Company Introduction Brochure 2022

Completely Clean Energy

Qcells

Our mission

We aim for a greener tomorrow with completely clean energy solutions.

About Qcells

We Value Long-term Partnership

Qcells is a renowned COMPLETE energy solutions provider in solar cells and modules, energy storage solutions, downstream project business, and distributed energy solutions business.
It is headquartered in Seoul, South Korea and Thalheim, Germany with four global R&D centres and diverse international manufacturing facilities in the U.S., South Korea, Malaysia and China.

Qcells has a strong heritage that dates back to its foundation in Germany in 1999, when it began as a true pioneer of advanced solar cell technology. Since then, Qcells quickly became one of the solar industry's leaders for its technology innovations.

As an affiliate of Hanwha Group, a Fortune Global 500 company and the seventh largest conglomerate in South Korea with total assets over $197 billion, Qcells is both a trusted and bankable renewable energy partner for our customers worldwide.

In addition to our Tier 1 Bloomberg rating and recognition as a BNEF Top Tier module supplier, our module production capacity of 12.4 GW makes us one of the largest solar solutions providers in the world.

Facts & Figures

Company Foundation

1999

Module Capacity (2021)

12.4 GW

Total Sales (2021) *

USD 9,371 Million

Operating Profit (2021) *

USD 644 Million

*Financial figures of Hanwha Solutions Corporation, the mother company of Qcells
*Exchange rate: 1 USD = 1,144.42 KRW

Strong Backing From Hanwha Group

Foundation

1952

Affiliates

80

Global Networks

469

Fortune Global 500 Company

277

7th Largest Conglomerate in South Korea

7

About Qcells

Complete Energy Solutions Provider

Qcells is a renowned complete energy solutions provider in solar cell and module, energy storage, downstream project business and energy retail. Qcells has a long history and deep know-how in the solar industry.

Our technology is regularly recognized as a top quality and our brand is the top choice for global customers. With our expertise, we are now moving forward in providing total energy solutions for each of the energy market segments including residential, C&I and utility sectors.

Solar Cell & Module

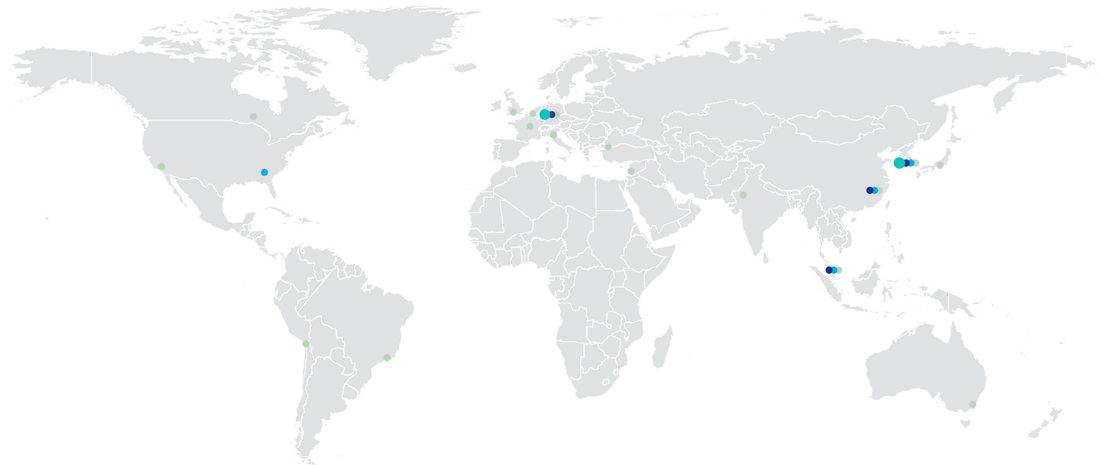
System Solution

Green
Energy Solution

Distributed
Energy Solution

Global Network

2 Countries	4 Countries	4 Countries	60+ Countries
Headquarters	**R&D Centers**	**Manufacturing Sites**	**Sales Network**



World Wide Recognition

TOP Brand PV

9 consecutive years in EU
7 consecutive years in Australia
1st in the US (2022)

LIFE & LIVING Award

Germany's most popular provider for 3 consecutive years

Highest Reputation Award

2 consecutive years

TOP Performer

7 consecutive years

QCPV

Quality Controlled PV

Intersolar Award

Q.PEAK RSF L-G4.2 (2017)
Q.PEAK DUO-G5 (2018)

Solar+Power Award

Q.PEAK DUO-G5 (2017)
Q.FLAT-G5 (2018)

* Applied to selected Qcells' modules.
Contact your sales representatives for further information.

About Qcells

Our History

Qcells has a strong heritage that dates back to its foundation as Qcells AG in Germany in 1999, when it began as a true pioneer of advanced solar cell technology. Since then, Qcells quickly became one of the solar industry leaders for its technology innovations. Today, Qcells is one of world's top Silicon Module Super League members.

We are the only solar company in the world with 4 global R&D networks, 4 manufacturing plants in Korea, China, Malaysia, and US, and a sales network in more than 60 countries worldwide. Our comprehensive business portfolio includes solar cells and modules, energy storage systems, downstream project business and energy retail.

Qcells Milestone

2022
- Launch of Q.ANTUM NEO technology
- Becomes the largest shareholder of REC Silicon, which operates hydropower-based polysilicon manufacturing facilities in the US.

2021
- Acquires one of the world's largest independent renewable energy companies RES France.

2020
- Qcells aquires GELI expanding its offering in integrated energy storage solutions
- First solar module manufacturer to pass new QCPV certification

2019
- Inaugurated the largest module facility in western hemisphere (1.7 GW, USA)
- Launch of Q.ANTUM DUO Z technology
- Began energy retail business

2018
- "Contracting for Solar Systems" offered for the first time

2016
- Launched energy storage system business

2015
- World-record efficiency of 19.5% in multicrystalline module
- Signed 1.5 GW module* supply agreement with NextEra

* In the Back to the Future Movie, the DeLorean time machine is a time travel device made by retrofitting a DMC DeLorean vehicle with a flux capacitor. The car requires 1.21 GW of power and needs to travel 88 miles per hour (142 km/h) to initiate time travel. In real life, if you account 1 GW for uneven use and especially for distribution loss, 1 GW could realistically power 300,000 homes.

2012
- World-first company to commercialize PERC technology *

* PERC tech essentially enables to improve light capture near the rear surgace and to optimize electrons than standard solar cell tech.

2011
- World-record efficiency of 19.5% in multicrystalline cell

2010
- Introduces world-first full-square monocrystalline cell

2008
- World's first company to ensure Hot-Spot-free cells with Hot-Spot Protect

2004
- Set new standard with Q6L 6-inch cell

2001
- Set new standard with 6-inch monocrystalline cell

1999
- Qcells AG was founded in Germany

Quality Management

The Four Quality Levels

Considering that solar modules have a long lifespan over 25 years, quality is one of the most important factors when you select the brand and the product.

All Qcells' products, engineered in Germany, pass strict quality program which consists of four levels.

Level 1
Initial Certification

The Basic Requirement for Commercial Solar Modules

To guarantee the electrical safety and construction of the modules, Qcells' modules get initial certification, such as IEC and UL, from external institutes.

Level 2
Yield Security

The Most Trustful Cell Technology

Qcells Yield Security and Advanced Yield Security ensures long-term reliability of modules.

Qcells Yield Security
- Anti PID
- Anti LID
- Hot-Spot Protect

Qcells Advanced Yield Security
- Advanced Anti PID
- Advanced Anti LeTID
- Hot-Spot Protect
- Tra.Q™

Level 3
Quality Controlled PV (QCPV)

The World's First to Pass Quality Controlled PV

Developed by TÜV Rheinland, QCPV is the strictest and most extensive testing program available in the industry. Along with that, it is the only certification in the industry to involve independent and random onsite testing as well as regular components and materials audits.

Level 4
Initial Quality Test

Uncompromising Testing Standard for the Ultimate Quality

Qcells' Internal Quality Test Program (IQT) ensures that all products meet high quality standards. As a leader in product quality, Qcells applies up to 3 times stricter testing standards than the global standard.

Quality Controlled PV TÜV Rheinland Seal

Qcells is the first solar module manufacturer in the industry to pass TÜV Rheinland's new Quality Controlled PV (QCPV) certification, the most thorough testing program in the industry.

TÜVRheinland® CERTIFIED
Quality Controlled PV
www.tuv.com
ID 1111232615

For more information

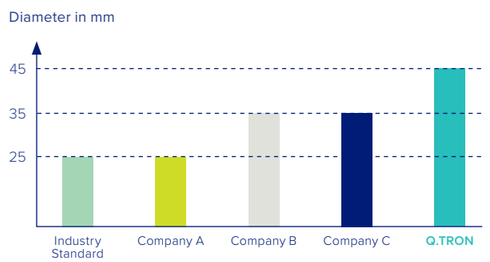
1 Extended Stress Testing Standards
- Over 40 individual tests before production and after any changes.
- Up to 3 times stricter than IEC certification standards.

2 Onsite Production Monitoring
- Independent expert from TÜV Rheinland at Qcells sites.
- Samples randomly drawn from production line for testing.

3 Components and Materials Audits
- Supplier audits and material footprint analysis regularly held.
- Before using in production, and regularly during production.

Physical Durability

The physical durability to withstand the external environment is important for any solar installation. One aspect that gives Q.TRON its premium edge is its excellent durability to resist 45 mm hail, larger than the industry standard.



Harvesting Energy Innovation

Continuous Development of Q.ANTUM Technology

Qcells is the world's first company to commercialize the PERC technology, which is now the mainstream of the global solar industry. As a pioneer of solar technology, Qcells has led the great era of PERC, developing its proprietary Q.ANTUM Technology by incorporating PERC and its unique Yield Security features. Qcells has continued its technology innovation, and Q.ANTUM has been evolved into Q.ANTUM DUO mainly with half-cell technology, and Q.ANTUM DUO Z with Zero-gap technology. And now, 2022, Qcells is opening a new era of solar by introducing Q.ANTUM NEO Technology. All of these technology advancements are always backed up by the world's strictest quality testing program QCPV, meeting the reliability customers need.

1 powered by Q.ANTUM

2012

- Advanced PERC Technology
- Yield Security

qcells Yield Security

2 powered by Q.ANTUM DUO

2017

- Q.ANTUM
- Half-cell Technology
- Multi Busbars
- Wire Interconnection

3 powered by Q.ANTUM DUO Z

2019

- Q.ANTUM DUO
- Zero-gap Technology

4 Q.ANTUM NEO

2022

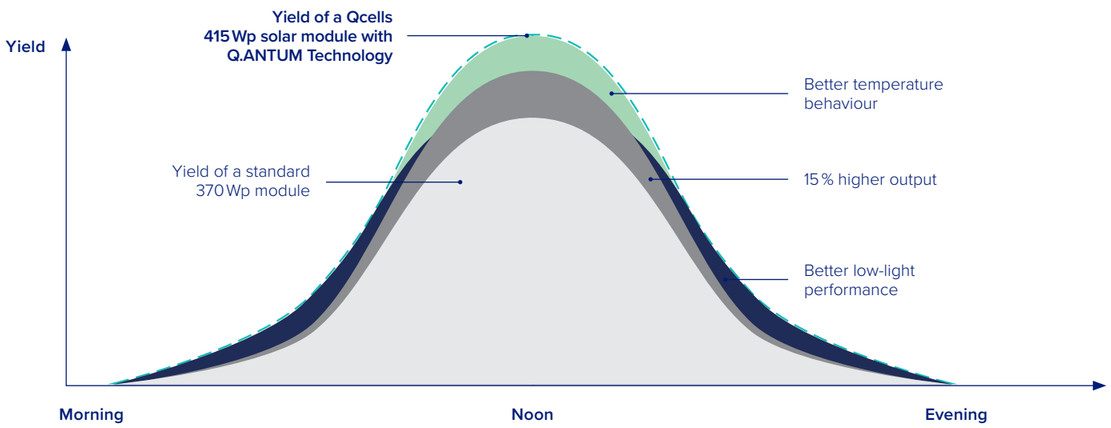
- N-Type cell
- Advanced Yield Security
- Innovative NEO Power Transmitter

qcells Advanced Yield Security

+7.5% +10% +12.7%

*Power Output compared to standard PERC technology solar module

Q.ANTUM Ahead - More Yield, More Profit

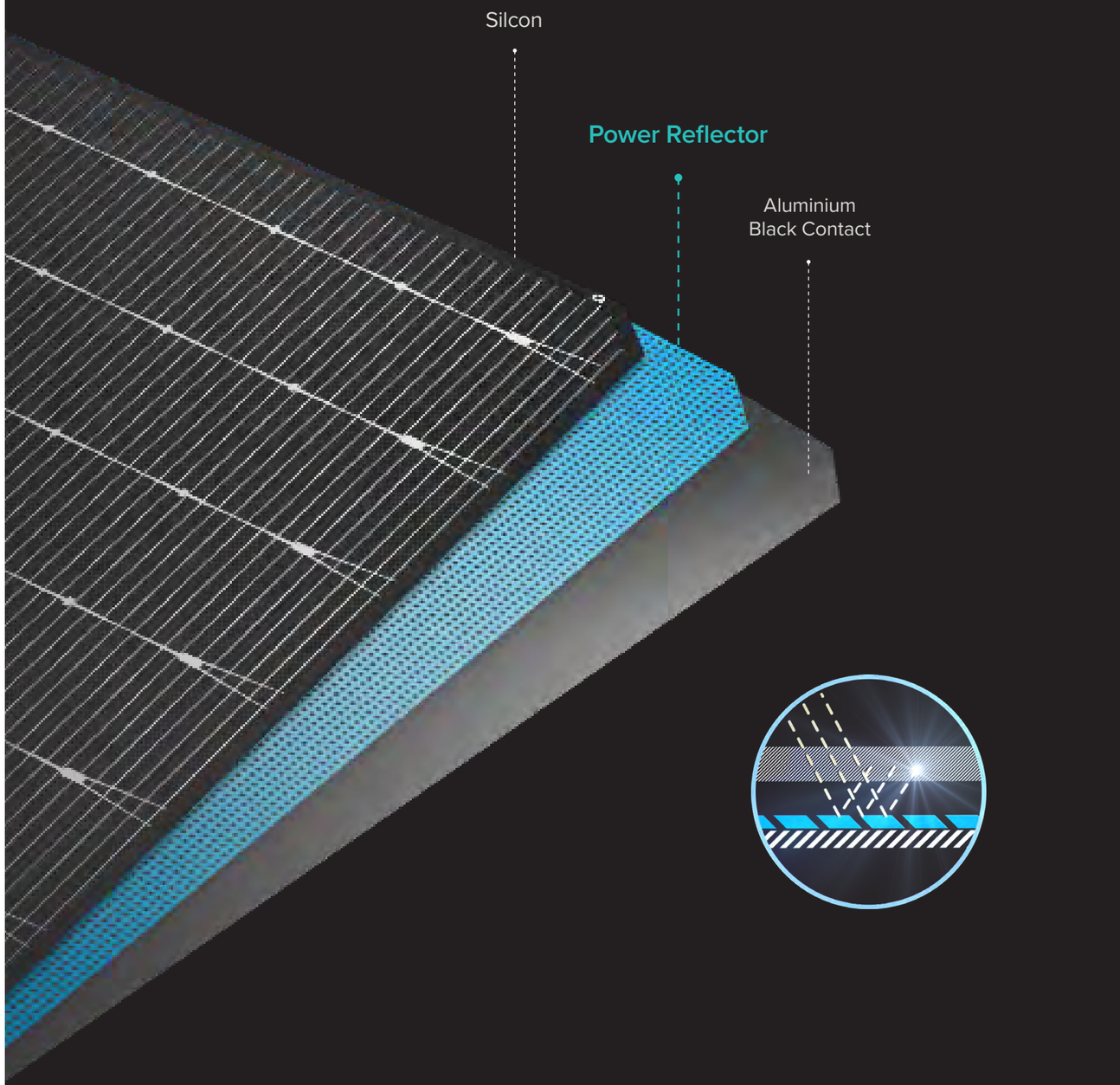


The Q.ANTUM Effect

The foundation of Qcells Technology

Rays of sunlight that would otherwise go to waste are mirrored by the Power Reflector back through the cell to generate more electricity. Laser-fired contacts complement the nano coating to enhance the module's electrical properties, increasing its efficiency considerably.

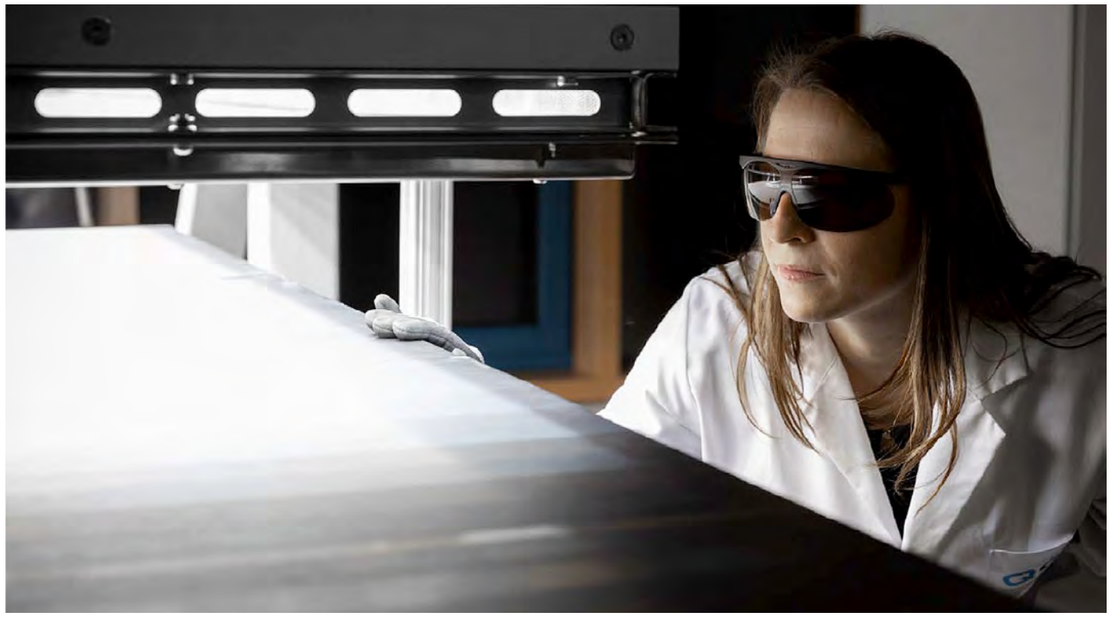
- Higher yields and lower LCOE
- Enhanced temperature coefficient
- Improved low-light behaviour
- Outstanding product reliability
- Best-in-class warranty terms



Ultimate PERC Solar Module

Q.ANTUM DUO Z Technology

Qcells solar modules with Q.ANTUM DUO Z Technology not only deliver impressive performance in real-world conditions, but also offer first-class performance guarantees of 98 % in the first year and a full 86 % after 25 years. The Q.ANTUM DUO Z Technology combines our Q.ANTUM cell with the innovative DUO cell separation method: The use of round connecting wires and zero-gap cell interconnection, which eliminates gaps between cells to allow more effective use of the module space, ensure higher power generation not only in the laboratory but also in everyday operation. Q.ANTUM DUO Z also increases the nominal power and improves the reliability of the module thanks to Qcells Yield Security consisting of Anti PID, Anti LID and Hot-Spot Protect. With more than 30 GW of Q.ANTUM solar cells produced, only Qcells has the experience and knowledge to drive the development of cell and module technology and launch new technologies such as Q.ANTUM DUO Z.



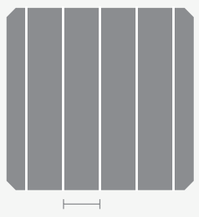
Q.ANTUM DUO Technology

Multi Busbars Technology

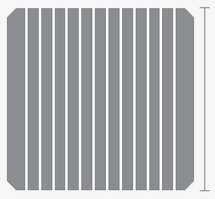
Half-cell Technology

Round Wire Connection

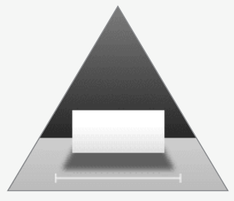
Conventional Technology



Standard 5 busbars



Full-cell Technology



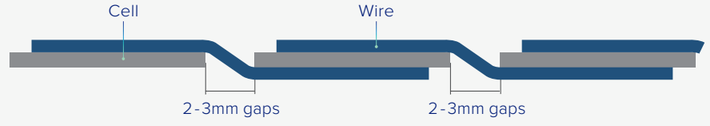
Standard Ribbon

Q.ANTUM DUO Z Technology

Zero-gap Technology

- Gaps between the cells are closed to ensure a more effective use of the module area
- More cells can fit within the module thanks to saved space

Current Industry Standard

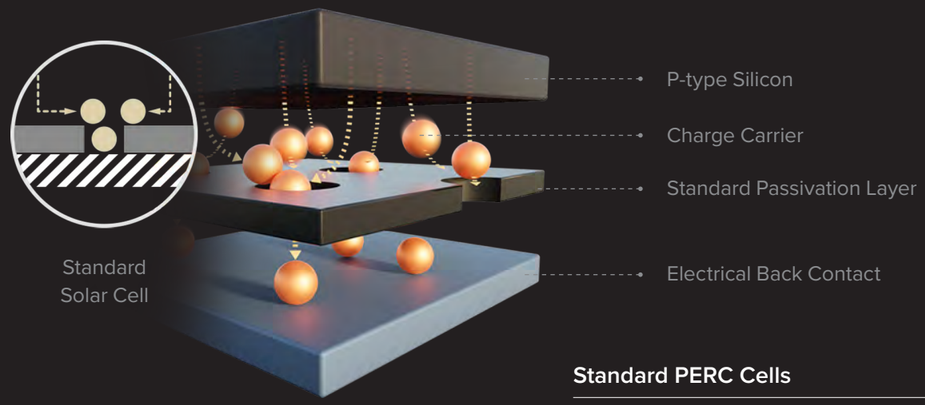


* Q.PEAK DUO BLK-G8 vs Q.PEAK DUO BLK ML-G9

All New N-type Cell Technology

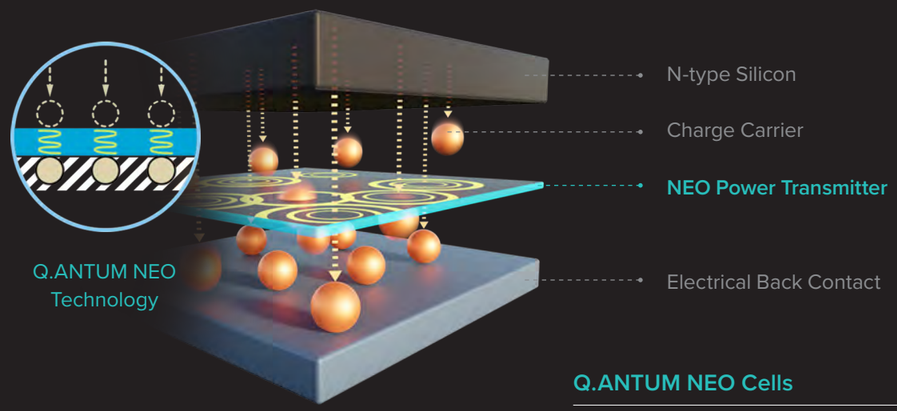
Q.ANTUM NEO

High Power & Efficiency



Standard PERC Cells

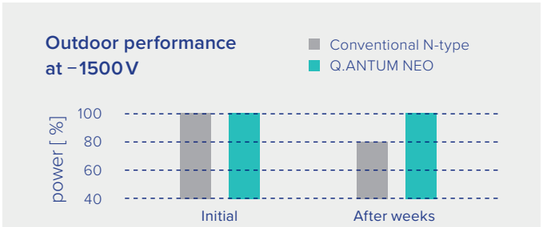
Standard PERC solar cells use a passivation layer with small holes for electrical interconnection of the cell's rear side. Passivation is reduced in the contact area which limits the maximum efficiency.

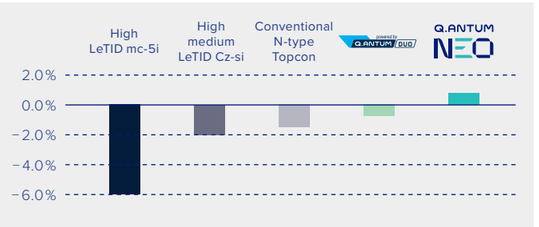


Q.ANTUM NEO Cells

Within Q.ANTUM NEO solar cells, a passivation layer and electrical interconnection functionality are integrated in the NEO Power Transmitter. This allows full area passivation and contact at the same time, thus pushing beyond the limits of standard PERC technology.

Advanced Yield Security





Advanced Anti-PID (APT)

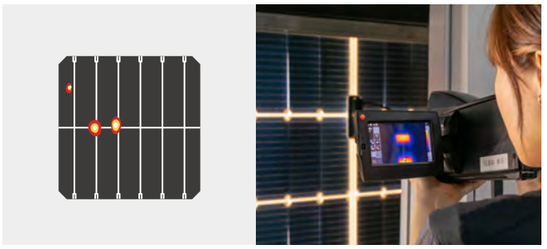
PID can lead to significant power loss for both P-type and N-type cells. The APT of Q.ANTUM NEO effectively protects the solar cells and secures high energy yield in the long-term.

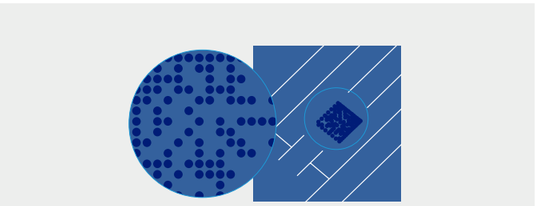
*PID: Potential Induced Degradation

Advanced Anti-LeTID (ALD)

Not only in P-type, but also in N-type, the power of solar cells can significantly decrease due to effects of LeTID. As the first company to observe LeTID effects and to devise a solution to suppress LeTID in 2015, Qcells secures high reliability against LeTID.

*LeTID: Light and Elevated Temperature Induced Degradation





Hot-Spot Protect

In order to prevent potential hot spots in cells, we inspect 100 % of the Q.ANTUM NEO cells with infrared camera scanning.

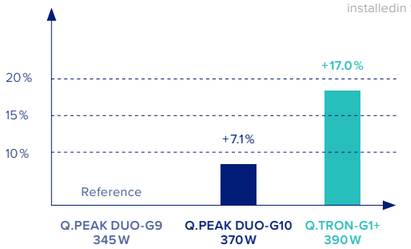
Tra.Q™

Qcells is the only solar manufacturer that conducts cell-level quality management. With Tra.Q™ laser marking, every single cell produced by Qcells is traced and monitored throughout the entire production process, enabling big data analysis and assuring high reliability and quality.

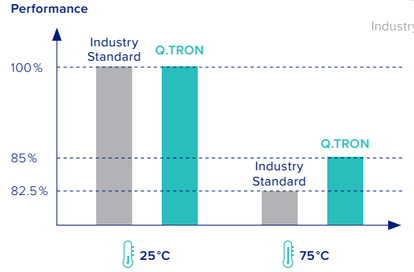
Yield Comparison

With Q.ANTUM NEO Technology and Advanced Yield Security, Q.TRON modules can generate more energy and boost profits even under harsh conditions like high temperature and low light.

*Simulation: 20 modules per system installedin San Francisco, USA



*Temperature Coefficient
Q.TRON = − 0.30 %/K
Industry Standard = − 0.35 %/K



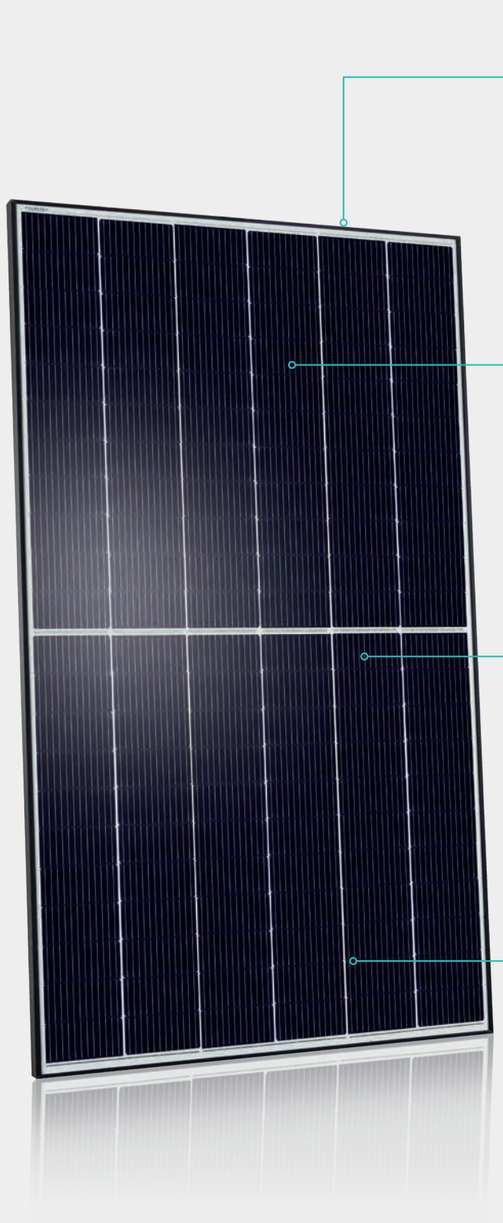
Qcells offers complete energy solutions that bring benefit for you and for the future of this planet.

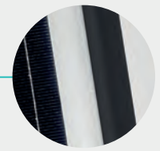
Solar Module

We Pay Attention to Every Detail

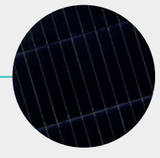
Front

High-quality anti-reflective glass for higher yields, homogeneous appearance and long-term stability.

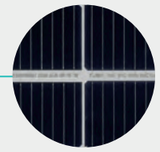




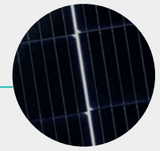
Flatter frame edges prevent moss growth and dirt accumulation



Q.ANTUM DUO Z half cells with 12-busbar Technology for higher yield per area at low BOS costs



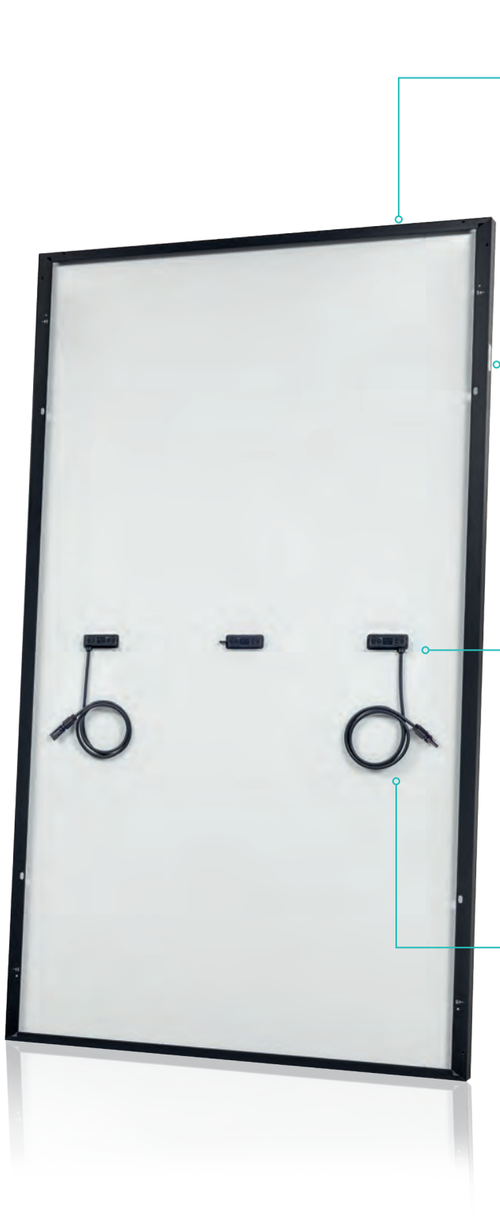
Independent parallel connected cells of the upper and lower half of the module ensure an improved yield in case of partial shading of the modules

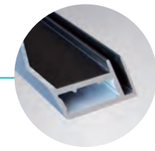


New round wire connections, which are narrower than solder ribbons, increase internal reflection and reduce shading by up to 75 %

Back

High quality rear for permanent sealing.





32 mm high-tech frame for wind and snow load up to 4000 / 8100 Pa (IEC)

Reliable silicone connection for excellent stability and durability

Optimised junction box design for higher energy efficiency and protection against corrosion

High quality connector plugs with >1150 mm cable length

Product Portfolio

Q.ANTUM NEO

Q.TRON-G1+

Power (Wp)	Max Efficiency (%)	Size (mm)	Weight (kg)
380 - 400	22.3	1717 × 1045 × 32	19.9

Warranty	TCOE* (%/K)	Cell
25 YEARS Warranty Product & Performance	– 0.30	120 Half-cells

Q.TRON BLK-G1+

All-Black

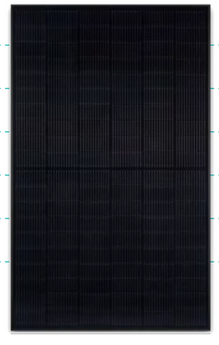
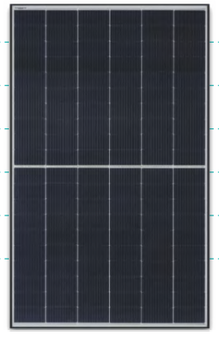
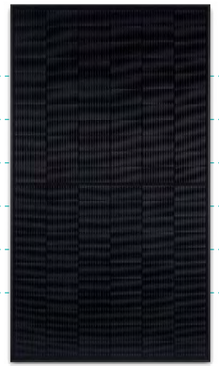
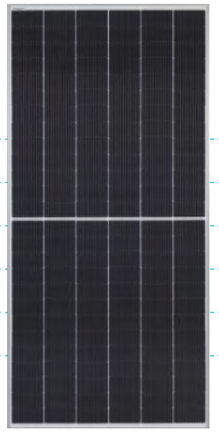
Power (Wp)	Max Efficiency (%)	Size (mm)	Weight (kg)
370 - 395	22	1717 × 1045 × 32	19.9

Warranty	TCOE* (%/K)	Cell
25 YEARS Warranty Product & Performance	– 0.30	120 Half-cells

Product Portfolio

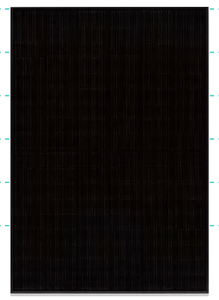
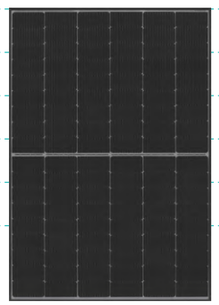
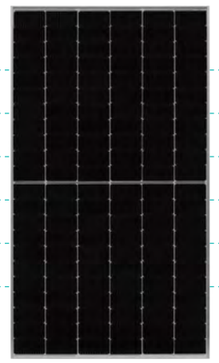
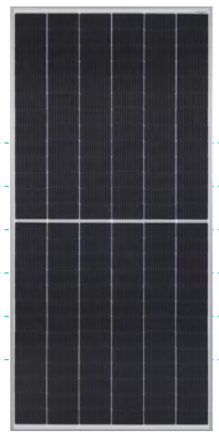
Q.PEAK DUO-G10 Series

powered by Q.ANTUM DUO Z

	Q.PEAK DUO BLK-G10/G10+	Q.PEAK DUO G10/G10+	Q.PEAK DUO BLK ML-G10/G10+	Q.PEAK DUO ML-G10/G10+	Q.PEAK DUO XL-G10
	All-Black		All-Black		
						
Power (Wp)	350 -370	360 -380	385 -405	395 -415	475 - 495
Max Efficiency (%)	19.5 - 20.6	20.1 - 21.2	19.6 - 20.6	20.1 -21.1	20.5 - 21.4
Size (mm)	1717 × 1045 × 32	1717 × 1045 × 32	1879 × 1045 × 32	1879 × 1045 × 32	2216 × 1045 × 35
Cell	120 Half-cells	120 Half-cells	132 Half-cells	132 Half-cells	156 Half-cells
Weight (kg)	19.9	19.9	22.0	22.0	26.0
Warranty	12 YEARS Warranty Product & Performance; 25 YEARS Warranty Product & Performance	12 YEARS Warranty Product & Performance; 25 YEARS Warranty Product & Performance	12 YEARS Warranty Product & Performance; 25 YEARS Warranty Product & Performance	12 YEARS Warranty Product & Performance; 25 YEARS Warranty Product & Performance	12 YEARS Warranty Product & Performance

Q.PEAK DUO-G11 Series

powered by Q.ANTUM DUO Z

	Q.PEAK DUO BLK M-G11/G11+	Q.PEAK DUO M-G11/G11+	Q.PEAK DUO ML-G11	Q.PEAK DUO XL-G11/BFG
	All-Black			Bifacial
	* Thickness 32mm available	* Thickness 32mm available		
					
Power (Wp)	380 -400	390 - 410	480 - 500	570 - 585
Max Efficiency (%)	19.8 - 20.8	20.3 - 21.4	20.6 - 21.5	20.8 - 21.4
Size (mm)	1692 × 1134 × 30*	1692 × 1134 × 30*	2054 × 1134 × 32	2416 × 1134 × 35
Cell	108 Half-cells	108 Half-cells	132 Half-cells	156 Half-cells
Weight (kg)	21.2	21.2	26.0	34.4
Warranty	12 YEARS Warranty Product & Performance; 25 YEARS Warranty Product & Performance	12 YEARS Warranty Product & Performance; 25 YEARS Warranty Product & Performance	12 YEARS Warranty Product & Performance	12 YEARS Warranty Product & Performance

Global Reference

North America

Q.PEAK DUO L-G5.2

138 MWp

Walmart

Early Country, Georgia, USA, 2020

Q.PEAK DUO L-G5.2

138 MWp

Bancroft Station Solar Farm

Early County, Georgia, USA, 2019

Q.PLUS L-G4.2

125.5 MWp

Laguna

Torreón, Mexico, 2019

Q.PLUS L-G4.2

235.7 MW

Midway

Texas, USA, 2018

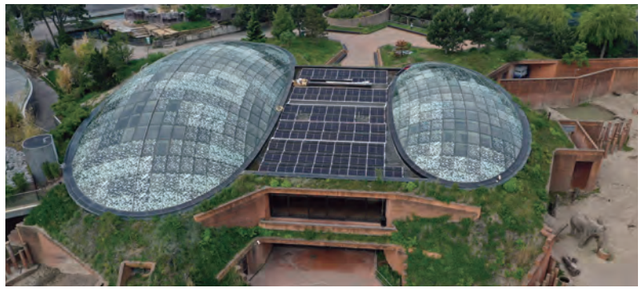
Europe

Q.PEAK DUO-G7, Q.FLAT-G5

102.3 kWp

RB Leipzig Stadium & Academy

Leipzig, Germany, 2020



Q.PEAK DUO BLK-G5, Q.PEAK DUO-G5

273 kWp

Zoo Copenhagen

Copenhagen, Denmark, 2019

Q.PLUS-G4

430 kWp

Gehrer Riding Centre

Durmersheim, Germany, 2019

Q.PEAK-G4.4

300 kWp

Kärcher UK Headquarters

Banbury, UK, 2019

Global Reference

Australia

Q.PEAK DUO-G5

7.8 kWp

Clifton Hill

Melbourne, VIC, 2019

Q.PEAK DUO-G5, Q.HOME+ ESS HYB-G2

6.6 kWp

North Sydney

Sydney, NSW, 2019

Q.PEAK DUO-G5, Q.HOME+ ESS HYB-G2

6.6 kWp

Woodend

Woodend, VIC, 2019

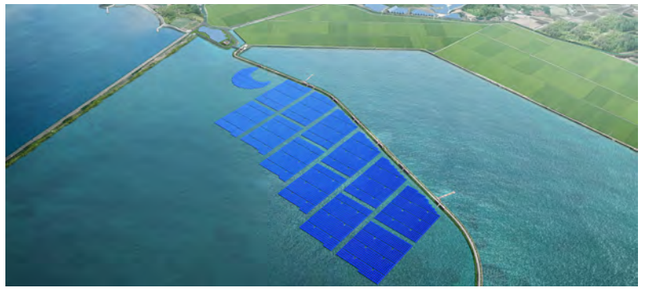
South Korea

Q.PEAK DUO L-G9

41 MW

Hapcheon Dam Floating Solar Plant

Hapcheon, 2021



Q.PEAK DUO L-G6.2

63 MWp

Goheung Solar Energy

Goheung, 2022

Q.PEAK DUO L-G8

0.5 MWp

YJ Solar Energy

Gumi, 2020

Q.PEAK L-G4.14

100 MWp

Yeonggwang Solar Energy

Yeonggwang, 2020

Global Reference

Asia China / Malaysia / Vietnam

Q.PEAK-G5

65.97 MWp

CGN Project in Qinghai

Delingha, China, 2018

Q.PEAK-G5

100 MWp

CGN Project in Hubei

Tongshan, China, 2018

Q.PEAK-G5

1.03 MWp

CGN Project in Yunnan

Shangri-la, China, 2018

Q.PLUS L-G4.2

60.4 MWp

Mattan Engineering

Rembau, Malaysia, 2018

Q.PLUS L-G4.2

36.7 MWp

Gading Kencana Development

Bidor, Malaysia, 2018

Q.PLUS L-G4.2

36.5 MWp

China Machinery & Equipment

Kota Tinggi, Malaysia, 2018

Q.PLUS L-G4.2

49.5 MWp

SH Site Solar Farm

Vung Tau, Vietnam, 2019

Q.PEAK DUO L-G5.3

49.6 MWp

KN Site Solar Farm

Ninh Thuan, Vietnam, 2019

System Solutions

Energy Storage Solution

Q.HOME CORE

Modular&Scalable Battery

Q.SAVE

6.86 kWh Modular battery
Scalable up to max 3 units

SAMSUNG

SAMSUNG SDI
Battery Cell

Sleek&Durable

Metallic Silver Cover

High-performance Inverter

Q.VOLT

4.6 kW / 5.0 kW
Hybrid or AC-Coupled

Enhanced Warranty

15 year Warranty

For Web Enable

Network Connectivity

Wi-Fi / LAN / LTE

Q.HOME CORE

Integrated Solar Inverter and Storage

Q.HOME CORE is perfectly suited to pair with any Qcells solar module for high reliability and cost-savings.

High Conversion Efficiency

Installers can check the status of multiple sites at a glance and find a particular site through search.

Extended 15 year Warranty

Enhanced product and performance warranty backed with high quality control.

Maximum Energy Generation

Q.OMMAND maximizes energy yields by incorporating real-time weather information.

Scalable Battery

Three scalable batteries up to 20.5 kWh depending on your energy needs.

Samsung Battery for Safety

SAMSUNG NCA battery cells ensure maximum safety.

Emergency Backup from Blackout

Automatic transfer to battery power in blackout conditions. (ATS* Embedded)

Assembled in South Korea

Assembled in Korea for enhanced quality.

Easy and Fast Installation

Wall-mounted or floor-mounting(optional) brackets available for convenience and easy installation.

* ATS (Automatic Transfer Switch)

A device that automatically transfers a power supply from energy grid to energy storage solutions in case of grid failure.

Energy Management System

Q.OMMAND

Q.OMMAND is Qcells' Energy Management System that consists of 3 Apps to support installation and module level monitoring. It provides real-time error feedback and performance assessment to keep the system at optimum state.

Homeowners
For your energy management

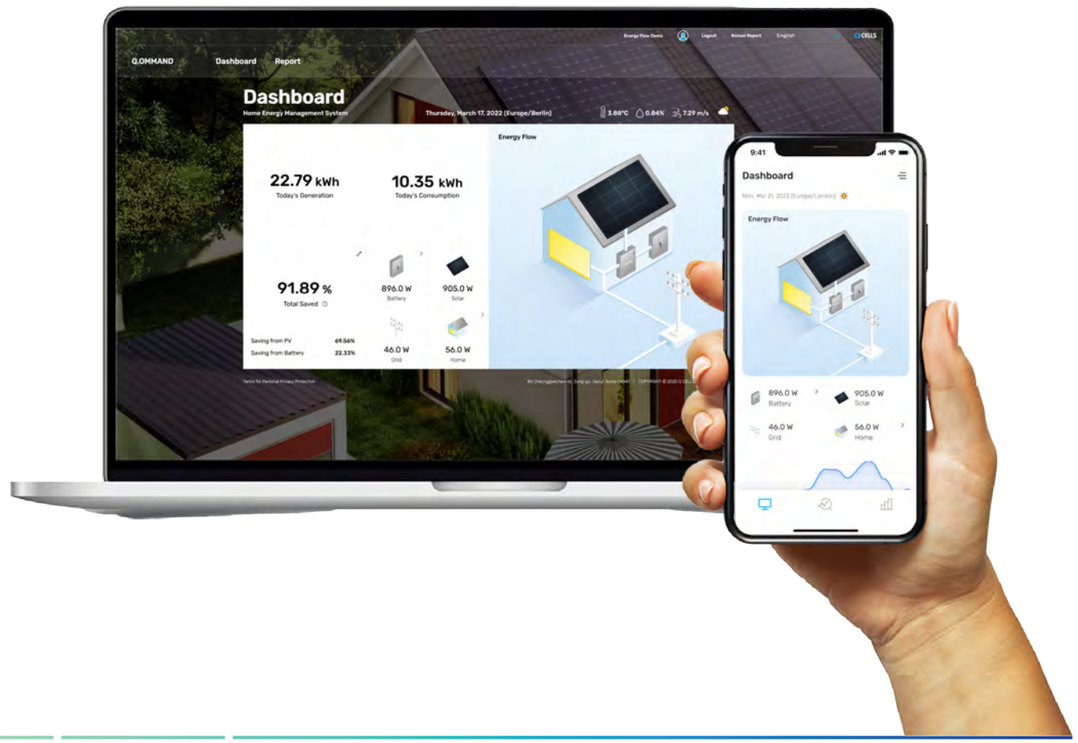
Q.OMMAND HOME

Installers
Remote System O&M

Q.OMMAND PRO

Commissioning
For easy & quick installation

Q.OMMAND GO



Q.OMMAND

HOME

Q.OMMAND HOME

For Homeowners

For monitoring and managing energy generation, storage, and usage anytime, anywhere.

Smart Functions

Q.OMMAND HOME Provides three smart functions as below.

1 **Dynamic Optimiser**
Maximized Energy Yield

Qcells advanced AI algorithm incorporates weather information with real-time data from your solar modules and energy storage system to maximize energy usage and generation.

2 **Energy Backup**
Blackout Precaution

In case of blackout, you can set the amount of energy your Q.HOME CORE will always store.

3 **OTA (Over-The-Air)**
Software Updates

Cloud-based software updates continuously adds new monitoring and management features.

Real-Time Energy Flow

Real-time update every three seconds.

Usage Pattern

Compare your energy usage to the same month last year.

Regular Report

Monthly, daily, and hourly reporting available.

Q.OMMAND

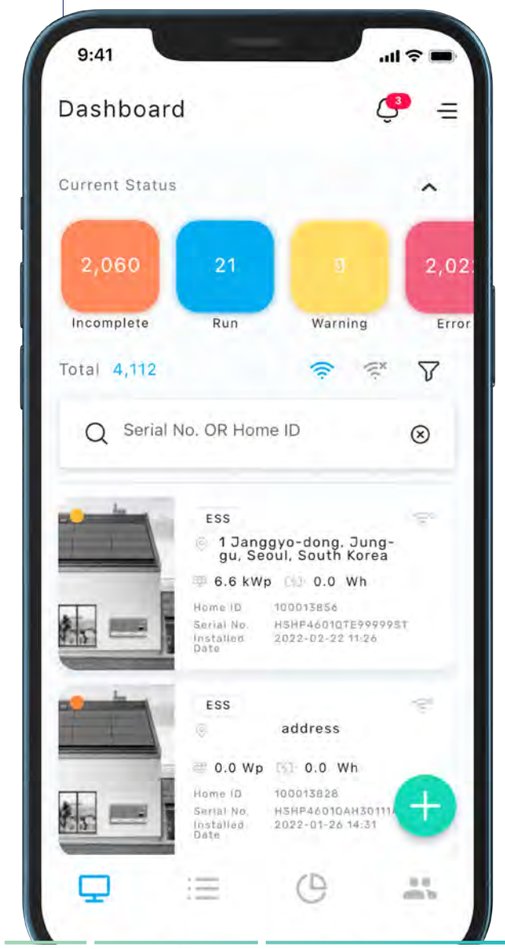
Q.OMMAND PRO

For Installers

For fast and easy O&M services.

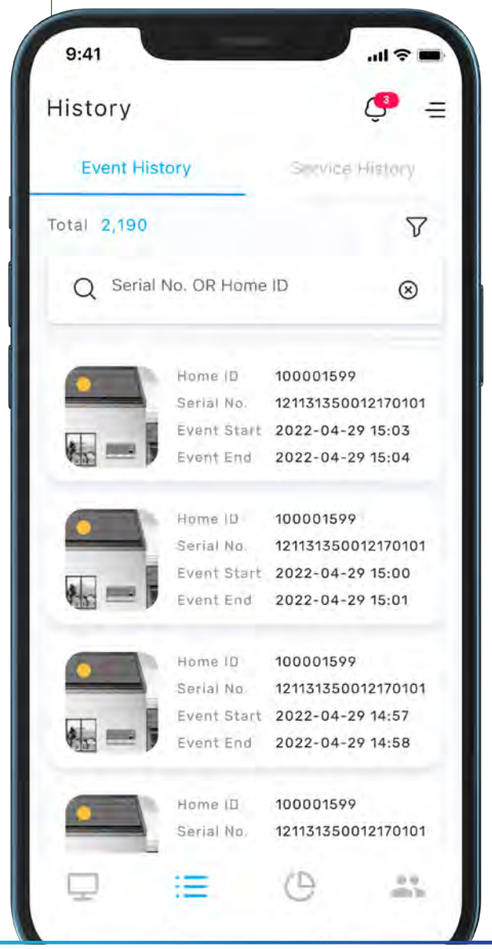
Dashboard

Installers can check the status of multiple sites at a glance and able to find a particular site through search.



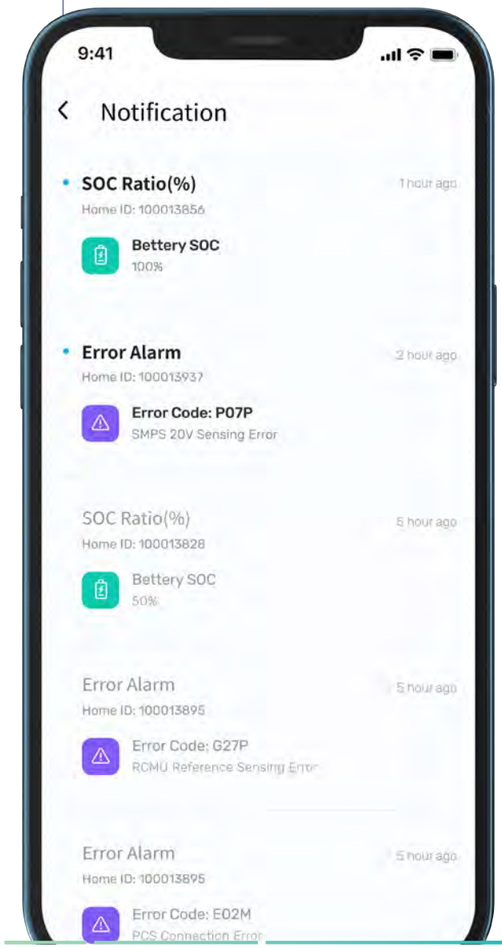
Tracking History

Installers can track the history of each site including service history, error messages, replacements and others.



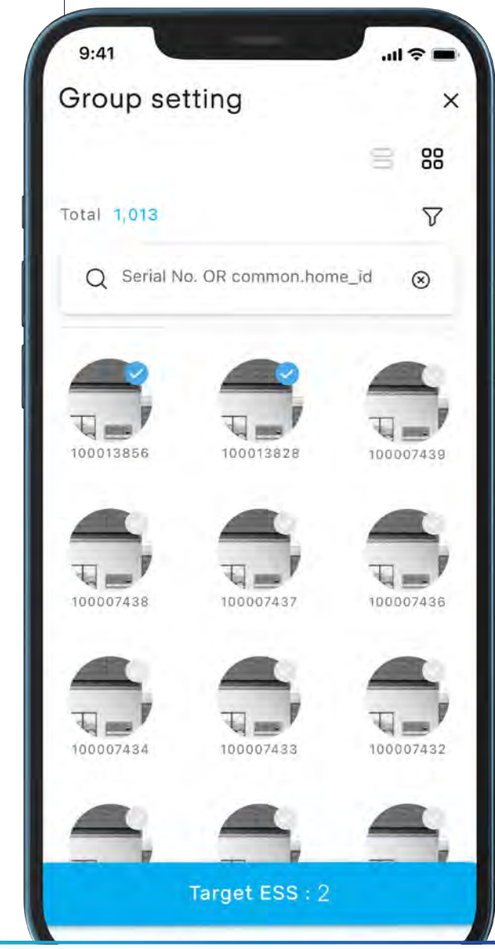
Notifications

Immediately notifies when service or maintenance is required.



Grouping System

Installers can group the sites by region to easily modify grid code, energy policy, and more.



Q.OMMAND

Q.OMMAND GO

For Commissioning

For easy installation of Q.HOME CORE.

Network Connection

Simple connection to the network within the house.

Remote Update

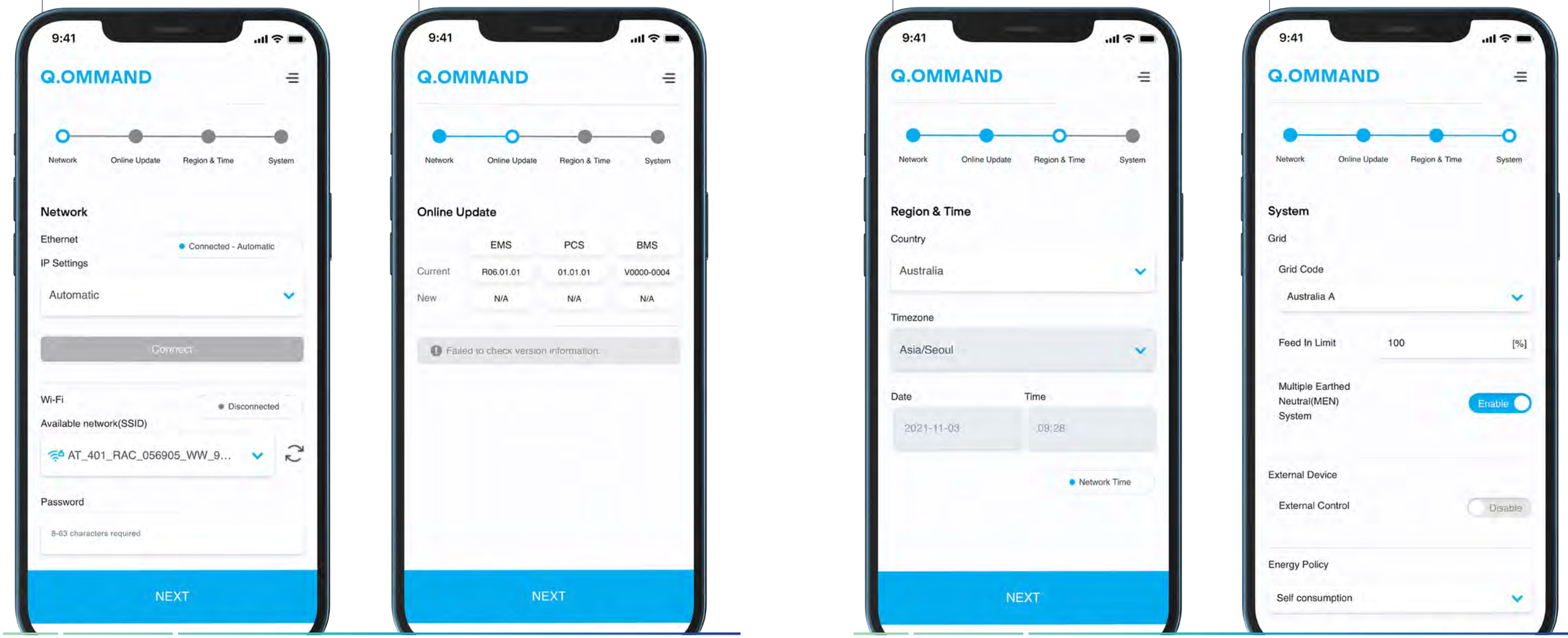
One-click update to the latest version.

Region & Time Setting

Select the region and time zone of the installation.

Device Setting

Initial settings of grid code, energy policy, solar module, batteries, and meter.



Green Energy Solutions

About Qcells USA

Qcells USA Overview

Qcells USA, Hanwha Solutions' US renewable energy platform, develops, constructs, and owns photovoltaic (PV) and energy storage systems (ESS) throughout North America.

Solar Pipeline

6.7 GW

ESS Pipeline

11.2 GW

2020

million net sales

$ 301

million assets

$ 343

(Audited)

2021

million net sales

$ 193

million assets

$ 316

(Audited as of Dec '21)

Utility-Scale PV+BESS Projects Developer

Develop & invest utility-scale solar plus Battery Energy Storage System Projects in North America.

Sustainable Reliability

Expertise in planning & engineering with advanced technology and high quality components.

Customized EPC Services

Along with the module quality, the design and layout of a solar power plant are carefully calibrated.

Strong Bankability

Backed by Hanwha Group, BNEF Tier 1 Company, Financing Track Record, and Integrated Solar Value Chain.

Qcells USA Introduction

1 Office Location

- Irvine, California, United States

2 Business Type

- Solar PV + BESS Projects Development & Investment
- Electricity Sales
- EPC Services

3 Employees

- 140+ (Development / Project Finance / EPC / Project Management / O&M, others)

4 History

- Founded in 2011 (Hanwha Solar Energy America Holdings)

Market Presence

2021 Top 10 Solar EPC Provider in United States

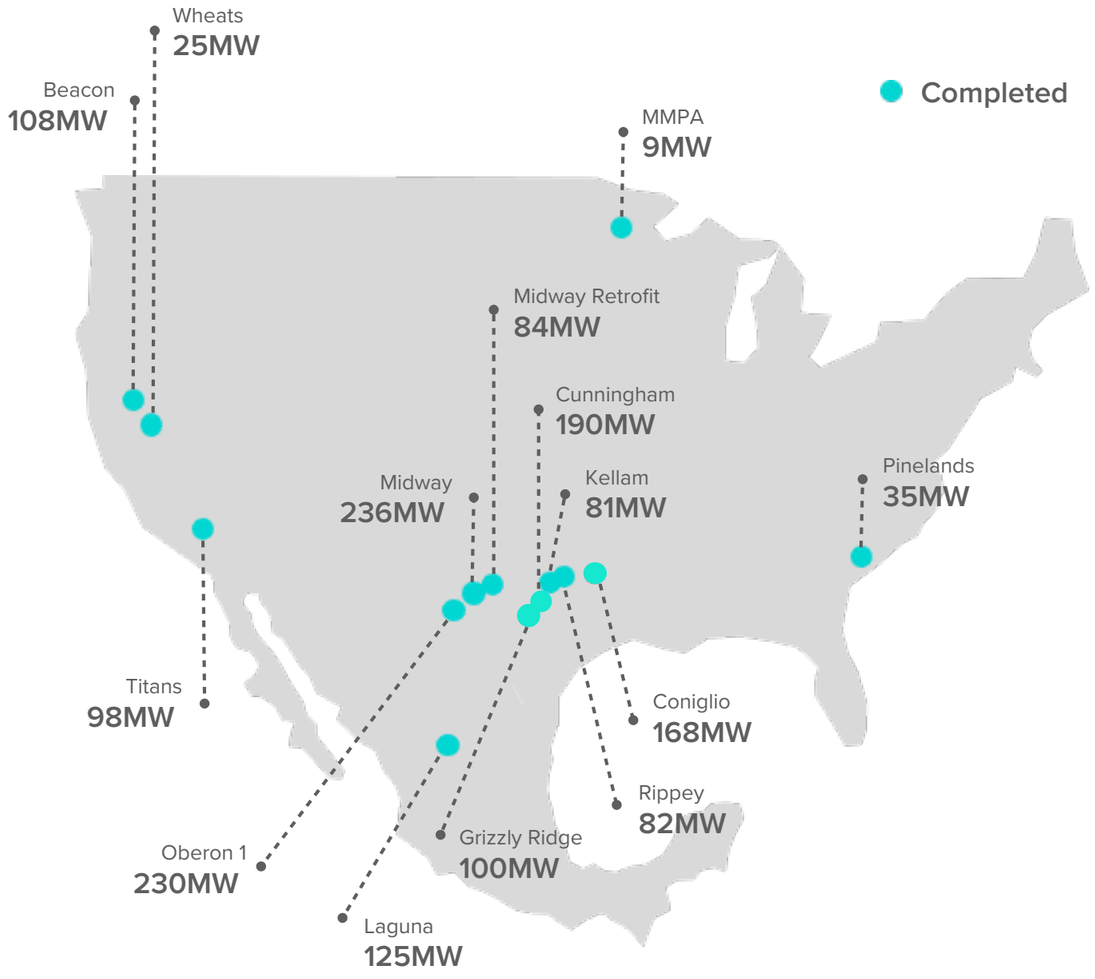
Rank	Company	MW in 2020	M/S
1	Blattner Energy	2,130	11%
2	Swinerton Renewable Energy	2,088	10%
3	Moss Construction	1,229	6%
:	:	:	:
9	**Hanwha Qcells USA**	**523**	**3%**
10	Rosendin Electric	403	2%
	Others	10,068	50%
	Total	**20,148**	**100%**

* Source: 2021 IHS Markit report; for All Non-Residential PV Systems (>10kW)

Qcells USA Track Record

EPC & Development

Track Record (2017 - Present)



Projects Completed By Development Platform

KELLAM

Capacity	81 MWdc
COD	2020
Dev Contributions	Project Development
Financing	Raised Tax equity, Financed on Balance Sheet
Strategy	Long term owner
Off-take Structure	Long term PPA

RIPPEY

Capacity	82 MWdc
COD	2020
Dev Contributions	Project Development
Financing	Raised Tax equity, Financed on Balance Sheet
Strategy	100% Divestiture

CONIGLIO

Capacity	168 MWdc
COD	2021
Dev Contributions	Project Development
Financing	Raised Tax equity, Financed on Balance Sheet
Strategy	Long term owner
Off-take Structure	Merchant

Qcells USA Strategy

Qcells' Total Energy Solutions

■ Utilizing vertically integrated solar value chain within Hanwha Group, Qcells provides total energy solutions for Photovoltaic (PV) & Energy Storage System (ESS) project development, investment as well as EPC services.

■ With 1.2GW of proven solar EPC track record in North America, Qcells USA develops, acquires, builds utility-scale solar PV & ESS power generation assets.
■ Qcells is expanding global presence for solar & ESS power generation assets primarily in North America, Europe, and Asia.

Complete Utility-Scale Turnkey Solar & ESS Solution Provider

Experienced Developer

Solar & ESS Project Development
Experienced team getting projects built correctly from the start

Interconnection
In-depth analysis and studies to develop viable projects

Strong Bankability
Backed by the Hanwha Group's $197 billion assets

Over 14 GW of Solar & ESS in Queues Across the US

Project Finance

Capital Market Relationships
Expertise to arrange complex financing for any projects

Reliable EPC Contractor

Engineering
Skillful design and optimization in a turnkey system

Procurement
Selection and delivery of high quality, integrated components

Construction
Project management and construction

Systems Integration

Project Orchestration
Financial modeling, technology selection, SCM, and full commissioning support to deliver superior projects

1.2 GW of Solar Constructed Across the US Since 2019

Dependable IPP

Asset Management
Monitoring, OEM support, Fleet management

Growth Support
Opportunity sourcing, Contract origination, Financing, Siting

Energy Marketing
Merchant energy trading, REC position management

Insights from O&M Utilized Within All Project Efforts

Solution Capabilities

1. **Development** — ■ Develop green field projects ■ Acquire projects under development
2. **Engineering Procurement Construction** (EPC Services) — ■ Build the solar/ESS plants
3. **Own/Operate or Sell** — ■ Hold as IPP or Sell solar/ESS assets

USA Reference

168 MW

Coniglio

Texas, USA, 2021

5 MW

Garnet

California, USA

82 MW

Rippey

Texas, USA, 2020

25 MW

Wheats

California, USA

82 MW

Kellam

Texas, USA, 2020

108 MW

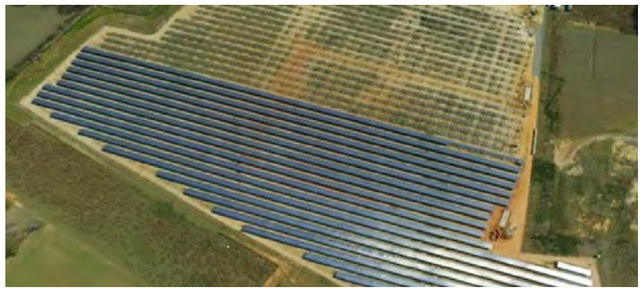
Beacon

California, USA

237 MW

Midway

Texas, USA



35 MW

Pineland

North Carolina, USA

Distributed Energy Solutions

Europe

Distributed Energy

Clean energy solutions for your company

■ Electricity costs under control in the long term with your own solar system

With a solar system on your roof, you immediately reduce your electricity costs, receive “real” local green electricity - and all this at stable prices over the long term. With Qcells you can also get your solar system without having to invest yourself.

■ Ownership with BNPL (buy now pay later)

If you would like to own a solar system, Qcells will be happy to help you with the needs analysis, project planning and turnkey construction, including attractive installment payment conditions. This saves you the effort of taking care of the financing and you get everything from a single source.

■ Qcells has been working on the future of solar technology for more than two decades:

With research, development and the highest quality components for a sustainable energy supply in your company.

■ Save immediately with power contracting or PV-leasing

Power Contracting : the all-round carefree package;
In the long term, it ensures you a very low electricity price from the solar system on your roof, without you having to spend money and worry about anything.

PV-leasing : when you lease the PV-system, you become a self-producer and reduce further electricity costs, e.g. the electricity tax on the self-consumed energy. By adding an energy storage system, you can further increase your autarky.

■ Qcells solar products meet the highest standards

Qcells has the hardest testing criteria in the industry. This is how we guarantee you high yields and a maximum of stability and security. As one of the world’s largest solar companies, Qcells offers you all the components and services you need for an independent and profitable power supply. This makes us a competent partner for all matters relating to your solar system.

Benefits for your company

No investment, no risk

Immediate saving effect and simple electricity marketing for surplus electricity

Long-term stable price for solar power

Minimal effort for planning and operation

Reduction of carbon footprint

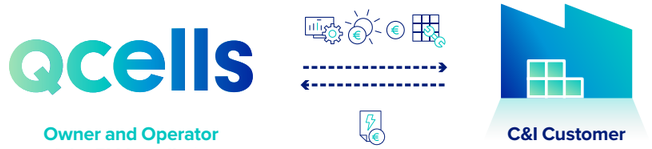
Active contribution to climate protection

Visible sustainability

Power Contracting, PV-Leasing or BNPL (buy now pay later) ?

1. Power Contracting: all-round carefree package

The solar system on your roof does not cost you a cent. Qcells provides the solar system and takes over the complete planning, project development, turnkey construction as well as operation and maintenance. All we need is your roof - you don’t have to worry about anything else. We install and operate the solar system ourselves. You benefit from purchasing the solar power from your own roof, which means lower electricity costs and a reduction in your carbon footprint. It couldn’t be easiert for you!

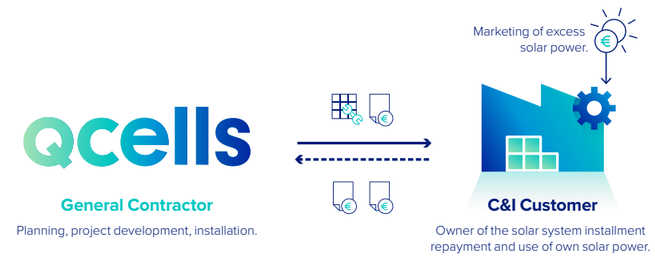


2. PV-Lease for maximum cost savings

Qcells will install the solar system on your roof – at no cost to you. Would you like to operate the solar system on your roof yourself? Then choose our PV-Lease model. You lease from Qcells the PV-Installation and become operator. You benefit from cheap solar power and save on charges (e.g. electricity tax) on the self-generated and consumed solar power.

3. BNPL (buy now pay later) : Plant purchase by installment payment

You will become the owner of the solar system with attractive installment payment conditions from Qcells. Qcells takes over the planning, project development and turnkey installation. So you get everything from a single source.



Europe

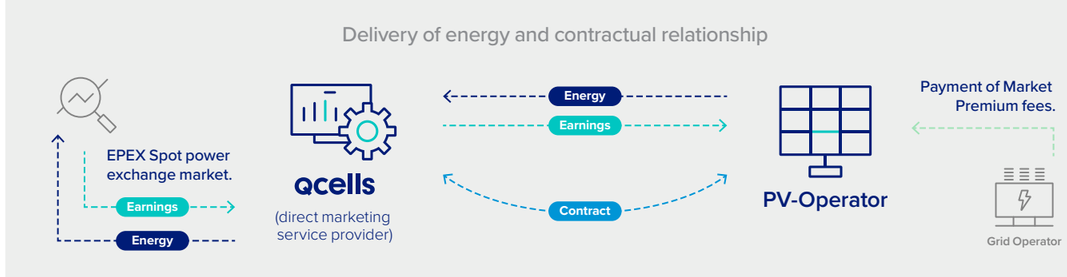
Distributed Energy

Market electricity from your PV system with Qcells

Whether with Feed-in-tariff remuneration or without Qcells is the one-stop shop for all components of the solar system and electricity marketing.

With Qcells, you get the best possible revenue on fair terms and easy contract processing.

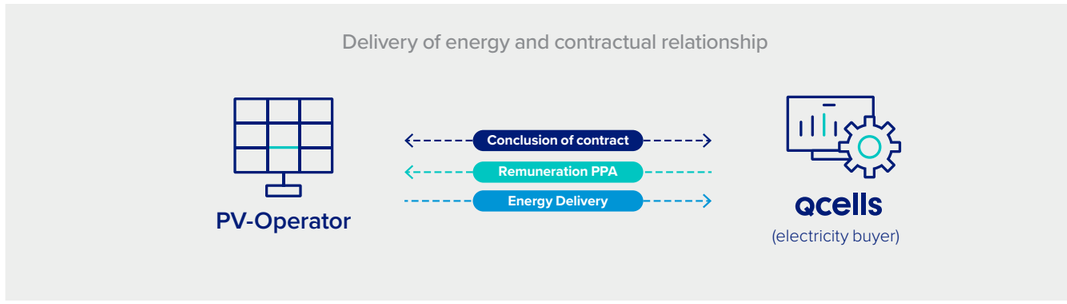
Mandatory direct marketing (EEG –German FIT-- market premium model)



We are happy to take over the marketing of your valuable PV electricity at fair marketing fees as part of the market premium model. Namely for roof and ground-mounted systems that are already feeding in or are still to be put into operation, as well as for surplus electricity or full feed-in projects.

Qcells takes care of the timely registration with the network operator and payment of the earnings generated and also assumes all Redispatch 2.0 obligations for you, and all without any additional costs.

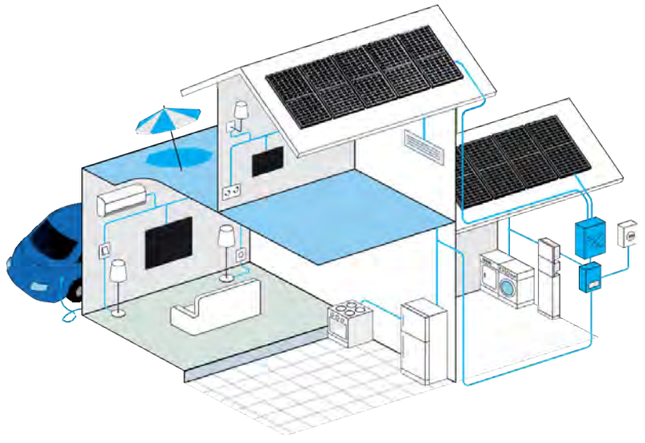
Power Purchase Agreement (PPA)



Save yourself time and efforts having to take part in a complicated and time-consuming EEG (German FIT tender, because as an alternative, Qcells pays for your PV electricity via a PPA (power purchase agreement) at fixed conditions. You get a high degree of flexibility in contract terms,

optimally tailored to the current electricity market. For the green electricity generated in Germany, we also pay for the guarantees of origin and at the same time take care of Redispatch 2.0 and REMIT reporting obligations - simple and uncomplicated.

My house, my roof, my electricity - and Qcells by my side



■ Solar Modules

Thanks to modern technology, our solar modules are characterized by particularly high performance on a small area: Maximum light output, even on cloudy days.

■ Real Green Electricity

Our green electricity comes from purely regenerative energy sources in Germany and Austria.energie.q-cells.de

■ Storage Solutions

With our energy storage, you can increase the proportion of self-produced solar power to up to 2/3 of your total power requirement. At the same time, your electricity costs are sustainably reduced.

■ Wallbox

With a wall box, you can charge your car with a charging speed that is up to 10 times faster than with a normal household socket. Owning a wall box is particularly worthwhile for owners of solar systems.

■ E-Mobility

With the climate-friendly Q.ENERGY Home & Charge car electricity tariff, you can conveniently charge your electric car from home and also supply your household with green electricity.

Your way to your own solar system

1 Consultation

We take your data such as power consumption and roof size and you get an initial overview of your potential solar system. Our energy consultant will provide you with detailed information about the costs and benefits of a solar system on your roof.

2 Planning and offer

We plan your system and create an attractive offer. You will also receive an offer for the purchase of the solar system and payment on installment basis.

3 Installation

Once you have decided on our offer, our qualified specialist partners will ensure that your solar system is installed and commissioned quickly – without any effort on your part.

4 Registration

We take care of registering your solar system with your responsible network operator - you don't have to do anything else.

America

Distributed Energy

Complete Energy Solutions, Accelerated

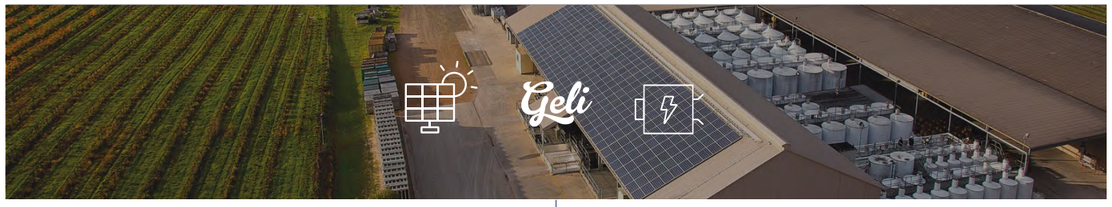
Qcells helps businesses and government organizations to manage their energy costs and better meet sustainability goals through the design, financing, deployment and operation of solar and energy storage resources. Qcells offers a full suite of solutions to unlock new revenue streams and boost project value for end users. With a heritage dating back to the origins of the modern solar industry, Qcells combines experience and expertise to deliver one-stop shop complete energy solutions, all backed by a Fortune Global 500 company.

- Project Co-development
- Financing & Asset Ownership
- PV Modules
- ESS Hardware
- Geli EMS
- O&M Services

Value Drivers for C&I Customers

Qcells' high-velocity, bankable energy solutions combine our leading PV modules, battery storage and our Geli energy management system to drive additional project value.

By applying machine-learning algorithms throughout the platform, we can provide continuity and confidence to generate business results for C&I customers in four key areas.



1 Bill Optimization

- Analytics for optimal size
- Future proofing for electricity markets

2 Demand Response & Grid Services

- Additional revenue potential
- Grid stability

3 Incentive Programs

- System optimization
- Decarbonization

4 Backup Power

- Resiliency enhancements
- Minimize downtime to boost project economics

Australia

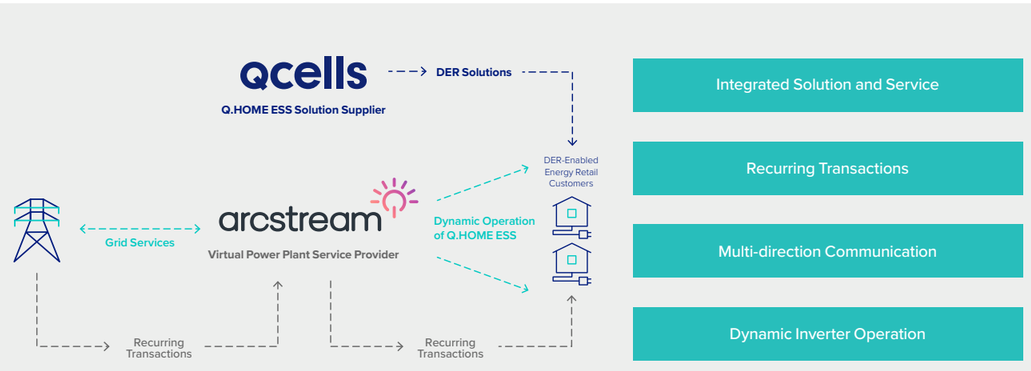
Distributed Energy

DER-enabled Energy Retail with Q.HOME ESS

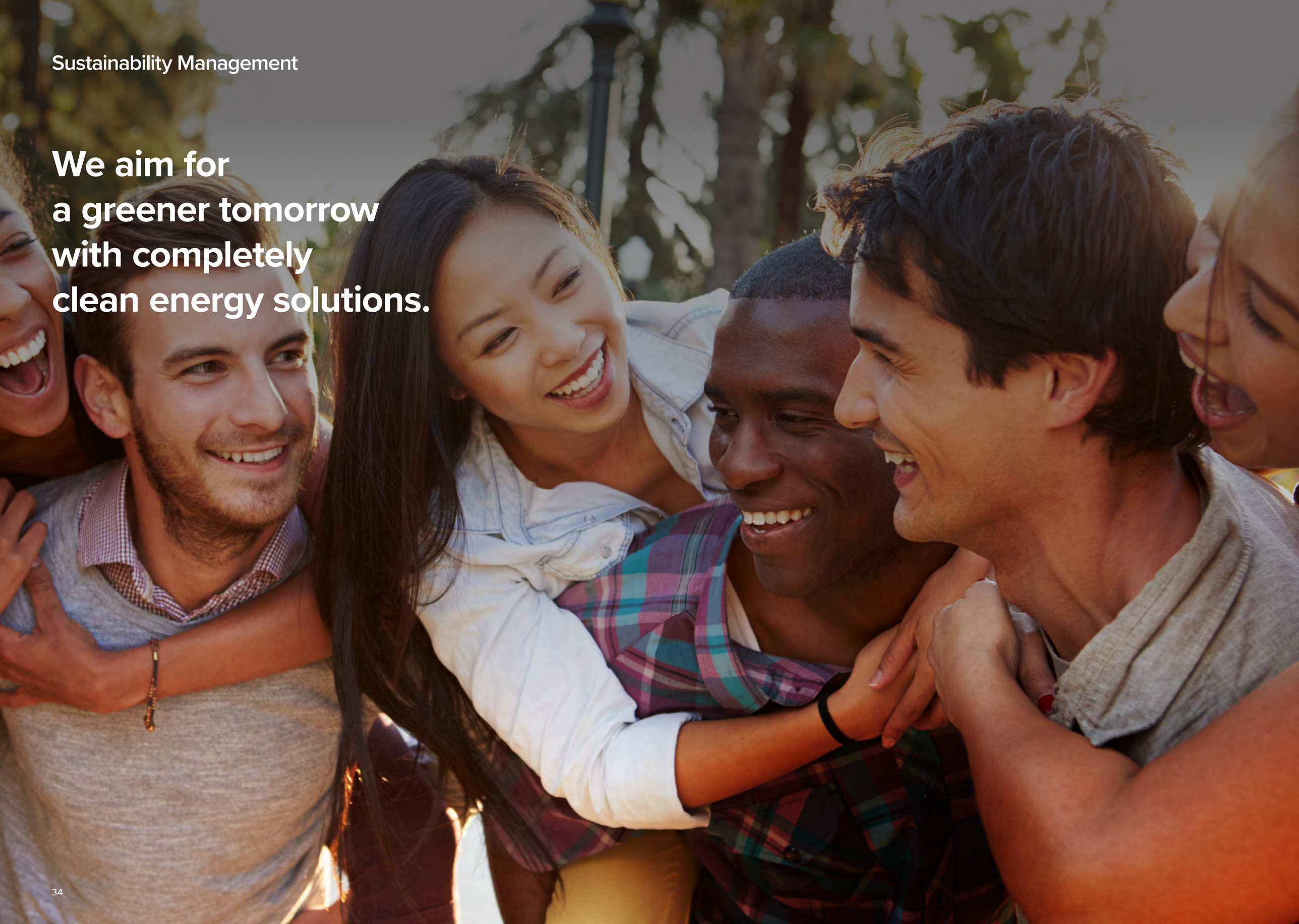
Qcells DER-enabled energy retail brand, Arcstream, was launched in Australia in Q1 2022. This offer is exclusive to owners of Q.HOME ESS and is supported by Qcells' in-house software that enables batteries to be aggregated into a virtual power plant (VPP).

Traditional Business Model

DER-enabled Energy Retail Business Model



We aim for a greener tomorrow with completely clean energy solutions.



Solar Sharing

Hapcheon Dam Floating Solar Plant

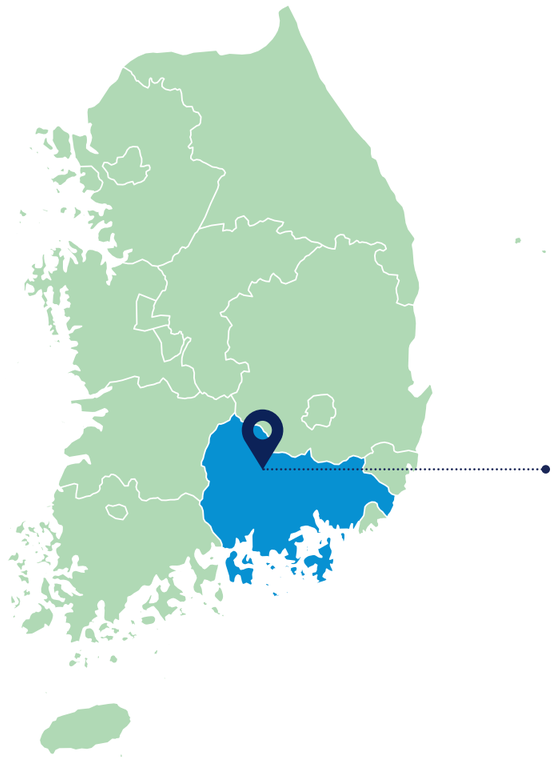
70 % of the Korean peninsula, a body of land surrounded by water on three sides, is covered with mountains. Due to a legislation that prohibits solar panels on mountains, land for utility-scale solar plants in Korea is limited. Qcells' proposal to best address this issue and accelerate local energy decentralization at the same time: Floatovoltaics (Floating + Photovolatic).

A local resident-funded 41 MW floating solar farm in South Gyeongsang Province is a testament to Qcells' ongoing efforts to realize environmentally and socially responsible solutions.

What one can expect to see on the 12-mile-long reservoir of Hapcheon are 17 giant flowers – this remarkable floating solar plant is made of more than 92,000 solar panels in the shape of the local icon, plum blossoms.

Carrying Qcells' floatovoltaic-specific modules Q.PEAK DUO Poseidon, Hapcheon dam floating solar plant generates electricity for approximately 20,000 households, enough to provide for 44,434 population of Hapcheon region.

When this plant was first annoucned, the local residents were given the chance to invest as well as job offers during construction. With their collective investment covering about 4 % of the total cost, about 1,400 residents expect to receive a 10% annual return over 20 years, with the pride of being part of the nationwide transition to renewable energy at an early stage.

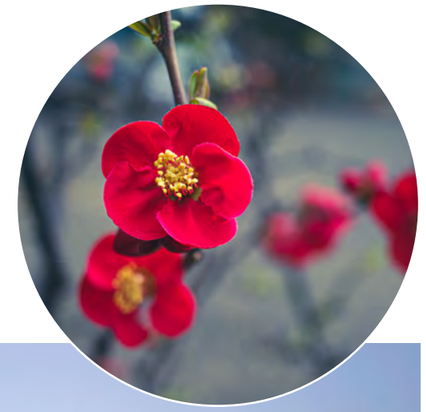


Hapcheon County,
South Gyeongsang Province

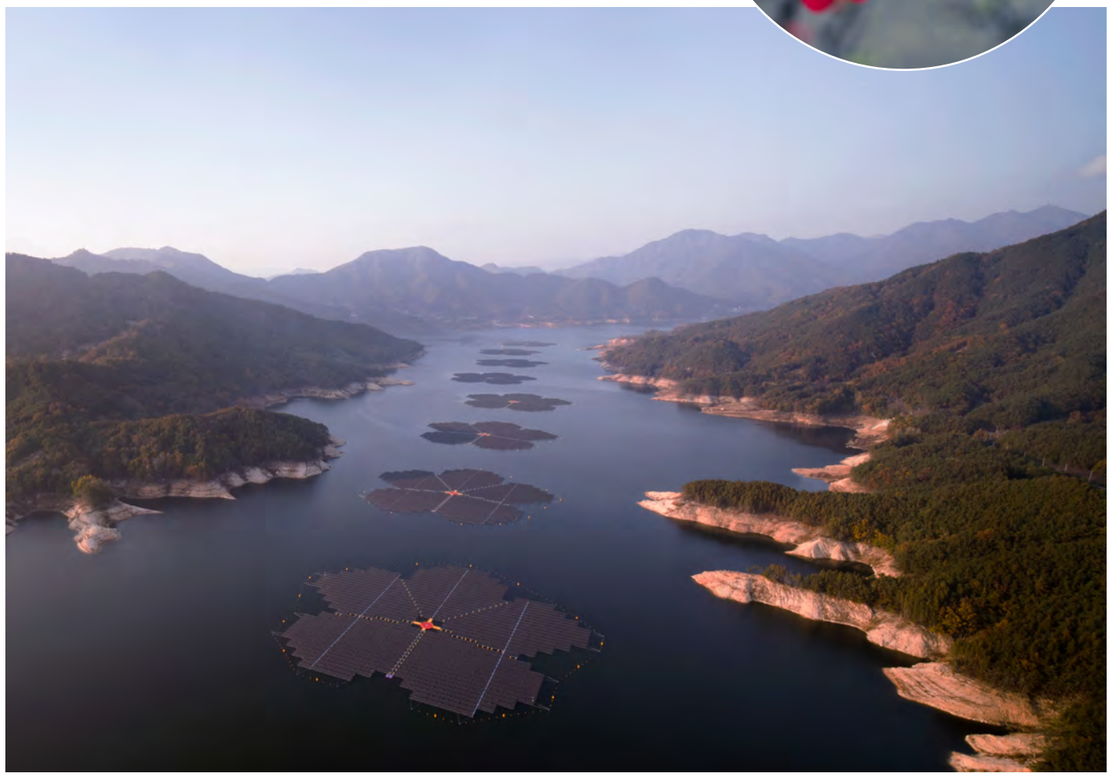
The **World's Largest** Solar Farm on Dam

More than **92,000** Floating Solar Panels

Generates Electricity for Approximately **20,000** Households



Hapcheon's Local Icon,
Plum Blossoms



Solar Sharing

Energy Self-Sufficient Island, JUKDO

The island of Jukdo off the coast of Hongseong county is a small island with 70 residents in 31 households. The residents have historically depended entirely on diesel fuel for electricity. However, with the Jukdo Island project, led by our CSR activities along with participation from ten smaller enterprises, the island's main energy source – diesel fuel – will be replaced with 100 % renewable energy. The emission-free convergence power generation system will produce 210 kW of electricity using solar and wind power. The surplus energy will then be stored in a 900 kWh energy storage system (ESS) until it is needed at night or during inclement weather to serve as a stable and consistent supply of electricity.

The desalination facilities that provide the drinking water for the residents will also be powered by the renewable energy. When the project is fully implemented, Jukdo will be able to reduce its carbon dioxide emissions by 200 tons per year, equivalent to the job of 41,000 trees.

100 % Energy Self-Sufficient

Installed **210 kW** Solar Systems

200 tons of Carbon Reduction a Year

Greener Davos Initiative

Qcells is supporting the Greener Davos Initiative introduced by the municipality of Davos and the World Economic Forum. Qcells has installed its highly efficient Q.PEAK photovoltaic system capable of 340 kWp on the rooftop of the Davos Congress Center. The solar system helps to decrease environmental impacts by generating enough energy to reduce more than 20 tons of CO2 emissions per year. This project is only one of our efforts to address dynamic issues surrounding our world today: climate change and the depletion of our energy resources.

Installed **340 kW** Solar Systems

20 tons of Carbon Reduction a Year

Solar Sharing

Clean Up Mekong

The Mekong is a trans-boundary river that runs through China, Myanmar, Laos, Thailand, Cambodia, and finally Vietnam before discharging into the sea. It moves 475 km^3 of water annually and supports over 70 million people who rely on it as their main source of water. However, indiscriminately disposed waste and sewage discharge along the river's length has turned the Mekong into one of the world's 10 most polluted rivers.
The pollutants ultimately float into the ocean and threaten marine life. As Vietnam is the last country the river runs through, the Clean Up Mekong campaign aims to remove waste before it enters the ocean, at the riverside city of Vinh Long. The key to the campaign's clean-up efforts are solar-powered boats.

Powered and propelled by Qcells' Q.PEAK DUO solar modules, the boats are used to scoop up waste in the Mekong River without emitting any greenhouse gases or other pollutants. The boats are also silent, resulting in minimal disturbance to local wildlife and communities.

Installed **210 kW** Solar Systems

Collect **Up to 100 tons** of garbage a year with **Zero Carbon** Emission

Hanwha Solar Forest Campaign

The Solar Forest Campaign is an initiative to create new forests with trees grown in solar-powered nurseries to fight against desertification and air pollution, supporting the UN SDGs. Total of seven Solar Forests were formed in China, Mongolia and South Korea, where more than 500,000 trees were planted in an area of 1,350,000 m2 combined. This is the world's first practice known for utilizing solar energy to fight desertification and recognized at the United Nations Conventions to Combat Desertification (UNCCD) COP Summit in 2011.

Started from **2011**

Planted **500,000** Trees

Created **8** Forests

Introduced at **UNCCD**

Qcells in Sports

Team Hanwha Qcells

Team Hanwha Qcells is a ladies professional golf team founded in 2011. The team has adopted the Hanwha Group's philosophy to contribute to the growth of sports and so through heavy investments and by continual supports a wide range of sports including Professional baseball, Shooting, Equestrian, and Boxing. Through a sponsorship agreement with Hanwha Qcells, one of the largest and most recognized photovoltaic manufactures in the world, the team was changed from Team Hanwha to Team Hanwha Qcells in 2018.

Since its establishment in 2011, the golf team has earned 41 victories including 20 LPGA wins, 14 KLPGA wins, 5 JLPGA wins, and 2 LET wins. In 2017, the team posted a total of 10 victories on the world's top three ladies professional golf tours in Korea, the US, and Japan, living up to its reputation as a premier golf team. A key to Team Hanwha Qcells success has been in its history of scouting great players and providing extensive player support that have been instrumental to achieving wins overseas and on domestic tours.

Qcells Disability Sports Team

To promote the power of hope, Qcells founded 'Qcells Parasports Team' in 2019, the nation's largest challenged athletes team in Chungbuk Province, Korea. Currently, Qcells is supporting total 35 players in 6 sports including shooting, weightlifting, and swimming. With Qcells' aid, covering the players' sport equipment expenses on top of additional financial support, the Team won a total of 28 medals at the 41st National Disabled Sports Championship in October, 2021.

Qcells

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