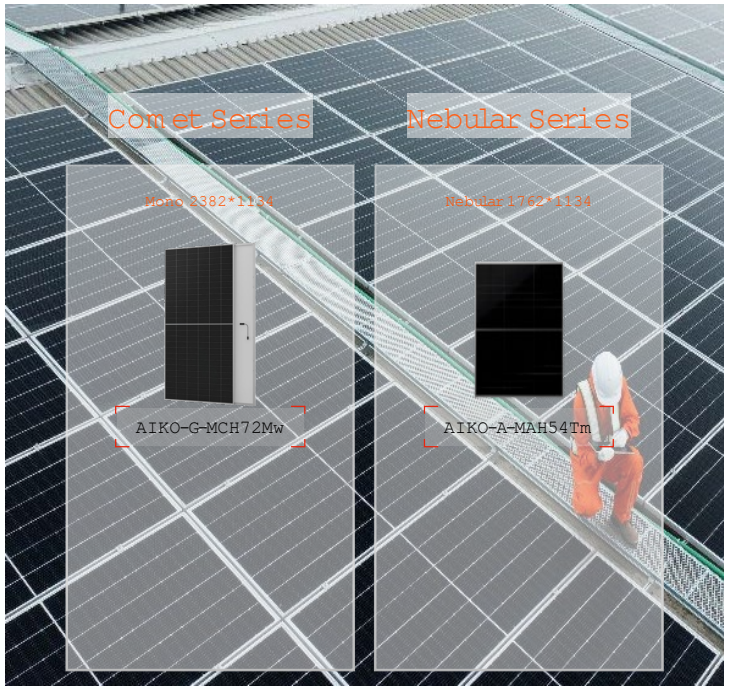
Comparison of Solar Cell Technology

	PERC	TOPCon	HJT	ABC
Cell Topology				
Front Surface Shading	Yes (3-5% Shadings)	Yes (3-5% Shadings)	Yes (3-5% Shadings)	No (0% Shadings)
Ag-based Metalisation	Front+Back (~70mg)	Front + Back (~110mg)	Front + Back (~150mg)	No (0mg)
Metalisation Temperature	>700℃	>700℃	~200℃	>700℃
/	/	/	/	/
Voc	690mV	715mV	>740mV	>740mV
ETA Potential	23.5-24%	25-26%	25-26%	26-28%

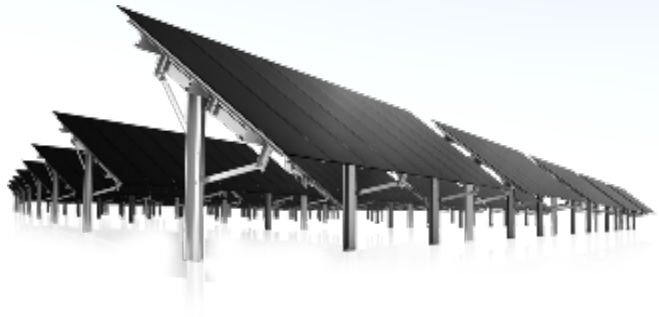
Born for Scenario

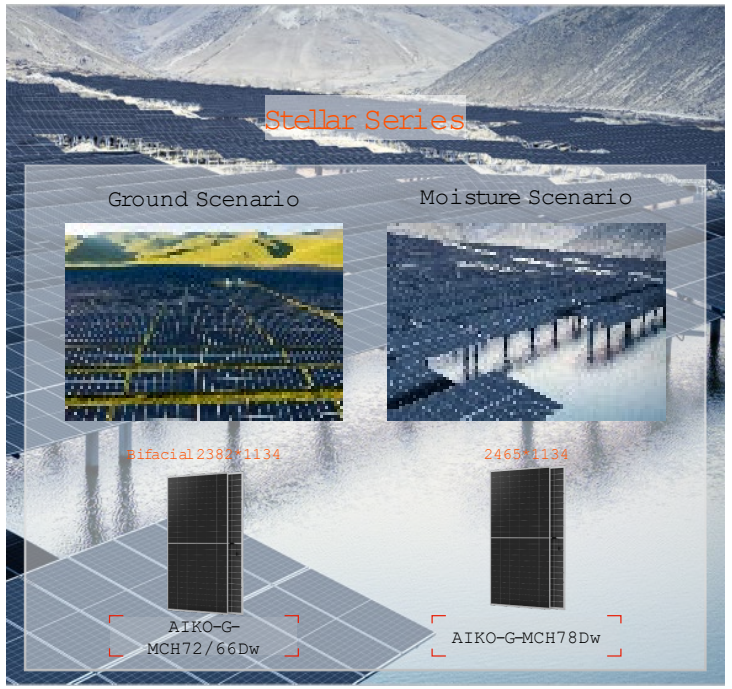
Residential Scenario

C & I Scenario



Utility Scenario





Maximum Power Under Same Area

Unit: W

Dimension	Scenario	Type	2024		2025		Leading TOPCon by
			Q3	Q4	Q1	Q2	
1757*1134 & 1762*1134 (INFINITE)	C&I	AIKO-A-MAH54Mw/ AIKO-A-MCE54Mw	470	470	485	490	20/20/30/35
	C&I	AIKO-A-MAH54Dw/ AIKO-A-MCE54Dw	470	470	480	485	25/25/30/35
	Residential	AIKO-A-MAH54Mb/ AIKO-A-MCE54Mb	460	465	480	480	20/20/30/30
	Residential	AIKO-A-MAH54Db/ AIKO-A-MCE54Db	460	475	480	480	25/40/40/40
2382*1134	C&I	AIKO-G-MCH72Mw/ AIKO-A-MDE72Mw	650	650	660	665	30/30/35/35
2382*1134	Utility	AIKO-A-GRH66Dw			650	655	35/35

Note: Grey columns denote INFINITE Module (GEN 3)

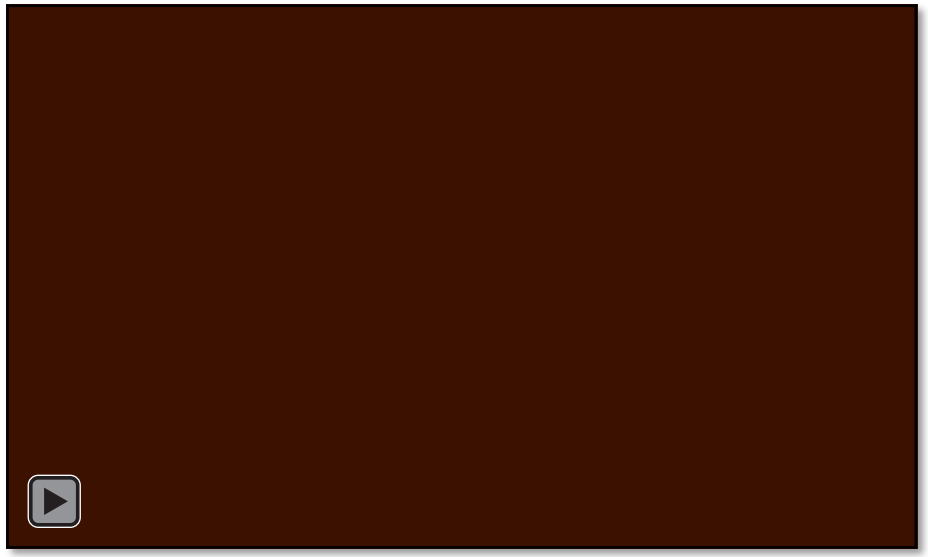
High Returns – Partial Shading Optimisation

When a cell is fully shaded,

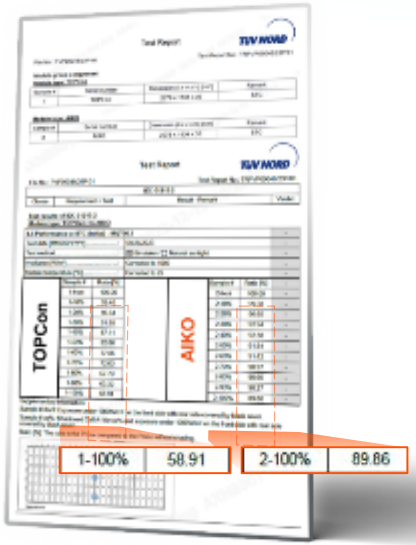
ABC can produce extra

30% electricity than TOPCon.

Partial Shading Optimisation



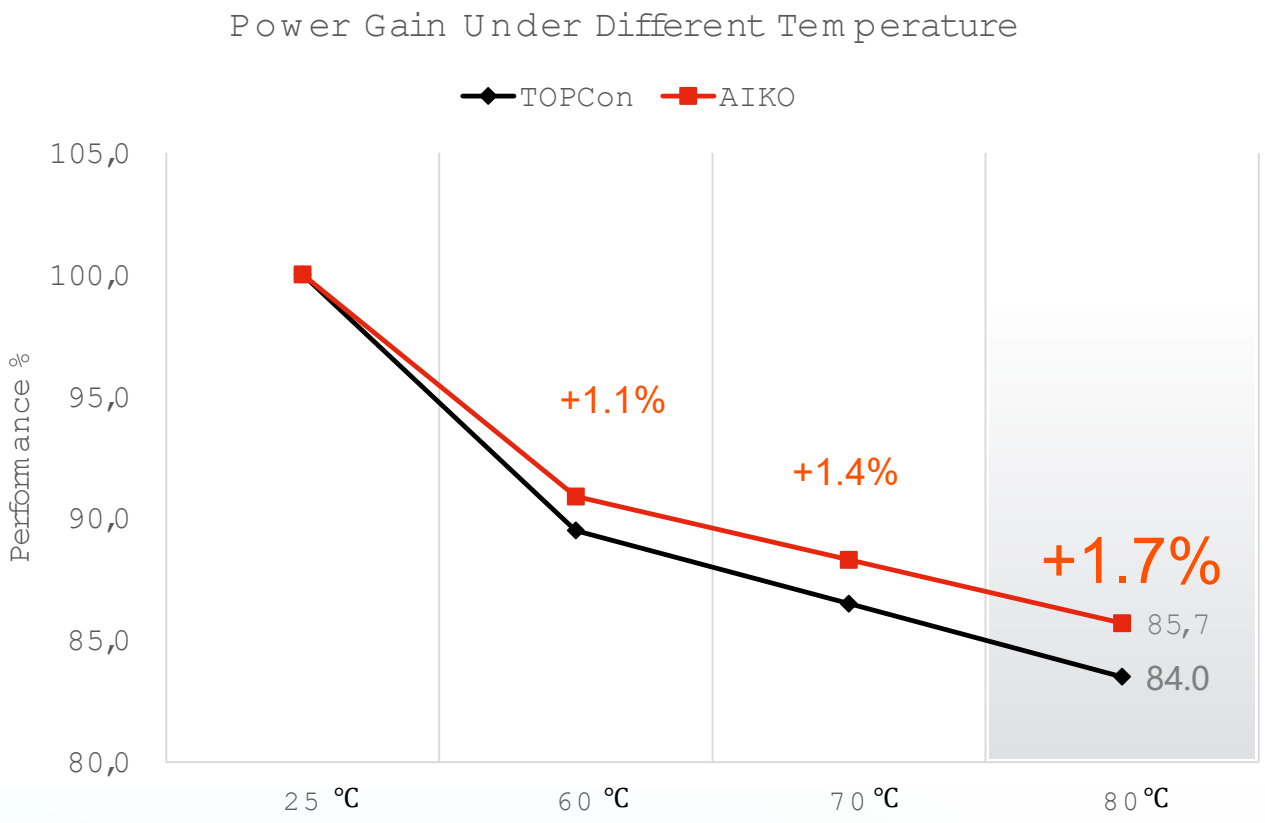
Partial Shading Optimisation Principle



TUV Nord Test Report

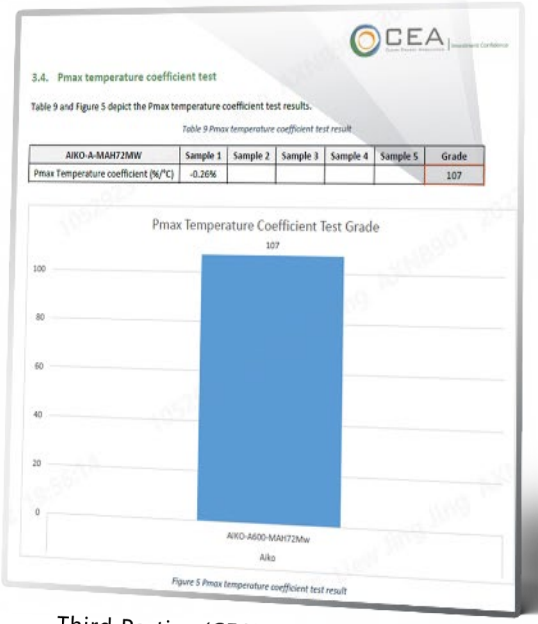
High Returns – Low Temperature Coefficient

-0.26%/°C vs **-0.29%/°C**



ABC Module

Grade 107/100

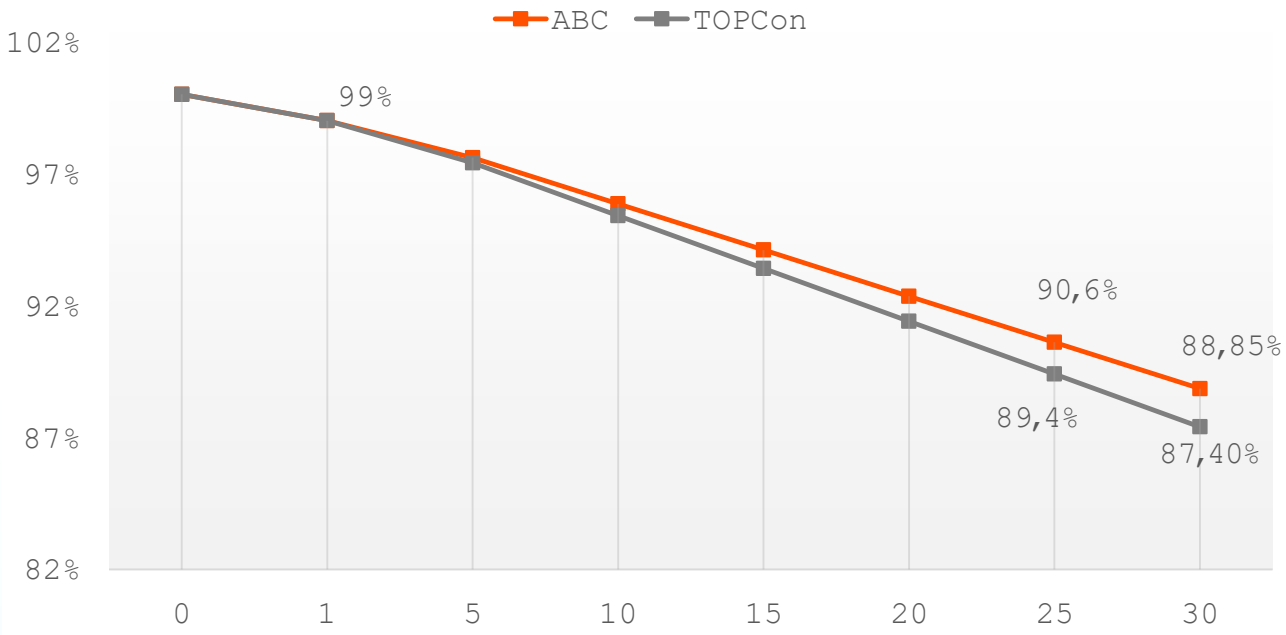


Third Parties (CEA) Test Report

High Returns – Lower Degradation

ABC	TOPCon
≤1%/0.35%	≤1%/0.40%
First Year/Year by Year	First Year/Year by Year

Linear Power Output over 30-years Life-cycle



Degradation in 25 years:

ABC modules

↓1.2% compared with TOPCon module

Degradation in 30 years:

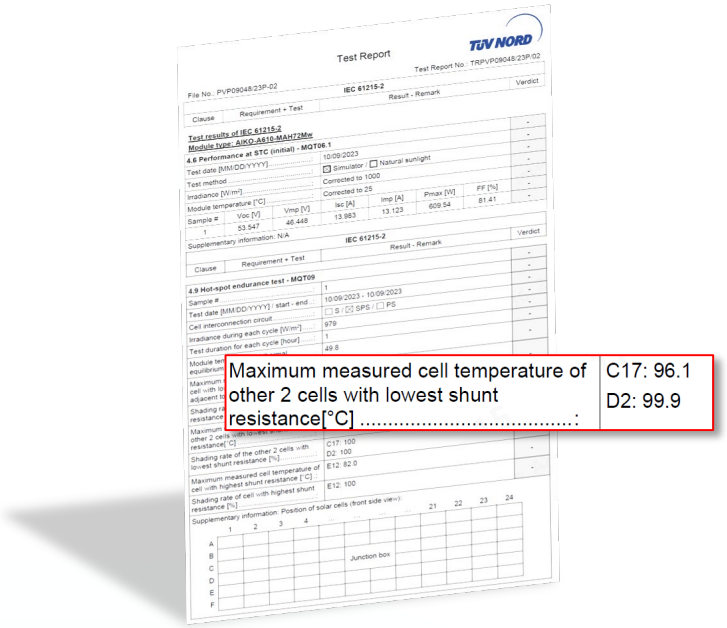
ABC modules

↓1.5% compared with TOPCon module

Example 100MW Simulation			
Output in 30 years (10,000 kWh)		Difference (10,000 kWh)	Growth Rate
TOPCon	ABC		
308,440	310,649	2,209	0.71%

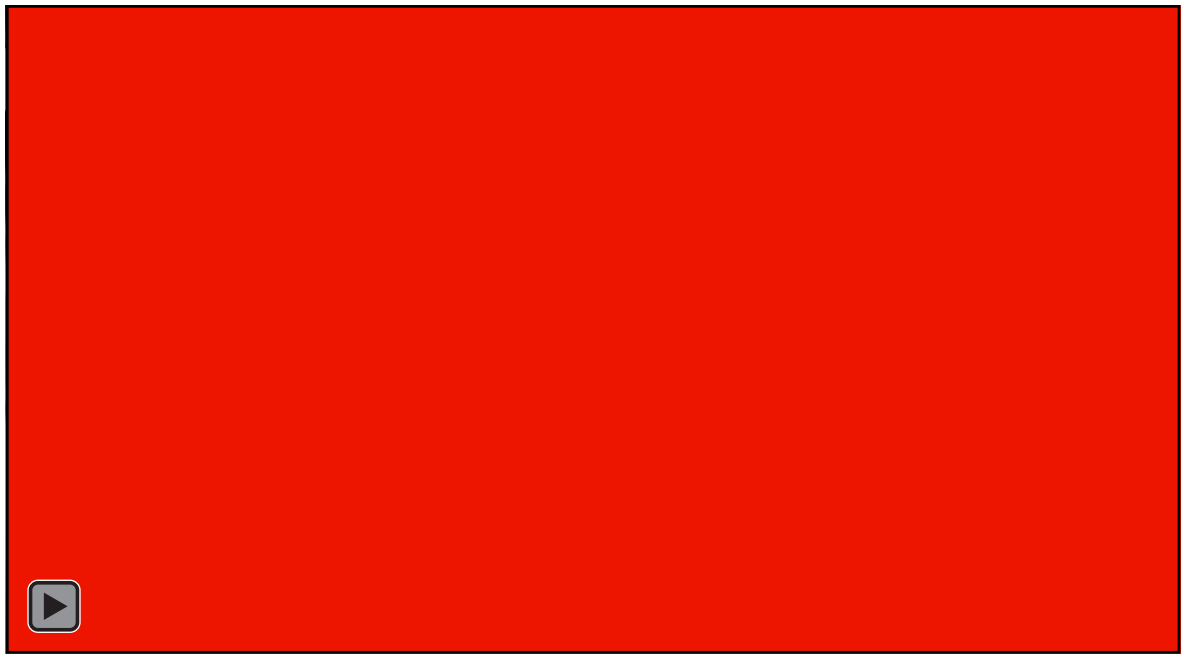
Ultra Safe – High Temperature Restriction

TUV Nord Test report shows
ABC maximum cell temperature : ~100℃



TUVNord Test Report

Excellent High Temperature Restriction

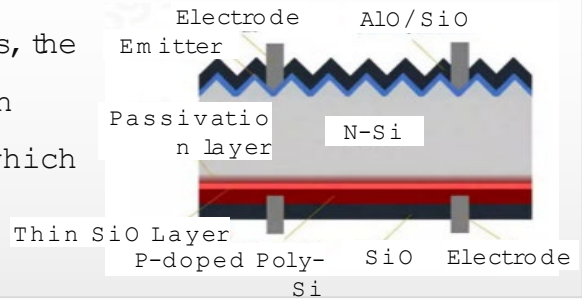


Ultra Safe – Micro-crack Resistance

Effectively reduce the probability of module failure

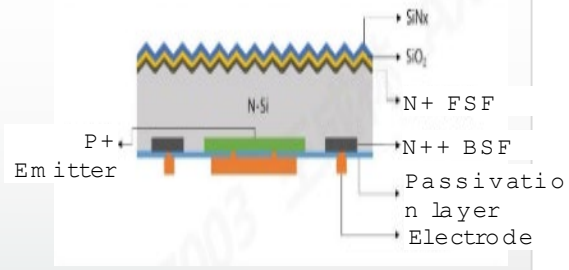
Silver Paste Firing, Introducing Stress

During TOPCon firing process, the silver paste enters the silicon wafer and introduces stress, which can cause micro-cracks.



ABC No Stress introduction

ABC does not need silver paste to be burned into the silicon wafer, so there is less stress introduction



Residential Case Reference

Germany

Sweden

Germany

Germany

Netherlands

Germany

C&I Case Reference

AIKO
FIND YOUR POWER

Netherlands

Netherlands

Germany

Spain

Australia

Netherlands

Contents

Maximize Installed PV Capacity Per Square Meter

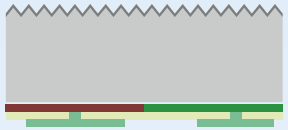
High Resistance Silicon Wafer, Break through the Efficiency Bottleneck

High Resistance

Less doping

Minority carrier's life increased by 10 times

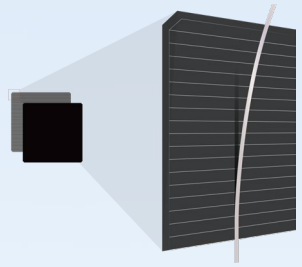
ABC Born for High Efficiency



No busbar at the front side, full area absorb light

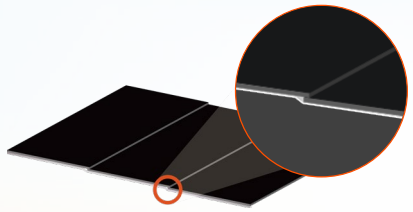
Light absorption area increased by 3%, decreasing electrical loss

ABC+ 0BB, effective and reliable



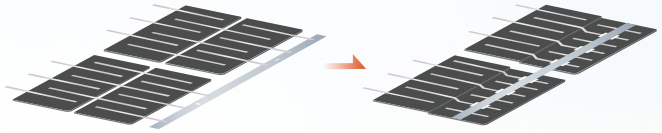
Decreasing electrical loss

Precisely overlap welding, eliminate cell spacing



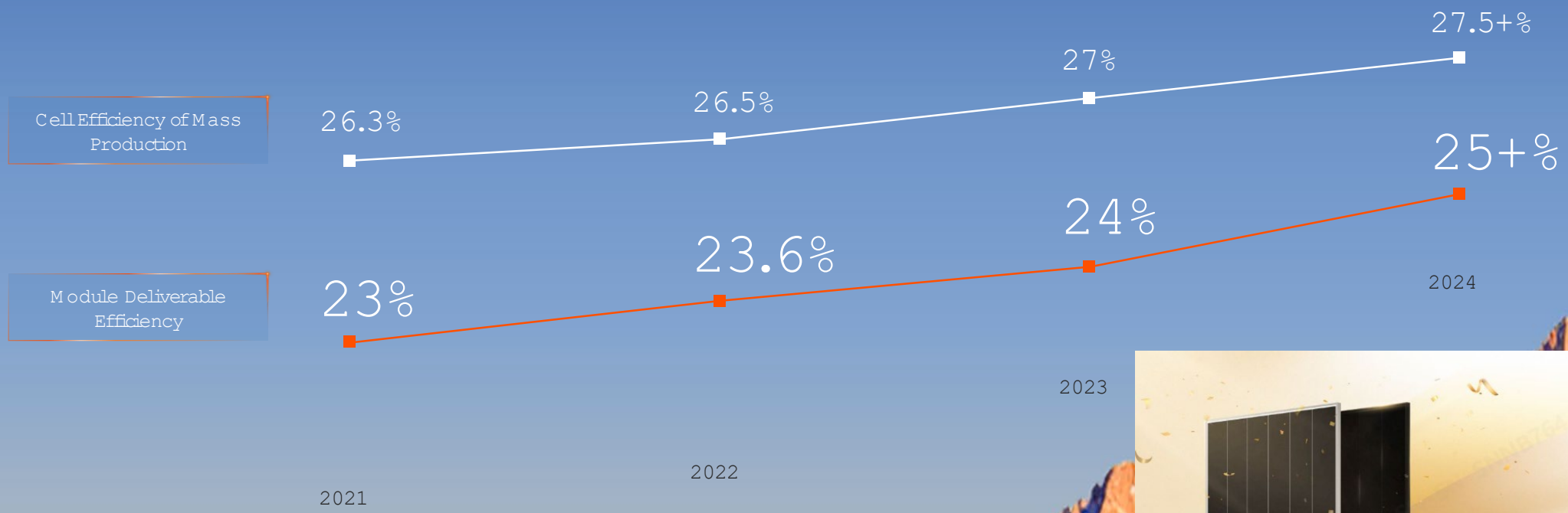
Light absorption area increased by 5%

Foldable String Collector achieve real full screen



Light absorption area increased by 1.1%

ABC Efficiency Roadmap

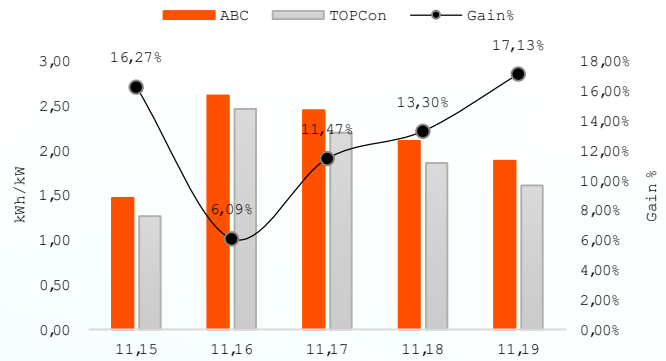



AIKO
Redefine Solar
For a Carbon-neutral Society
AIKO
BloombergNEF
Tier 1
PV Module Manufacturer

Pilot Cases – Tree, Obstacle and Dust Shading

The power generation of each kilowatt gain by ABC dual-glass 635W over TOPCon dual-glass 570W in 5 days is 12.04%

Type	ABC Dual-glass 635W	TOPCon Dual-glass 570W	Gain
Each kW of Power Generation (kWh/kW)	10.54	9.41	+12.04%
Power generation (kWh)	80.33	64.36	24.81%

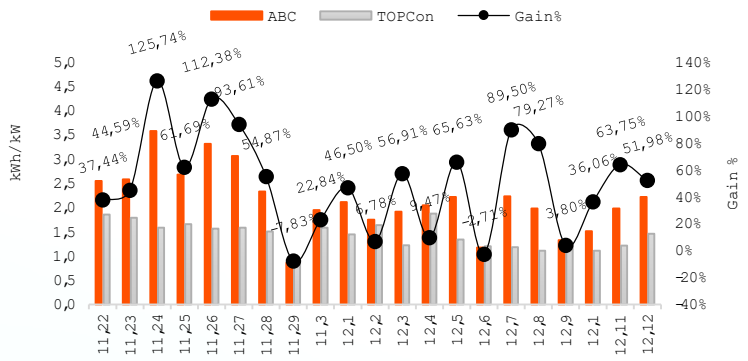


1、Baseline: TOPCon; Installed 12 module for each type (72P)

2、Location: Guangdong, Zhanjiang

The power generation of each kilowatt gain of ABC mono-glass 600W over TOPCon mono-glass 580W in 21 days is 50.72%

Type	ABC Mono-glass 600W	TOPCon Mono-glass 580W	Gain
Each kW of Power Generation (kWh/kW)	45.27	30.03	+50.72%
Power Generation (kWh)	27.24	17.53	55.36%

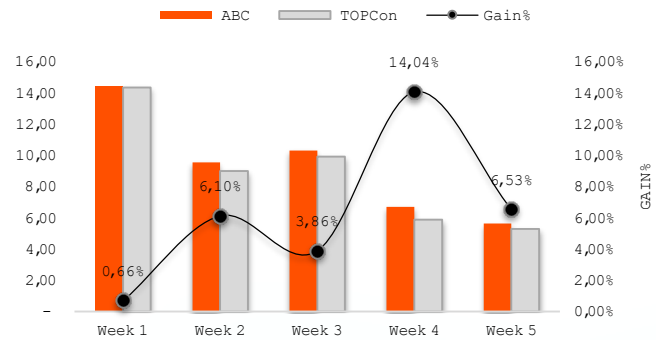


1、Baseline: TOPCon; Installed only 1 module for each type (72P)

2、Location: Guangdong, Zhuhai

The power generation of each kilowatt gain of ABC mono-glass 600W over TOPCon mono-glass 580W in 32 days is 4.94%

Type	ABC Mono-glass 600W	TOPCon Mono-glass 580W	Gain
Each kW of Power Generation (kWh/kW)	46.55	44.35	+4.94%
Power generation (kWh)	27.93	25.92	7.75%



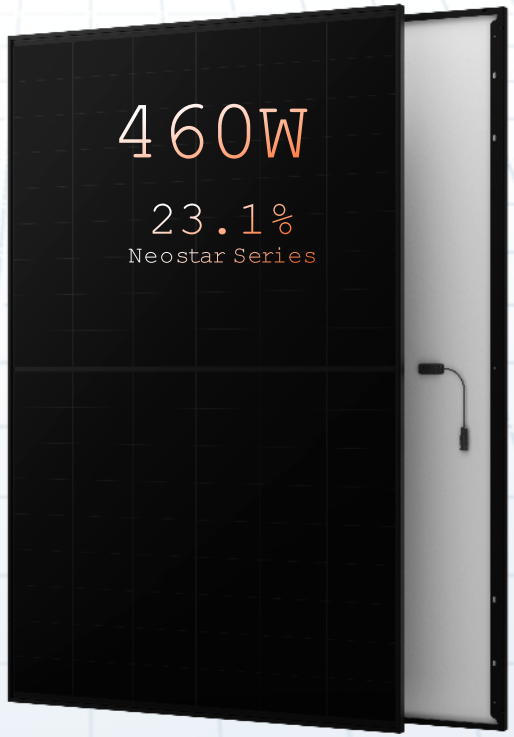
1、Baseline: TOPCon; Installed only 1 module for each type (72P)

2、Location: Guangdong, Zhuhai

Residential Scenario – Europe Products

AIKO-A-MAH54**Mw**
AIKO-A-MAH54**Dw**

54P Monofacial
1757*1134



AIKO-A-MAH54Mb

54P Monofacial Black
1757*1134

AIKO-A-MAH54Db

54P Bifacial Black
1757*1134

≤1%/0.35%

First year/Year by year

-0.26%/℃

Temperature coefficient

Installed Capacity

+4.5%

ABC Payoff

2 months

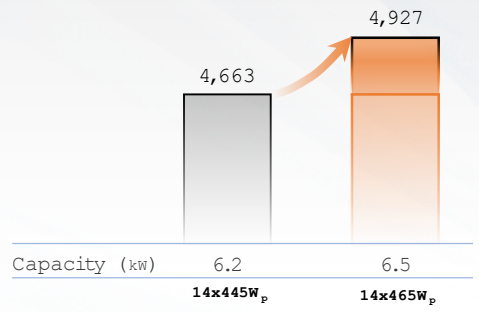
Lifetime Production

+7.5%

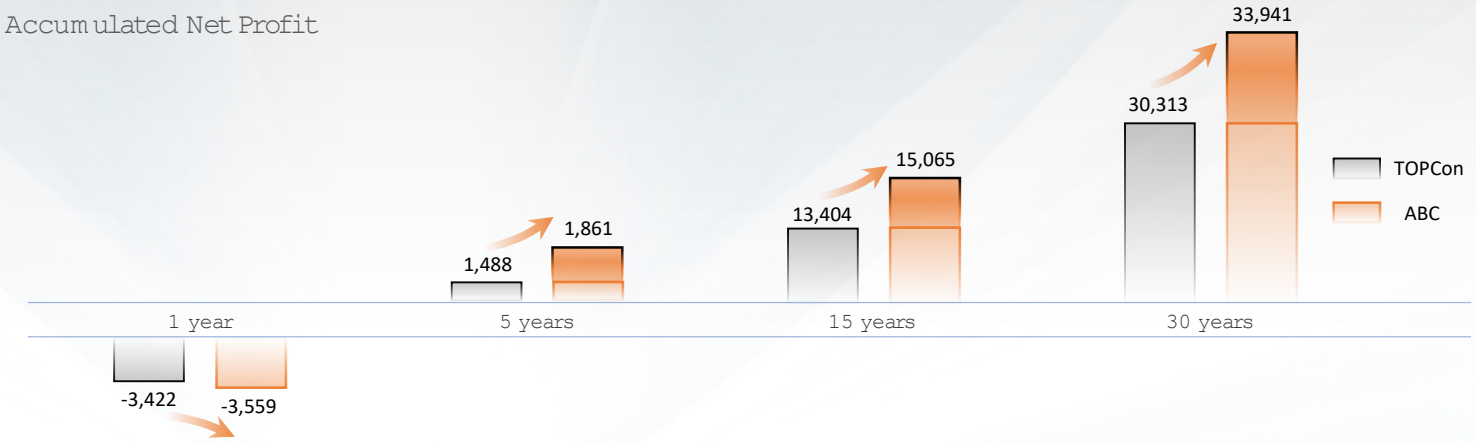
Lifetime Benefits

+ 12.0% / €3,628

Capex (Euros)



Accumulated Net Profit



Remarks:

Location: Arnhem

Household: 4 people (2 adults + 2 kids)

Roof type: Gable roof

Module Inclination: 35°

Orientation: south

Feed-in tariff: 0.051 €/kWh

Electricity price: 0.326 €/kWh (net metering)

C&I Scenario – Products

AIKO-G-MCH72Mw

72P Monofacial
2382*1134

AIKO-A-MAH54Dw

54P
1757*1134

AIKO-A-MAH54Tm

54P Monofacial
1762*1134

≤1%/0.35%

First year/Year by year

-0.26%/℃

Temperature coefficient

Installed Capacity

+6.6%

ABC Payoff

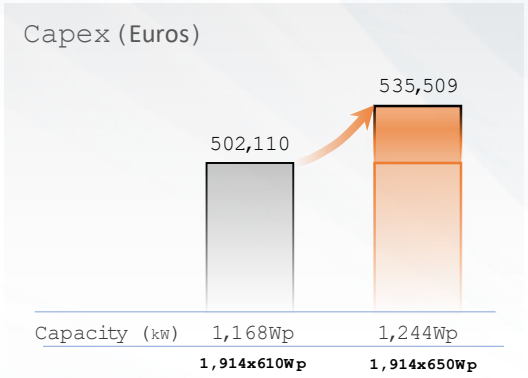
2.7-year

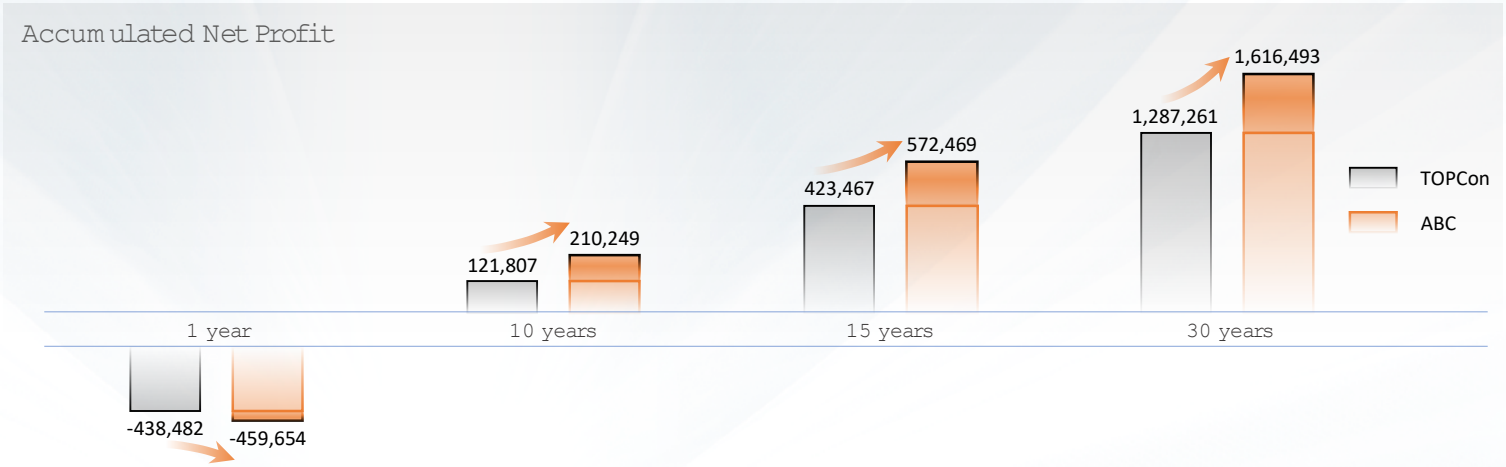
Lifetime Production

+12.7%

Lifetime Benefits

+ 25.6% / €329,232





Remarks:

Location: Utrecht

Roof type: Flat roof

Module Installation: east-west 12°

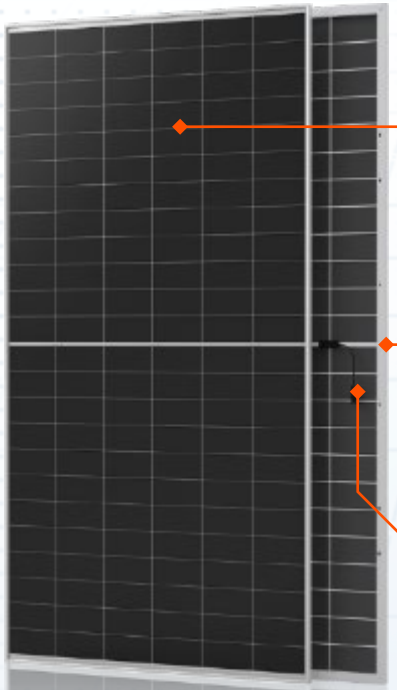
Self-consumption Electricity Price: € 0.11/kWh

Feed-in Electricity Price: € 0.09/kWh

Self-consumption Rate: 41%

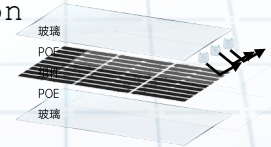
Utility Scenario – Products

Optional additional features for floating PV

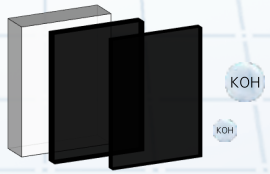


2382*1134*30mm

High water resistance encapsulation technology



Anti-corrosion frame



Waterproof cap

1. Dual Glass
2. Connector MC4 Compatible/MC4
3. Short Cable: 350/-280mm
4. Long Cable 1400mm, 1550mm

645W
Delivered power output

23.9%
Delivered efficiency

70%
Bifaciality

≤1%/0.35%
First year/Year by year

-0.26%/℃
Temperature coefficient

Examples of projects won in Europe:

Netherlands 37 MW
Netherlands 7 MW
Germany 180 MW
Bosnia 58 MW