



LEADING HUMANITY INTO THE CARBON-FREE ERA

AIKO



Solar energy - the source of energy for the Earth



The advancement of human society is closely tied to our ability to improve solar energy utilization. Over the past 2–3 centuries, humanity has consumed much of the solar energy stored on Earth for 4.5 billion years. We must urgently transition to a carbon-free era powered by clean energy. Looking further ahead, we must strive for a negative carbon era—storing energy to support the prosperity of humanity for the next 1.5 billion years. Photovoltaics, which convert sunlight directly into electricity, represent the most crucial carbon-free energy source. Increasing conversion efficiency is a vital mission for everyone in the PV industry.

1.5 million years ago



humans began using fire

500000 years ago



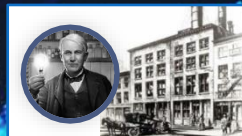
humans learned to create fire manually

1859



Drake drilled out the first commercial oil well

1882



Edison built the first coal-fired power station

1954



Bell Labs invented the first crystalline silicon solar cell

2060



entering the carbon-free era with solar and other clean energies as the primary sources



Negative Carbon Era



Mission and Vision



Mission: Leading Humanity into the Carbon-Free Era

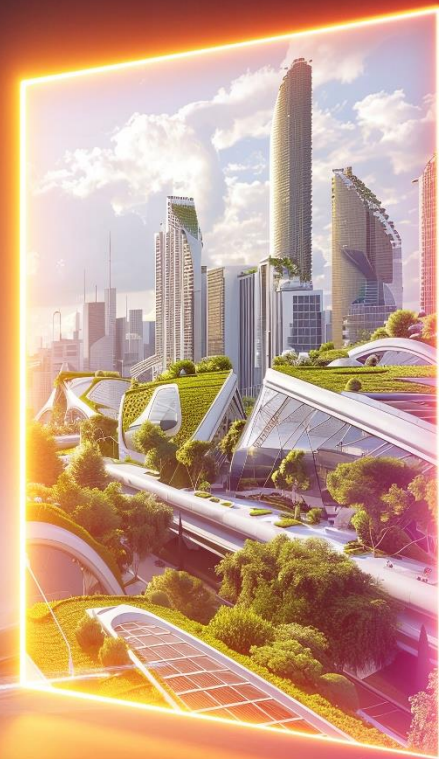
The PV industry, by converting sunlight into electricity, directly harnesses solar energy as a usable power source for humanity. A more prosperous and beautiful zero-carbon ecological society in the future will undoubtedly rely primarily on zero-carbon energy sources, with solar photovoltaic power at the core. The photoelectric conversion efficiency thus becomes a key indicator for humanity's transition to the zero-carbon era. As a pursuer and enabler of extreme photoelectric conversion efficiency, AIKO will accelerate the progression of humanity towards a higher level of civilization and provide zero-carbon energy solutions for future society.

Vision: To be a global leader in the PV industry

Bearing in mind the goal of achieving the ultimate conversion of solar energy through the use of photovoltaic products, over the past fifteen years AIKO has continuously subverted conventional industry perceptions and has led the global photovoltaic industry in every step of its quality development from the P-type era to the N-type era by means of innovation in product R&D, engineering, and manufacture. We strive to make full use of sunlight in every scenario for more energy conversion, make each square of module more powerful and make each watt of module generates more power.

Core Values:

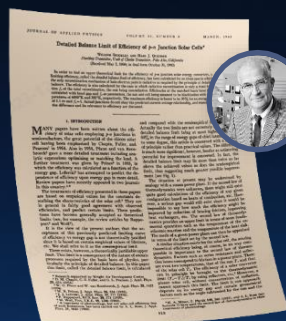
Customer-centric, Contributor-oriented, Long-term Hard Work, Self-criticism, Sustainable Innovation.



So far, crystalline silicon solar technology has dominated the development of the entire solar power industry



ABC technology is the ultimate technology for monocrystalline silicon solar energy, and will continue to support more efficient solar energy technologies in the future



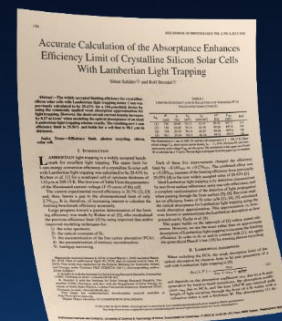
1961

Shockley Semiconductor Laboratory

based on the principle of detailed balance for narrow bandgap (1.1eV) materials

The theoretical efficiency limit of solar cells was estimated at

~30%



2018

Solar Energy Research Hamelin (ISFH)

based on an ideal Lambertian light-trapping model

Revised the theoretical limit of crystalline silicon cells to ~29.4%

~29.4%



Polycrystalline Era

Bell Labs invented the first crystalline silicon photovoltaic solar cell with high conversion efficiency

6%

1954

Sharp in Japan was the first to adopt solar energy on a large commercial scale in 1963, with a conversion efficiency

10%

1963

Wuxi Suntech launched a 10MW polycrystalline production line with conversion efficiency

14.5%

2002

P-type single crystal era

AIKO launched a 5GW tubular PERC production line in 2016, achieving 22% conversion efficiency

22%

2016

N-type single crystal era

N-Type monocrystalline silicon technology began to rise in 2020, with TOPCon and HJT entering the market first. These cells achieved efficiencies

23.5-23.8%

2020

AIKO began supplying the market with N-type ABC modules

2021

Separatech technological innovation and low-cost mass production practice of AIKO ABC



Made significant contributions to the development of the global photovoltaic industry

Principle based technological innovation:

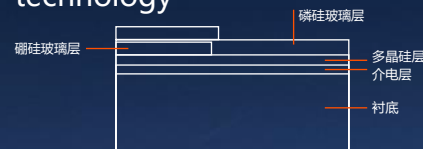
1975

Swartz from Purdue University in the United States invented back-contact (BC) cell technology and achieved 17% efficiency using a one-step fabrication process



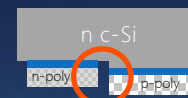
1985

SunPower was founded and began promoting the industrialization of one-step BC cell technology



2016

AIKO pioneered the separatech ABC technology and established a comprehensive intellectual property system



Key innovations in AIKO's ABC mass production journey:

□ Silicon wafer

Ultra-high-resistivity silicon wafers ($>500 \Omega \cdot \text{cm}$), low oxygen content (oxygen impurity concentration $<10 \text{ ppm}$), and high minority carrier lifetime ($>10,000 \mu\text{s}$) meet the stringent quality standards required for BC cells, enabling mass-production efficiency potential beyond 27%.

☐ Cell

Cell structure: all area light reception, all silicon power generation, all electrode passivation, and all back contact configuration — all of which provide the necessary foundation to approach the theoretical maximum efficiency of 29.56%.
Cell patterning: Leveraging femtosecond, picosecond, and sub-picosecond ultrafast laser technologies to enable semiconductor-grade circuit design precision.
Cell metallization coating: Industrial-scale metallization replaces traditional silver paste screen printing entirely, significantly enhancing micro-crack resistance.

☐ module

Invention and application of BC-exclusive features: high-temperature restriction, and partial shading optimization
Full-screen module design: INFINITE modules achieve a 7.2% increase in active area ratio, delivering up to 25.2% conversion efficiency.
Highly reliable OBB architecture combined with laser interconnection enables robust, flexible, and streamlined module assembly.
High bifaciality: BC modules reach bifaciality of $80\% \pm 5\%$.



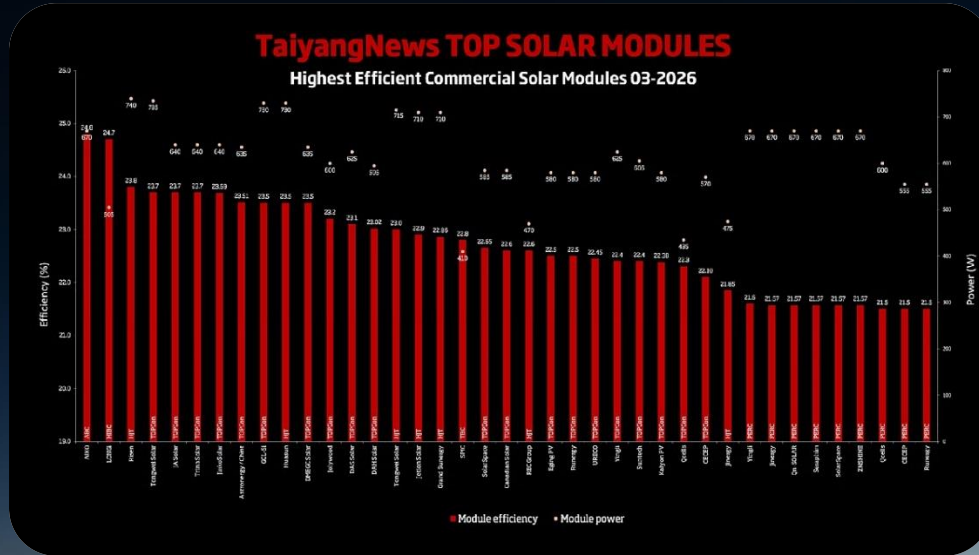
As an early mover on the BC technology path, AIKO has firmly established a leading position in the industry



ABC modules rank **No.1** globally in commercial production efficiency

* AIKO has been ranked No.1 in the TaiyangNews commercial module efficiency ranking since March 2023

The only BC module globally using copper electroplating



About AIKO



As a global leader in new energy technology, AIKO has been at the forefront of the photovoltaic industry for 17 years. Through continuous disruptive innovation, we have consistently set new benchmarks for the industry. AIKO is committed to dedicating research and development, as well as refining marketing strategies. We provide global customers with highly efficient and reliable ABC cells, modules, and scenario-based solutions. Our cumulative shipments of cells and modules have reached 190 GW, making us the top choice for high-end customers in various scenarios around the world.



190GW+

Cumulative Shipments



10,000+

Employees Globally



20%

R&D Ratio



3

R&D Centers



20+

Global Branches

- Global Branches
- Production base
- R&D platform

Netherlands

France

UK

Portugal

Spain

Germany

■ Brazil

■ South Africa

Solarlab AIKO Europe

Poland

Italy

Chuzhou

TianJin

Jinan

Zhuhai

Zhuhai R&D Center

Foshan

Yiwu

Yiwu Photovoltaic Center

Korea

Japan

■ Australia

AIKO is dedicated to advancing product technology and manufacturing engineering, with a strong emphasis on enhancing photoelectric conversion efficiency. We strive to deliver PV products with WNo.1 efficiency and WNo.1 quality to global customers.



Make full use of sunlight in every scenario for more energy conversion



Make each square of module more powerful



Make each watt of modules generates more power

Product Technology Innovation



From the P-Type era to the N-Type era, AIKO has consistently led the industry in technological innovation; Our groundbreaking N-Type ABC technology, mass-produced for the first time globally, has revolutionized the entire value chain from wafers to cells and modules, keeping pursuing a record-breaking PV conversion efficiency of 29.4% for monocrystalline silicon cells.

Zero Carbon Society

In collaboration with Burgenland Electricity, accelerating the achievement of carbon neutrality in Burgenland, Austria

Launched ABC Infinite module, with module efficiency 25%+

2024

Invented ABC technology with a bi-faciality rate reached 70%

2023

ABC module officially released, with module efficiency 23.50%

2022

ABC cell officially released, cell efficiency 26%+

2021

Invented and mass-produced 210mm cell
Invented and mass-produced 166mm cell

2019

Invented tubular PERC technology
Invented bifacial tubular PERC technology

2016

R&D investment

451mn\$+

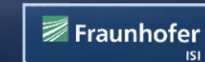
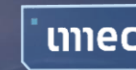
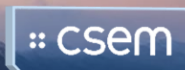
R&D investment in recent 3 years

3

R&D Centers

1000+

Patents



Eight partner laboratories worldwide

Zhuhai-AIKO R&D Center



Yiwu-Global Photovoltaic Joint Innovation Center



Freiburg Germany-Solarlab AIKO Europe



Manufacturing Engineering Innovation



Guided by our philosophy of redefining PV module manufacturing, AIKO continues to lead the industry in intelligent manufacturing breakthroughs. Through comprehensive innovation in equipment, processes, and procedures, we are pioneering the "zero-carbon smart factory" model.

Zero Carbon Society

- 
- 2024** ■ Jinan Zero-Carbon Green Factory
100% green electricity | 90% water recovery | 30% waste heat recovery
 - 2024** ■ Unveiled ABC INFINITE modules utilizing mass production technologies like invisIRibbon, ZeroGap, 0BB cells, etc
 - 2023** ■ Zhuhai AIKO completed as the world's first smart factory integrated with 10GW cells and modules
 - 2022** ■ Zhuhai AIKO mass produced with silver-free metallization technology, utilizing aerial transmission to further enhance production efficiency
 - 2017** ■ The world's first 5GW-scale automated PV cell factory
Pioneering photovoltaic flexible production by being the first to connect process machines through AGVs (Automated Guided Vehicles)
Inventing AI-powered automatic quality inspection technology to elevate the quality standards of photovoltaic products



Six major production bases

📍 Zhuhai



📍 Yiwu



📍 Tianjin



📍 Foshan



📍 Jinan



📍 Chuzhou



ABC module series designed for specific scenarios



AIKO possesses profound insights into the unique challenges and requirements of diverse photovoltaic application scenarios.

Residential Scenario

Ultimate Efficiency. Premium Aesthetics. Ultra-Safety.



Gen 3 INFINITE

Gen 2

Neostar Series



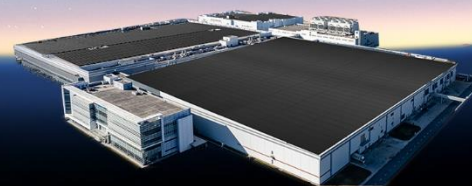
C & I Scenario

Powerful Green Energy. Higher Returns. Ultra-Safety.



Comet Series

Nebular Series

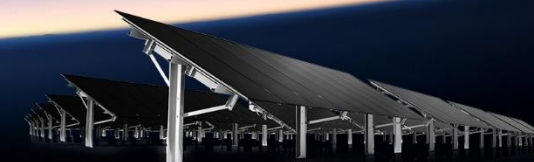


Utility Scenario

Higher Power. Lower LCOE. Reliable Performance.



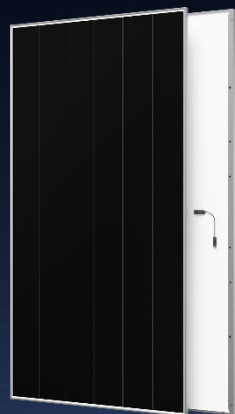
Stellar Series



Scene-Based Advantage I: Higher Output



25% efficiency modules scheduled for delivery starting Q3 2025



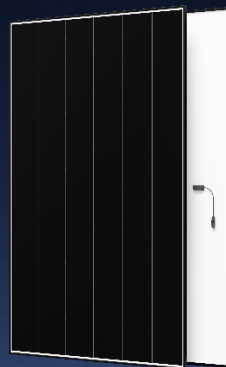
Comet series

680_w

25.2%

Comet 3N72

AIKO-A680-MDE72Mw
2382*1134*30mm



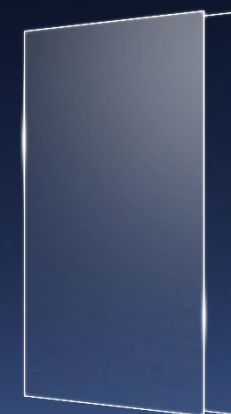
Neostar Series

500_w

25.0%

Neostar 3P54

AIKO-A500-MCE54Mw
1762*1134*30mm



Neostar Series

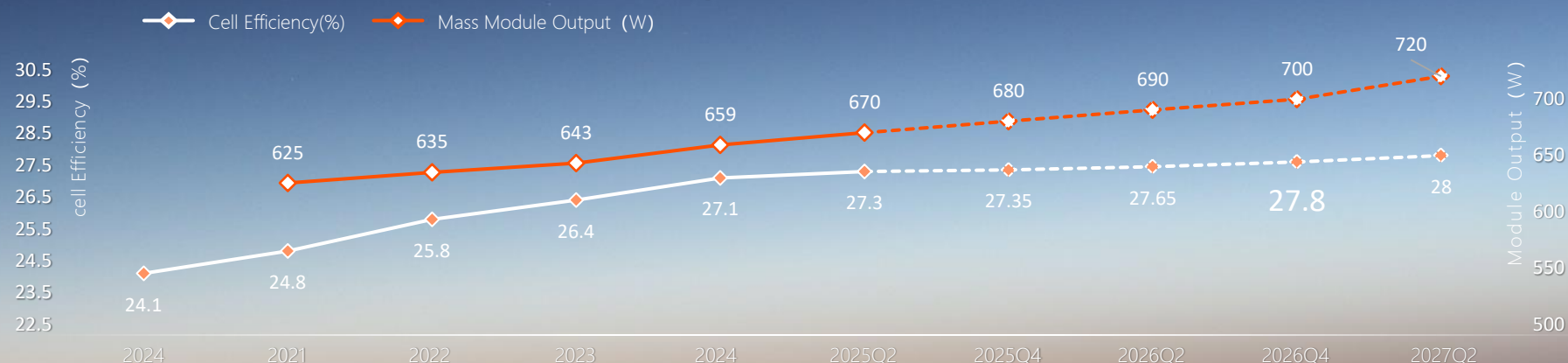
805_w

25.1%

Neostar 3N78

AIKO-A805-GTE78Mw
2465*1303*33mm

ABC module three-year mass production power improvement chart

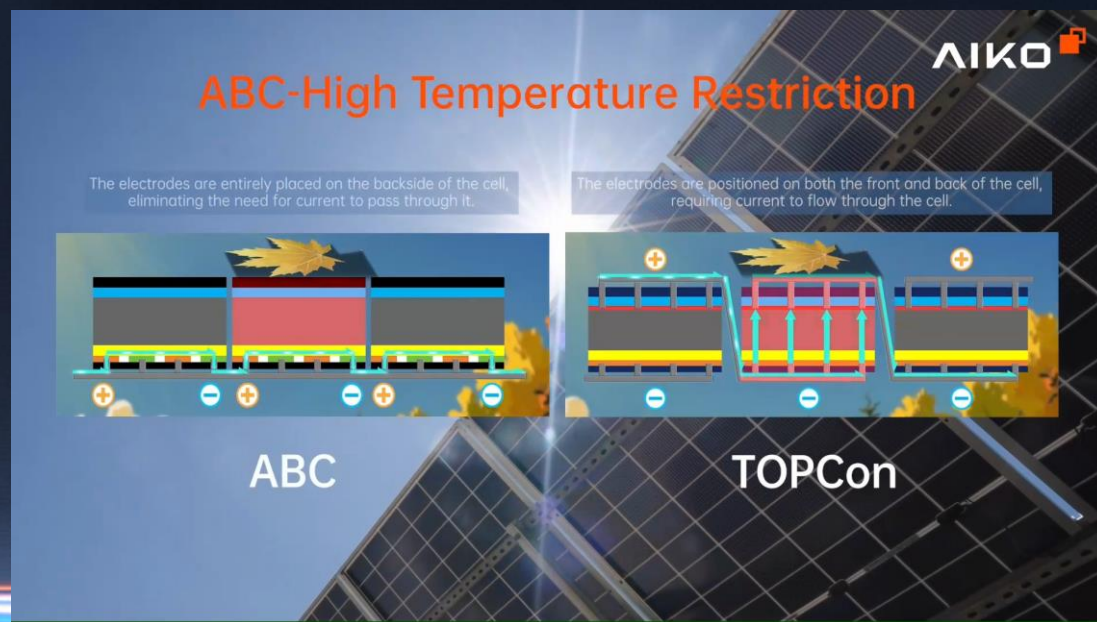


Scene-Based Advantage II: Enhanced Safety



Dao Li Yi Yi, safe and sound" — from Yi Lin, referring to both human and environmental safety

ABC High-Temperature Restriction Principle — Video Demonstration



At around 2:00 PM on May 21, 2025,
a fire broke out on top of the sound barrier along
the South Hongmei Road elevated expressway in
Shanghai, near the entrance to the tunnel



Scene-Based Advantage II: Aesthetics



"Beauty is the perfection of sensory cognition." – Baumgarten, Father of Aesthetics

TOPCon Residential Scenario

TOPCon Module



TOPCon Cell

ABC Residential Scenario



ABC Cell

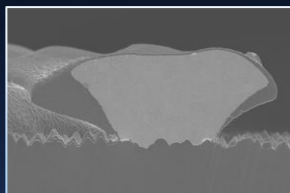
ABC Full Black Module

Scene-Based Advantage IV: Power Generation Despite Micro-cracks

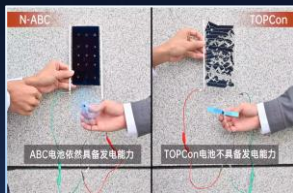
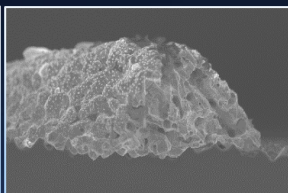


The world's only supplier of dual-glass modules with anti-microcrack, high-tensile copper interconnection

SEM Image of Copper Electrode



SEM Image of Silver Electrode

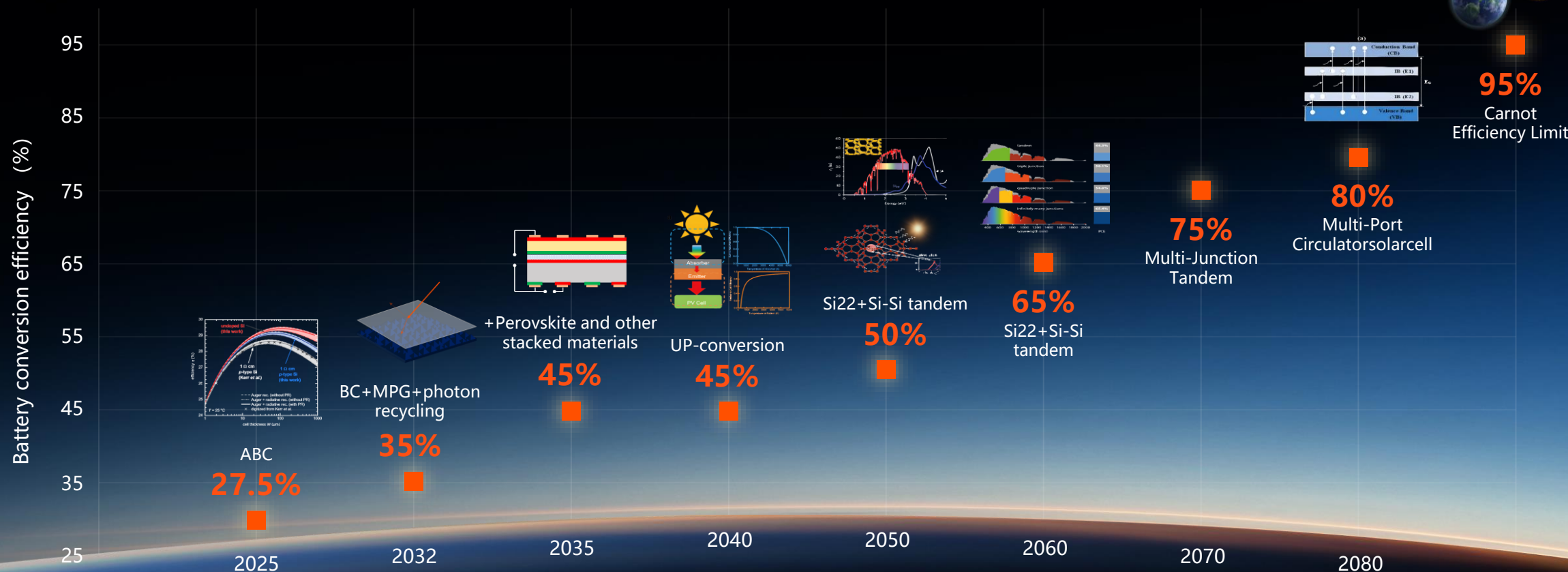


Yantai CPVT offshore field test: cumulative energy gain of 4.67% per kW **4.67%**

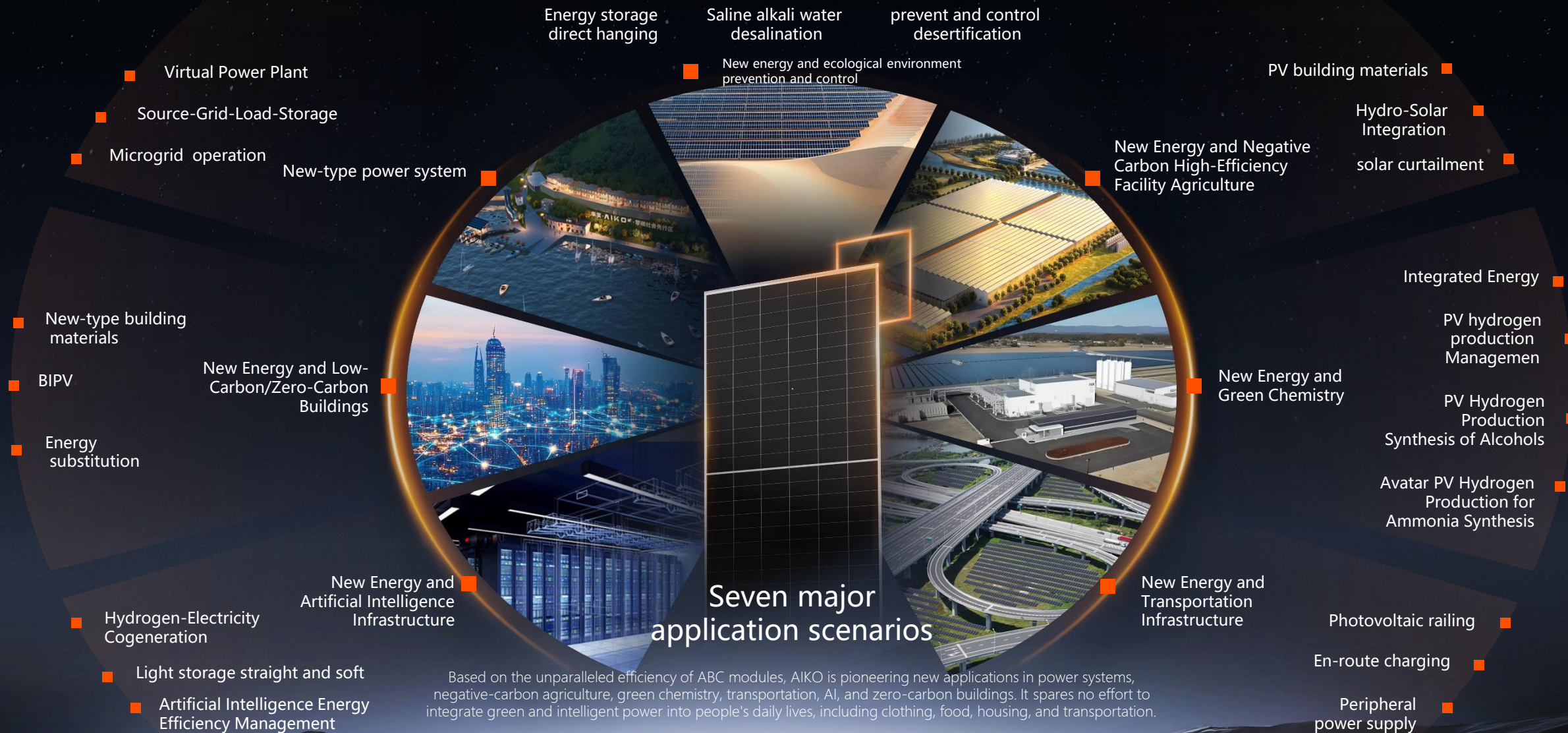
Power Generation Gain Trend per kW



Historical Progression of Solar Energy Conversion Efficiency in Human Civilization



AIKO Solar + New Application Scenarios





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