Completely
Clean Energy

Company Introduction

Energetik Energija d.o.o. – Zagreb 27/5/2025

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Hanwha

Hanwha is South Korea's seventh-largest business group with innovative business in the areas of clean energy&ocean solutions, aerospace&mechatronics, finance, and retail&services.

FORTUNE 500

Clean Energy & Ocean Solutions, Aerospace & Mechatronics, Finance and Retail & Services

Main Industries

Total Sales (2023)

USD 61.3 Billion

Total Assets (2023)

USD 181.2 Billion

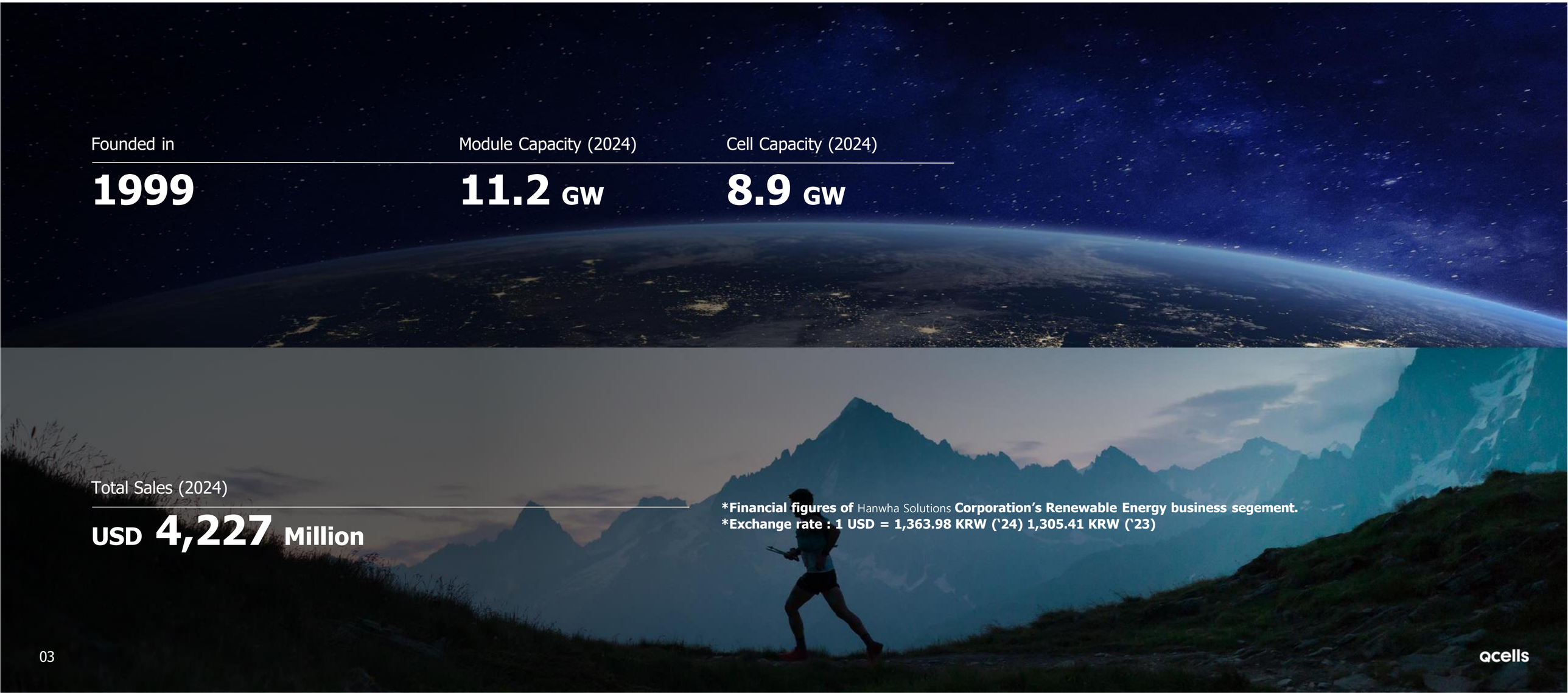
Founded in	Domestic Affiliates	Global Networks
1952	**103** (As of end of 2023)	**776** (As of end of 2023)

Fortune Global 500 ®	Business Enterprise in South Korea
372 (As of 2024)	**7** (Total asset basis, as of end of 2023)

(Source : Hanwha **Profile 2024**)

qcells

Qcells is a global leading and fully bankable energy solutions provider with more than 20 years of history and financial stability.



Founded in

1999

Module Capacity (2024)

11.2 GW

Cell Capacity (2024)

8.9 GW

Total Sales (2024)

USD 4,227 Million

***Financial figures of** Hanwha Solutions **Corporation's Renewable Energy business segement.**
***Exchange rate : 1 USD = 1,363.98 KRW (`24) 1,305.41 KRW (`23)**

Global Network

Qcells works closely with global R&D and manufacturing sites
to deliver the highest level of quality in manufacturing, sales and support.

1

Headquarters

Seoul, South Korea

4

R&D Centers

Germany, South Korea, U.S.

4

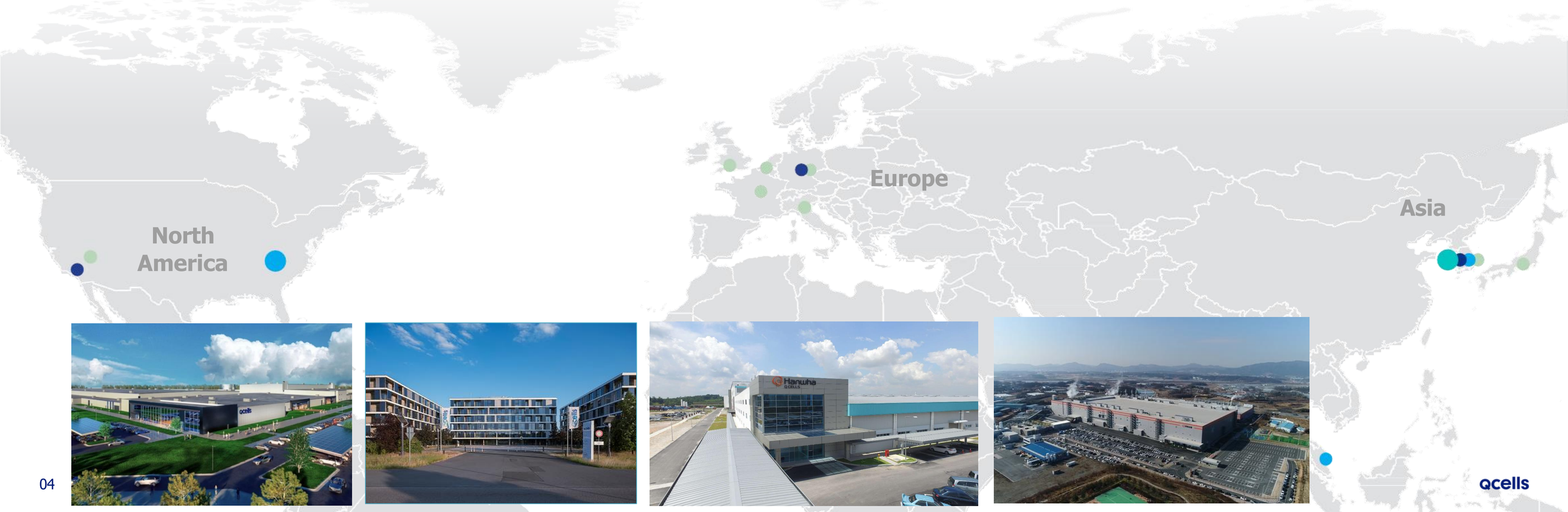
Manufacturing Sites

South Korea, Malaysia, U.S.

8+

Global Sales Network

North America, Europe, Asia and more

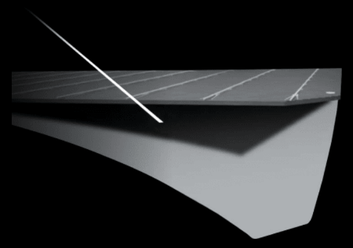


Continuous Advancements in Q.ANTUM Technology

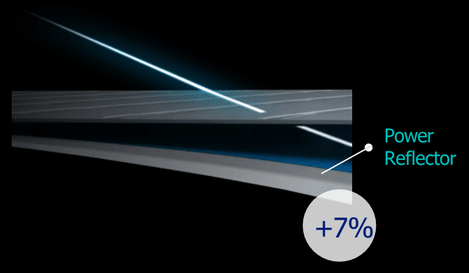
Qcells has continued its technology innovation with its proprietary Q.ANTUM technology evolving to Q.ANTUM DUO (half-cell technology) and further to Q.ANTUM DUO Z (zero-gap technology). Qcells most recently introduced a new era of solar with the advent of Q.ANTUM NEO technology.

1 2012

powered by Q.ANTUM



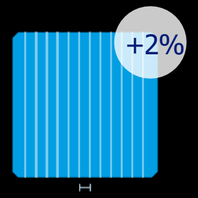
Standard Crystalline Solar Cell



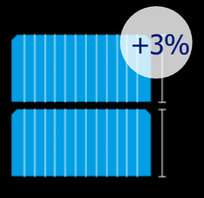
Q.AUNTUM Solar Cell

2 2017

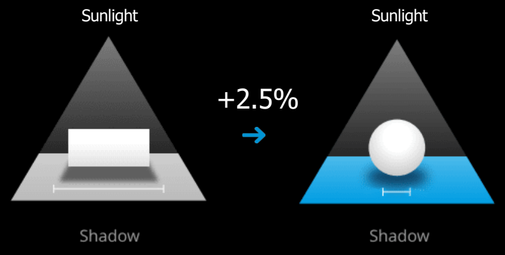
powered by Q.ANTUM DUO



Multi Busbar Technology



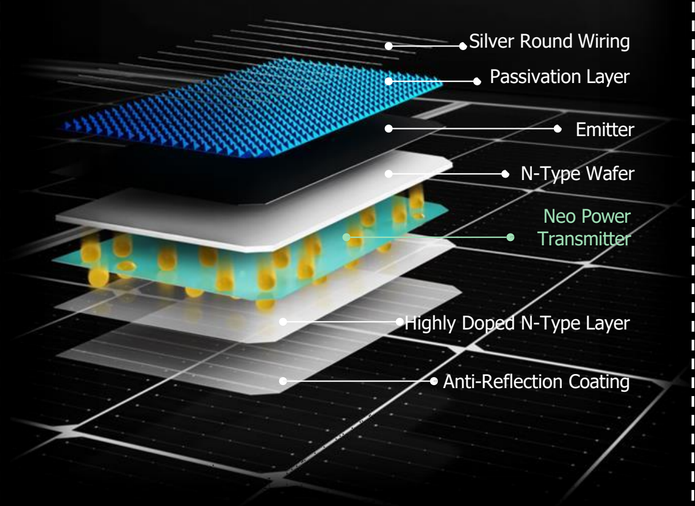
Half-Cell Technology



Round Wire Connection

3 2022

Q.ANTUM NEO

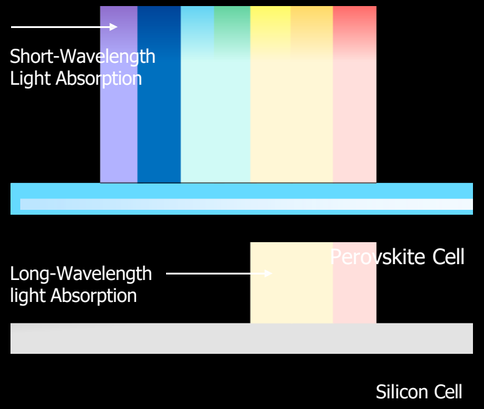


Through the Neo Power Transmitter, more charge carriers can easily reach the back contact with much less recombination losses, which makes for higher efficiency.

4 2026

New

Perovskite-Silicon Tandem Cell



Perovskite-silicon tandem cells incorporate perovskite, a new material used in solar cell technology. The perovskite is added to crystalline silicon bottom cells to achieve high power-conversion efficiency by absorbing light at different wavelengths than the silicon substrate.

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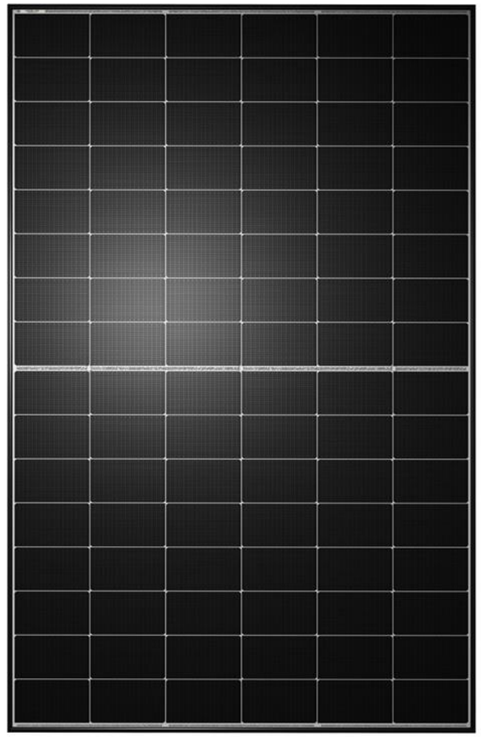
Q.TRON Series (Residential)

Bifacial

96 Half-cells

Q.TRON S-G3R.12+ BFG



Power (Wp)

450-455 from Q2
460 from Q4

Max efficiency (%)

22.8

Dimensions (mm)

1762 × 1134 × 30

Weight (kg)

20.9

TCOE* (% / K)

– 0.30

Warranty

25 YEARS Warranty (Product)

30 YEARS Warranty (Performance)

Product : 25 years
Performance : 30 years
(1° year : 98.5 %, 30° years : 88.93 %

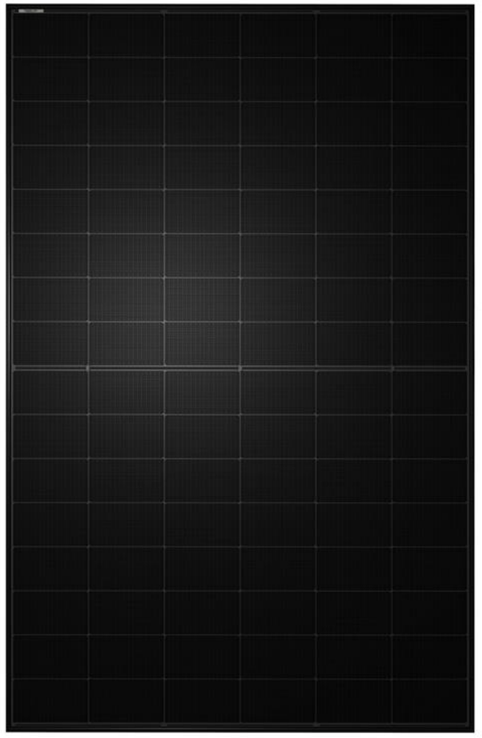
1 Pallet : 36 modules
1 Truck : 1008 modules
Hail test 35mm
Ammonia and salt certification

Bifacial

All-Black

96 Half-cells

Q.TRON BLK S-G3R.12+ BFG



Power (Wp)

440-445 from Q2
450 from Q4

Max efficiency (%)

22.3

Dimensions (mm)

1762 × 1134 × 30

Weight (kg)

20.9

TCOE* (% / K)

– 0.30

Warranty

25 YEARS Warranty (Product)

30 YEARS Warranty (Performance)

Product : 25 years
Performance: 30 years
(1° year : 98.5 %, 30° years : 88.93 %)

1 Pallet : 36 modules
1 Truck : 1008 modules
Hail test 35mm
Ammonia and salt certification

Q.TRON Series (Commercial & Industrial)

Q.ANTUM NEO

Bifacial

108 Half-cells

Q.TRON M-G3R.12+ BFG

Power (Wp)

500-505 from Q2
510 from Q4

Max efficiency (%)

23.2

Dimensions (mm)

1961 × 1134 × 30

Weight (kg)

27.0

TCOE* (% / K)

– 0.28

Warranty

25 YEARS Warranty (Product)

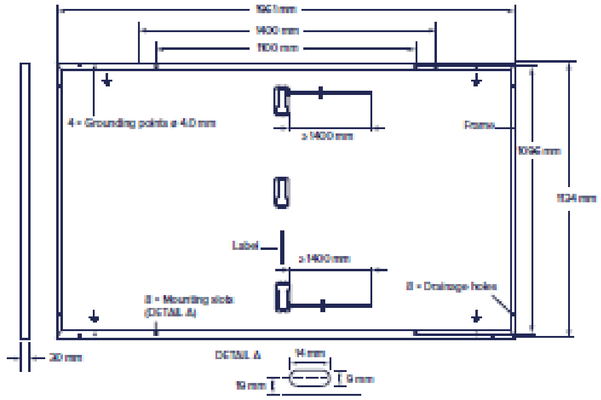
30 YEARS Warranty (Performance)

Product : 25 years
Performance : 30 years
(1° year : 98.5 %, 30° years : 88.93 %)

1 Pallet : 36 modules
1 Truck : 936 modules
Hail test 35mm / 45mm (certification ongoing)
Ammonia and salt certification

Mechanical Specification

Format	1961 mm × 1134 mm × 30 mm (including Frame)
Weight	27.0 kg
Front Cover	2.0 mm thermally pre-stressed glass with anti-reflection technology
Back Cover	2.0 mm semi-tempered glass
Frame	Anodised aluminium
Cell	6 × 18 monocrystalline Q.ANTUM NEO solar half cells
Junction Box	53-67 mm × 28 mm × 17 mm Protection class IP68, with bypass diodes
Cable	4 mm² Solar cable; (+) ≥1400 mm, (–) ≥1400 mm
Connector	Stäubli MC4-EVO2A; IP68



Electrical Characteristics

Power Class			495	500	505	510	515
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC¹ (POWER TOLERANCE +5 W / –0 W)							
Minimum	Power at MPP¹	P_{MPP} [W]	495	500	505	510	515
	Short Circuit Current¹	I_{SC} [A]	15.86	15.89	15.92	15.95	15.98
	Open Circuit Voltage¹	U_{OC} [V]	39.88	40.06	40.24	40.42	40.60
	Current at MPP	I_{MPP} [A]	14.80	14.84	14.88	14.92	14.96
	Voltage at MPP	U_{MPP} [V]	33.45	33.70	33.94	34.19	34.43
	Efficiency¹	η [%]	≥ 22.3	≥ 22.5	≥ 22.7	≥ 22.9	≥ 23.2

Bifaciality of P_{MPP} and I_{SC} 80 % ± 5 % • Bifaciality given for rear side irradiation on top of STC (front side) • According to IEC 60904-1-2
¹Measurement tolerances P_{MPP}, I_{SC}, V_{OC} ± 3 % at STC: 1000 W/m², 25 ± 2 °C, AM 1.5 according to IEC 60904-3

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT²							
Minimum	Power at MPP	P_{MPP} [W]	374.0	378.0	381.0	385.0	389.0
	Short Circuit Current	I_{SC} [A]	12.80	12.83	12.85	12.88	12.90
	Open Circuit Voltage	U_{OC} [V]	37.97	38.14	38.31	38.48	38.65
	Current at MPP	I_{MPP} [A]	11.95	11.98	12.01	12.05	12.08
	Voltage at MPP	U_{MPP} [V]	31.30	31.56	31.73	31.96	32.21

² 800 W/m², NMOT, spectrum AM 1.5

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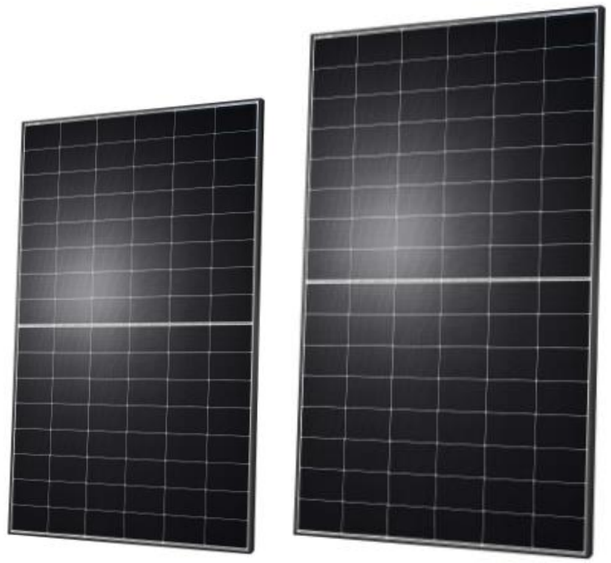
Q.TRON Series (Commercial & Industrial)

Q.ANTUM NEO

- Specific module for new construction and revamping C&I systems.
- The Q.TRON G3 bifacial modules capture the light reflected on the back, ensuring an increase in production that can vary between 5 and 10% more than a classic monofacial module depending on the albedo.
- The increase in production that the Q.TRON G3 module can guarantee is a highly appreciated advantage in C&I systems, which makes them versatile for different types of installations: **flat roofs with reflective surfaces**, **pv canopies**, **agrivoltaic installations, floating systems or integrated into building facades.**



Qcells offers installers and consumers added value through an extended 25-year product warranty ensuring long-term safe operation and a 30-year efficiency guarantee.

25 YEARS Warranty (Product)

30 YEARS Warranty (Performance)

Product : 25 years
Performance : 30 years
(1° year : 98.5 %, 30° years : 88.93 %)

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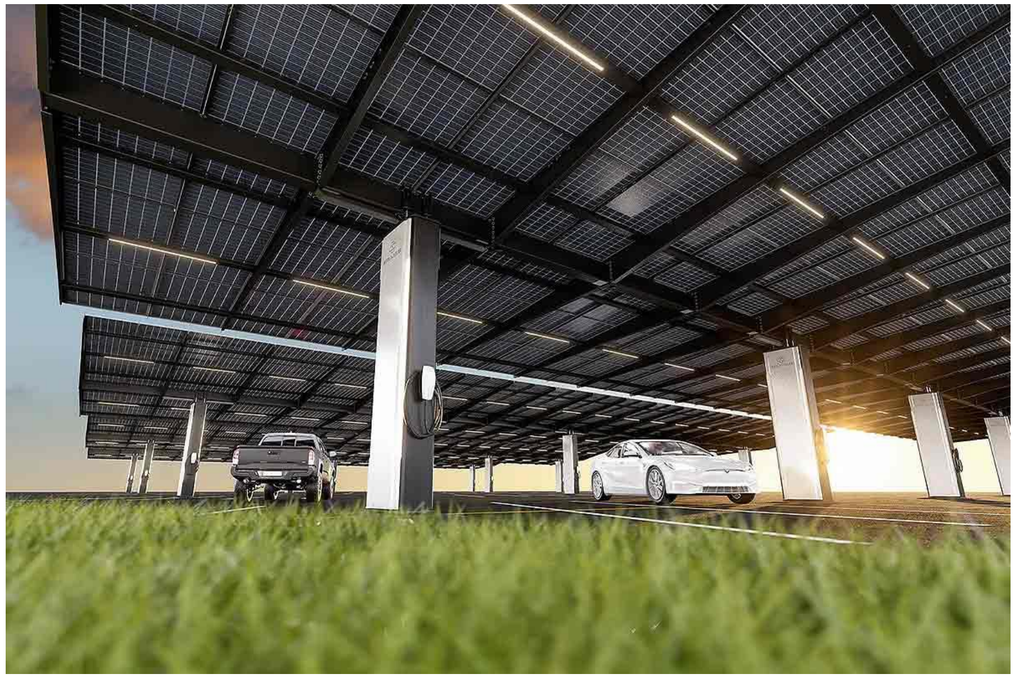
Bifacial PV system on flat roof

Maximizes energy production and improves efficiency, offering both economic and practical benefits.

Double-sided PV system on a canopy



It maximizes the use of available space, represents an innovative and sustainable solution for charging electric cars, also contributing to a more efficient and sustainable energy production.

Bifacial agrivoltaic PV system

Maximizes land use and increases the profitability of agricultural activities.

Reflective terrain (such as soil or crops) can further contribute to energy generation.

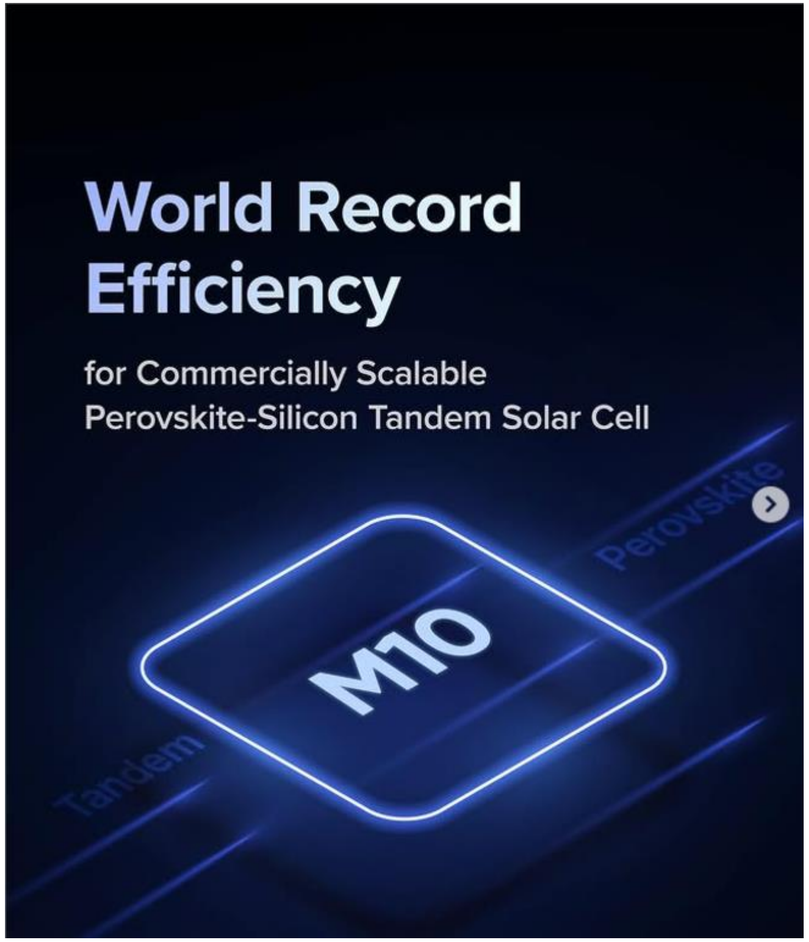
Combines energy production with agriculture, allowing the same land to be used for both activities.

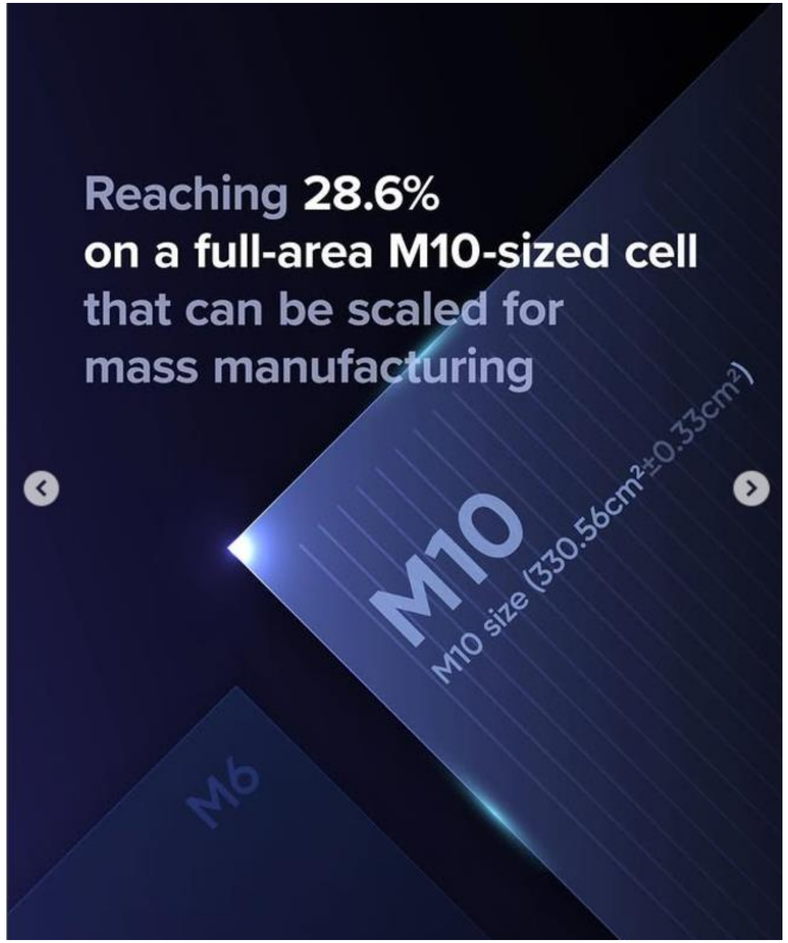
Reduces water and heat stress, resulting in higher crop yields, especially in areas with hot climates.

Bifacial PV system with solar tracker / new or to be revamped

Increased energy production by 20-40% compared to a fixed system

Potential increase in energy production by 30-50% depending on site specific conditions and ground reflectance thanks to bifacial technology.





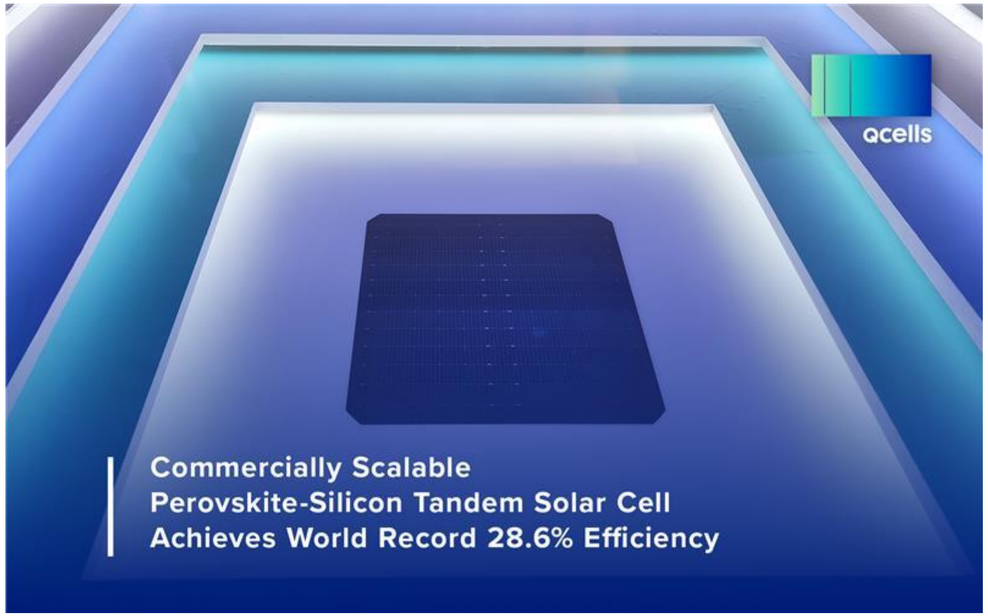
Perovskite Technology Development 2026 – 2027 (+16% more efficient than TOP Con and HJT modules)

Qcells achieved a breakthrough tandem solar cell efficiency of 28.6% on an M10 cell, independently verified by Fraunhofer ISE thanks to R&D in South Korea and Germany

Market Presentation Q3 2026 – Commercialization Q4 2026 – Q1 2027 – Made in South Korea (Jincheon)

Focus Markets: Europe, US, Japan, South Korea

>$100 million investment for series production of perovskite and silicon tandem cells (dream solar cells).



Qcells' tandem cell technology features a 2-terminal device architecture, which is composed of a perovskite technology top layer and silicon bottom layer featuring Qcells' proprietary Q.ANTUM technology.

The core of this latest achievement by Qcells involves successfully passing the most critical stress tests for solar cell reliability according to International Standards IEC 61215-2:2021 and UL 61215-2:2021, these include the :

UV preconditioning test for 15kWh/m^2 (MQT10; UV15)

Thermal cycling test for 200 cycles (MQT11; TC200)

Humidity-freeze test for 10 cycles (MQT12; HF10)

Damp heat test for 1000h (MQT13; DH1000).

These stress tests have been successfully passed by fulfilling the tandem-specific requirements for power measurements as specified in International Standard IEC TS 60904-1-1 for multi-junction modules.

QCells' Strengths Compared to Other Players

A long tradition in the European market since QCells was founded 26 years ago in Germany

BNEF Tier 1* Producer (listed since 2017)

It is a subsidiary of Hanwha Solutions, which is listed on the South Korean stock exchange (KOSDAQ since 2020)

It is part of Hanwha Group which is ranked in the Fortune Global 500 ® (#372 Rank) a multinational company with a strong global network of affiliates, enabling it to leverage synergy to provide solutions and innovations for sustainable growth across all industries.

Hanwha Group has been named to TIME's 100 Most Influential Companies 2024 list for its commitment to technological innovation, developing advanced solutions in renewable energy, aerospace, marine and defense.

Pioneers in the development of new tandem technology with perovskite.

It has a global manufacturing footprint: United States, South Korea, Malaysia.

QCells offers up to 30 years of performance guarantee with the support of its parent company Hanwha Group, which is present in many sectors and has a global turnover of over $60 billion per year.

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* BNEF (Bloomberg New Energy Finance) classifies module manufacturers that are considered to be of high quality and financial stability, which must meet certain criteria, such as production capacity, financial strength and reliability.

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