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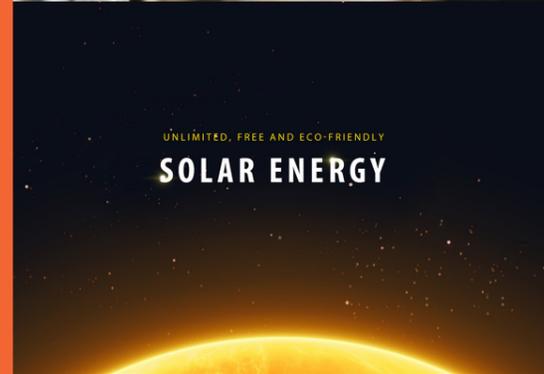
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# Chairman's Message Commemorating Hanwha Group's 65<sup>th</sup> Anniversary



Seung Youn Kim, Chairman

Beloved members of the Hanwha family,

Today, we've taken another step forward, building on the proud history of the Hanwha Group. Our last 65 years has been a time of both challenges and innovations that are perhaps best described in a famous 14th century historical novel, "found a way through, when confronted by mountains, and bridged to the other side, when blocked by a river." The legacy we've created was the fruit borne of our collective efforts of our companies and employees worldwide. For this and more, I extend my heartfelt gratitude to our business partners, customers, shareholders, and the people of Korea.

Sixty-five years ago, our dream began in a corner of a dilapidated factory in near ruins. Despite lacking resources, experience, and capital, we persisted tirelessly, opening a new chapter in our lives. As our story unfolded, we refused to set our sights on financial gains but instead devoted ourselves to pursuing a greater cause – to contribute to society and nation through business—a truly advanced and lofty goal at the time.

Today, we are faced with a vast wave of transformations whose magnitude we find hard to grasp: General Electric is selling off its iconic light-bulb business dating back 125 years and companies like Google and Apple continue to transform themselves by crossing over industries and making inroads into electric vehicles and solar energy.

**Now, we need to once again become pioneers for a more dynamic future by reviving the kind of start-up spirit that established Hanwha.** Especially now, in the midst of the fourth industrial revolution, we must not stop at simply finding new opportunities but move on to generating creative values. To this cause, we must seek in ourselves, a youthful Hanwha and cultivate the kind of DNA that drives a new-born enterprise with enthusiasm and to innovate – the kind that has

made us great for the last 65 years.

Dear members of the Hanwha family, Our nation's desire for a new Korea is as fervent as ever. And we must respond to it in earnest by breaking away from the old paradigm and changing our mindset to pivot into a completely new direction. **As we embrace the new era, let us establish a new order and discipline in the Group and ponder over the roles and responsibilities that befit our 65-year legacy.**

What will remain unchanged is our goal to fundamentally improve the quality of life and contribute to a sustainable world through our businesses. We will stay at the forefront, identifying and resolving the many issues that society faces around the environment, energy, safety, and human rights. We will work with our customers, business partners, and the communities in cooperation and pursue win-win growths by going further together.

**We at Hanwha must become an enterprise of sincerity with trust as our unwavering top priority.** We have pursued a corporate culture that never lost the faith people have given us, even if we lost everything else. It was this sincerity that has driven us to rise from the worst crises in the past, such as the explosion at Iri Station and the Asian financial crisis. We've moved people and changed their hearts. We built trust by not appealing to the mind but to the heart, and by taking responsibility not with words but through action.

Hanwha's sincerity must continue to be integral to our businesses, products, and services. As a company, we need to be mindful of our responsibilities, putting righteous values before profit and our conscience before practical interests. We must continue extending this sincerity to our customers, the society, and the nation as we have in the past 65 years. Because it has indeed served as the foundation for Hanwha's philosophy of serving the country through business and

will help us as we aspire to become a true world-class enterprise.

On this anniversary of our foundation, I hope that each and every Hanwha employee will demonstrate new determination – one that will build on a culture of mutual respect and consideration between the labor and the management, transparency and fair trade, and of ethical responsibilities and practices. In so doing, we will always take the paths to create more opportunities for a better world. I ask our presidents and CEOs of our affiliate companies to demonstrate a sense of responsibility for the long-term by laying the groundwork for the company's future growth and value. Manpower, technology, culture, and other software competitiveness have to be brought up to a global level, too.

Dear members of the Hanwha family,

Some predict that 40 percent out of Fortune Global 500 companies will disappear in the next ten years. Continuing to overcome challenges and pursuing innovation with eyes on the future is not only necessary in our current times but they must be done with enthusiasm. So, let us meet these historic raging waves of change head on, and welcome this new era. And we'll do so with a burning passion in our hearts that will lead the change in our world.

Thank you.

*October 09, 2017*  
*Chairman Seung Youn Kim*

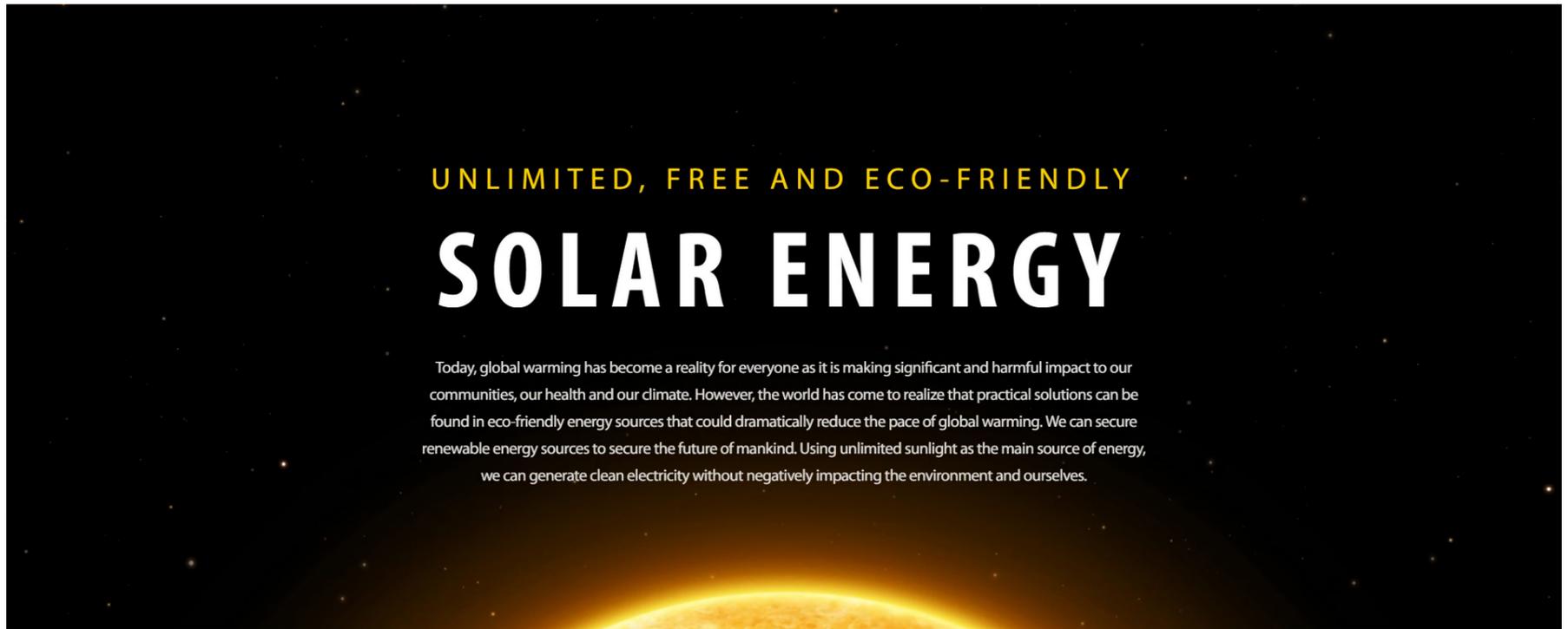
# Solar Energy: A Reality For All

To find out more in detail, please go to [www.hanwha.com/solar-rnd/en/](http://www.hanwha.com/solar-rnd/en/)

UNLIMITED, FREE AND ECO-FRIENDLY

## SOLAR ENERGY

Today, global warming has become a reality for everyone as it is making significant and harmful impact to our communities, our health and our climate. However, the world has come to realize that practical solutions can be found in eco-friendly energy sources that could dramatically reduce the pace of global warming. We can secure renewable energy sources to secure the future of mankind. Using unlimited sunlight as the main source of energy, we can generate clean electricity without negatively impacting the environment and ourselves.



### THE GROWTH IN POPULARITY OF SOLAR ENERGY

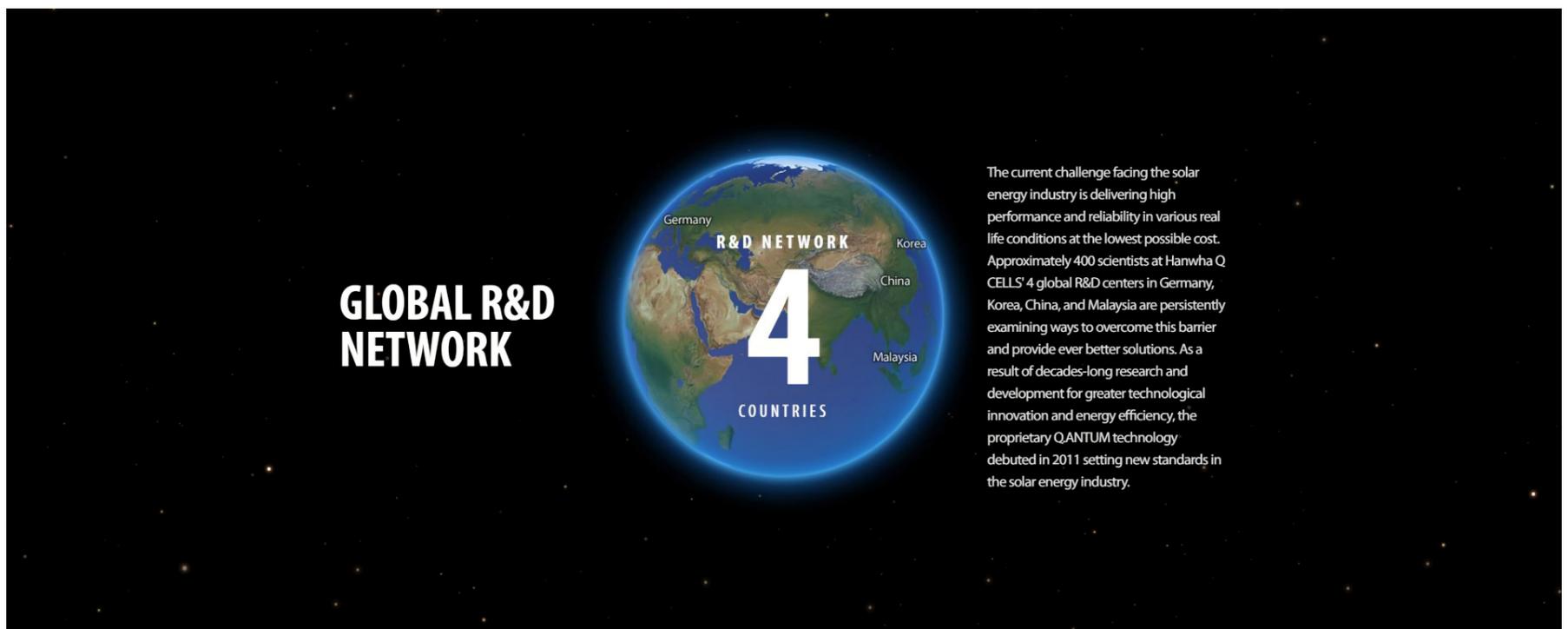


328/Twh by 2017

953/Twh by 2025

Current growth in the popularity of solar energy testifies to this shifting paradigm in energy innovation. According to the International Energy Association (IEA), global demand for solar energy is likely to reach 953/Twh by 2025 achieving an annual growth rate of 14.3% from the 328/Twh required in 2017. IEA also projected that solar energy could contribute 27 percent of global electricity by 2050. And due to recent technological advances, decreasing LCOE has contributed to a surge in solar energy adoption.

### GLOBAL R&D NETWORK



R&D NETWORK

4 COUNTRIES

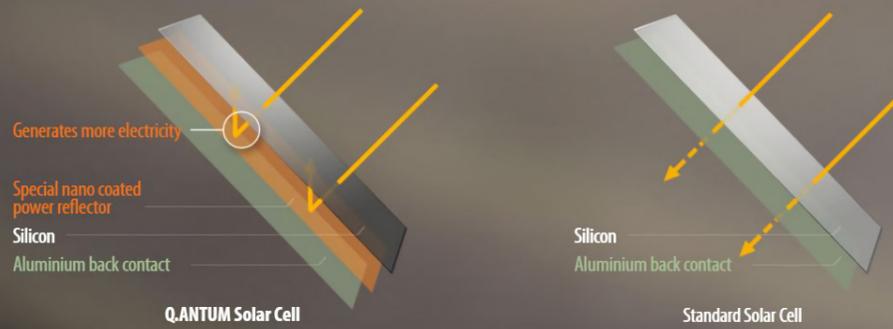
Germany, Korea, China, Malaysia

The current challenge facing the solar energy industry is delivering high performance and reliability in various real life conditions at the lowest possible cost. Approximately 400 scientists at Hanwha Q CELLS' 4 global R&D centers in Germany, Korea, China, and Malaysia are persistently examining ways to overcome this barrier and provide ever better solutions. As a result of decades-long research and development for greater technological innovation and energy efficiency, the proprietary QANTUM technology debuted in 2011 setting new standards in the solar energy industry.



## “DON'T JUST BUY PERC, BUY Q.ANTUM”

The Q.ANTUM technology developed by Hanwha Q.CELLS is based on Passivated Emitter Rear Cell (PERC) technology. PERC allows for the passivation of the solar cell's rear side, which involves installing a reflective layer, designed to capture previously unused sunlight back into the cell where it can be converted into solar electricity.



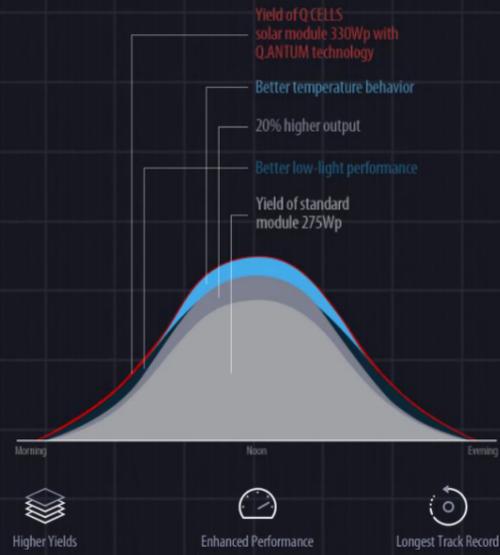
## EVOLVING FROM PERC TO Q.ANTUM: YIELD SECURITY

PERC technology provides high-performance capabilities for solar cells and modules, but there are several potential hazards that can diminish its effectiveness. In order to protect products from degradation, safety risks and management problems, Hanwha Q.CELLS developed yield security technologies including Anti-PID, Anti-LID, Hot-Spot Protect and TRA.Q™.



## LEVEL OF POWER GENERATION: STANDARD vs. Q.ANTUM

The proprietary Q.ANTUM technology boasts the remarkable performance and efficiency of solar cells and modules to greatly increase power generation.



## CERTIFIED EFFICIENCY

Module Efficiency  
**19.5%**

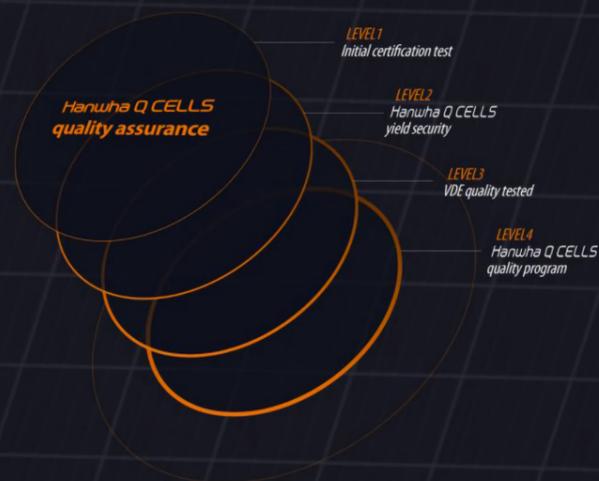
Founded on technical initiatives, Hanwha Q CELLS stood proudly as its Q.ANTUM-based polycrystalline product set a world-record by achieving 19.5% module efficiency and 301 Watts from a standard sized solar module in 2016. This record was officially certified by the Fraunhofer Institute for Solar Energy (ISE), a certified solar laboratory belonging to one of the most renowned scientific societies in Germany.

Standard Sized Solar Module  
**301 Watts**

## UNCOMPROMISING QUALITY ASSURANCE

Hanwha has four ways with which it ensures uncompromising quality and can guarantee that every one of its solar modules will maintain high performance and reliability even under harsh conditions. Hanwha has applied its methodology by leveraging its decade of experience and its wealth of data to develop algorithms and qualitative analysis to perfect its Q.ANTUM technology.

Hanwha applies 4 quality control measures to ensure performance and quality: yield security assessments, examinations by global certification institutions, VDE Quality tests, and Hanwha's own Q-Tests.



# 'ENGINEERED IN GERMANY' EARNS GLOBAL RECOGNITION



## REWRITING HISTORY OF SOLAR ENERGY WITH THE WORLD'S LARGEST SOLAR CELL PRODUCTION CAPACITY

By acquiring the proprietary PV solution, Hanwha Q CELLS has been able to mass produce high quality products. Subsequently, it has become the world's largest producer of in-house solar cells and has a power generation capacity of 6.8 GW. In 2017, Hanwha Q CELLS has achieved a new milestone by producing one billion QANTUM solar cells.

**6.8**  
GW  
Power generation capacity

**1**  
billion  
Q.ANTUM solar cell production

## PROVIDING ENERGY SOLUTIONS TO GLOBAL MARKET

Hanwha provides highly efficient energy solutions to 50 countries around the world. Hanwha has also bolstered its position in the global market by signing a record scale modules supply contract from across the globe.

# Explore This Month's News of Hanwha and Its Affiliates, Taking the Initiative in All Corners of the World



## China



### Sino-Korea Life Insurance Co. Ltd.

On August 23, Sino-Korea Life Insurance hosted "The 4th Hall of Fame" at Pan Pacific Serviced Suites Ningbo in Zhejiang Province to recognize the outstanding accomplishments of its salespeople. The event was attended by a number of executives including CEO Don Wan Koo and representatives from branch offices.

Admittance to the Hall of Fame is the highest honor given to exceptional members of Sino-Korea Life Insurance. The event included the highest number of awardees in history, including the Hall of Fame's chairman and vice chairman as well as members of the Million Dollar Round Table. Other honorees included the most accomplished employee, the best quarterly bancassurance premium award and the insurance premium contribution award. Live streamed on WeChat, the event boasted an unprecedented number of viewers.



The Chief Channel Officer of Sino-Korea Life Insurance, Li Quan, delivered a congratulatory statement for insurance planners and reaffirmed his commitment to achieving business objectives to create a new turning point for the company.



### Hanwha Chemical (Shanghai) Co., Ltd. Hanwha China

Hanwha China carried out the Hanwha Group Training Program from July to September in 2017 in cooperation with Hanwha Human Resource Development Center. The training program, conducted a total of 21 times across six cities in China (Shanghai, Ningbo, Qidong, Dongquan, Beijing and Tianjin), was the largest in history, involving 600 Hanwha staff working at 23 Hanwha branches for 10 affiliates across China.

The training was designed to expand local staff's understanding of Hanwha's history and core values, and to strengthen the Group's spirit and individual business capabilities. To increase local participation, Human Resources selected seven staff in four Chinese affiliates and trained them as in-house lecturers to provide interesting classes and a wide variety of training programs.



The latest training helped foster a cooperative spirit and teaching employees how to apply their newfound expertise. Also, the program helped local staff gain a better understanding of Hanwha Group and its core values, and built employee pride and morale.



### Hanwha Q CELLS Qidong

#### Hanwha Q CELLS Launches Q.PARTNERS Program to Build Presence in China's Distributed PV Systems Market

Following Beijing's introduction of incentives on advanced clean energy & cost-

efficient technologies, PV demand in China has remained robust, particularly for commercial, industrial and residential purposes.

The rapid growth of distributed PV systems has affected the strategy of Hanwha

Q CELLS as well. The company is focused on building stable partnerships with major wholesalers and module developers to boost module sales to PV plants and is set to further prioritize the distributed PV systems market.

Hanwha Q CELLS is currently developing Q.PARTNERS, a program designated to cater to the needs of China's distributed PV systems market. Q.PARTNERS provides product and technology training as well as marketing support to vendors with high-quality products and expertise, carefully screened and selected by Hanwha Q CELLS to meet the company's stringent assessment standards. Vendors selected to become Q.PARTNERS will serve as a bridge between Hanwha Q CELLS and customers as a provider of PV products and are expected to contribute to the expansion of Hanwha Q CELLS' share in the retail market. Hanwha Q CELLS widely promoted the program prior to its launch in

2017 and has already strengthened the company's cooperative relationship with its partners.

Hanwha Q CELLS organized a tour of the Qidong Plant and showcased new products in April and September for Q.PARTNERS. By fostering interaction and cooperation between them, the partners were able to gain a better understanding of Hanwha Q CELLS' advanced technologies.

Hanwha Q CELLS plans to launch, promote high-end Q series products, and expand the Q.PARTNERS program going forward to improve the company's standing in China.



### Hanwha Q CELLS Korea Donates Solar Tree to National Assembly's Climate Change Forum

On August 31 Hanwha Q CELLS Korea unveiled its solar tree through a donation to the National Assembly in commemoration of the 10th anniversary of its Climate Change Forum. The forum is dedicated to the legislation and policymaking of actions for climate change.

The 4.8 x 4.1 meter solar tree is designed to enhance public awareness and raise the profile of renewable energy. Incorporating Q.ANTUM solar cells—a flagship product of Hanwha Q CELLS—the tree can generate and accumulate solar energy during the day and generate spectacular LED light at night using stored electricity.

The tree was jointly made by Hanwha Group and the Smart Technology Institute, an enterprise in Seosan Solar Venture Complex which opened in July 2017. The Seosan Solar Venture Complex reflects Hanwha Q CELLS' commitment to fostering SMEs and the domestic solar PV industry.

The unveiling ceremony was attended by 120 people including Hyun Soo Cho,



President & CEO of Hanwha Q CELLS Korea, numerous political figures and representatives from energy and environment associations.

President Cho said, "The donation is anticipated to not only raise the public awareness of climate change but also to spark a shift towards renewable energy sources. As the No.1 company in the global PV sector, Hanwha Q CELLS will continue to provide proactive support for the government's policies designed to ease the transition towards eco-friendly energy."



### Hanwha Techwin Introduces High-performance CCTV at Wisenet Partners Day

In September, Hanwha Techwin hosted Wisenet Partner's Day events in Gwangju, Daejeon, Busan, Daegu and Pangyo in Korea.

The events aim at identifying security market trends and promote unity and cooperation across approximately 700 partners and agencies. Hanwha Techwin showcased a wide range of new products and solutions, proving itself to be an undisputed market leader in video security and surveillance.

One of the new products that garnered the biggest attention was the 'extraLUX' series. The ultra-low-light camera lineup comes with the world's first F0.94 lenses. These innovative lenses are able to deliver sharp and clear images even in pitch-black darkness.

In addition, Hanwha Techwin introduced the Compact PTZ Camera, which sports a visually discreet design to naturally blend into any space with a slimmed down size compared to existing cameras. The company also featured a Multidirectional Camera that is perfect for an extensive range of monitoring functions and an Intelligent Parked Vehicle Management System which enables



users to check the scene of the accident through clear images in case a car damage or other accidents occur in the parking garage.

Wisenet Partner's Day served as a platform for strengthening the relationship with vendors and to reaffirm the significance of collaboration for a win-win growth. Hanwha Techwin, building on its technological prowess, plans to place a focus on key surveillance products and solutions to cement its position in the international market. ■

# Shifting to a Smart Plant and into the 4<sup>th</sup> Industrial Revolution

- State-of-the-art ICT: big data, mobile, IoT, and RPA to transform its plants
- P-LTE-based explosion-proof smartphones to be installed
- 30 billion won to be invested by 2019, converging traditional industry and IT



Hanwha Total Petrochemical announced its plan to adopt smart plant solutions as part of its strategy to proactively join the 4th industrial revolution.

The company plans to transform its petrochemical plants. Its entire process has already been automated and enabled for extensive data capture but further changes are taking place to transform production facilities into smart plants. Hanwha Total Petrochemical's IT-enabled production lines will be further modified to increase productivity and operational flexibility while simultaneously eliminating human error.

Hanwha Total Petrochemical's transformation is part of a three-year roadmap to complete the adoption of smart plants by 2019. Total investment over the three years is expected to be around KRW 30 billion won.

The company identified four areas—facilities, safety & environment, IT infrastructure, and logistics & operation to improve using advanced IT solutions, big data, mobile technology, and IoT. The changes are expected to transform key components to make a plant intelligent. Changes will follow to enable monitoring of the plant across all its operations and then provide data-driven information to allow for decision-making.

## Big data analysis will improve processes and provide predictive facilities maintenance

Hanwha Total Petrochemical is actively seeking to make use of big data collected from the diverse operations of its plant and then use them to enhance the productivity of its lines and operational efficiency of its facilities.

As a first, step, the Company has employed a global analysis solution firm to analyze the big data from its synthetic resin plant over a period of six months, starting January of this year.

Several measures to improve the quality and production efficiency in resin manufacturing were concluded from the results that were analyzed. These measures and learnings from the project will play an important role in the future

and the analysis will be applied to more big data from other plants like the aromatics and styrene monomer (SM) plant.

To improve operational efficiency, Hanwha Total Petrochemical plans to use its big data analysis to prevent emergency shutdowns by monitoring and detecting anomalies before they occur. To this end, the company has deployed SmartSignal, a predictive maintenance system by General Electric Company, also in January of this year to monitor key assets in its plant and detect performance degradations. Once the analysis of the big data on these facilities is complete, the company plans to combine all analyses and work to establish its own predictive maintenance system that can be customized to the different types of facilities under operation.

Going forward, Hanwha Total Petrochemical seeks to increase the use of big data in areas outside of production processes and facilities, such as safety & environment and customer management, areas that generate atypical data.



### **Korea's first petrochemical production complex to use wireless explosion-proof smartphones**

As part of its blueprint to change to smart plants, Hanwha Total Petrochemical has set up its a P-LTE communication network within its production facility and provided its employees with explosion-proof smartphones. These devices will be able to communicate on the P-LTE network to transmit data transmission and manage tasks.

P-LTE is a wireless communication network for enterprise use. Hanwha Total Petrochemical partnered with LG Uplus to set up the P-LTE network within its production facility, setting up an IoT infrastructure for the future use of wireless sensors and devices.

The explosion-proof smartphones are loaded with diverse applications that are needed to carry out operational tasks. They allow operators to enter and view on-site inspection results on the spot, boosting their work efficiency.

As a part of a pilot program earlier this month, Hanwha Total Petrochemical distributed the smartphones to select employees at different shifts. The plan is to expand the pilot and use the devices to the rest of the plant.

The company has also set up an LTE-communication-based wireless CCTV monitoring system that remotely monitors its production sites. The newly adopted mobile CCTV identifies locations via GPS and supports real-time video monitoring both via the central control room (CCR) and individual PCs.

The company's smart-plant roadmap also includes a plan to establish mobile systems designed to better serve its customers by allowing them to track their items at every stage of the process. The mobile logistics system enables the user to check logistical information in real-time and see where their order is in the workflow – from delivery vehicle to final delivery.

Hanwha Total Petrochemical plans to gradually expand the application of P-LTE into areas like IoT helmets, noxious gas detectors, and drones.

### **Transforming into smart office through robotics process automation (RPA)**

To improve office-work productivity through automation, Hanwha Total Petrochemical will adopt a robotics process automation (RPA) system, a digitized robot that replaces human beings for simple, repetitive office work.

By launching an RPA system to manage logistics including the shipping of documents and maintenance of the daily operation logs, the company expects to cut work hours by 80 percent. Employees with reduced work load could focus on greater high-value-added tasks or focus on innovation.

"Through the Smart Plant project, employees will be able to stay informed plant-wide operations and detect any abnormalities in advance. It will also significantly contribute to improving work efficiency via mobile communication and help facilitate the decision-making process," said a spokesperson at Hanwha Total Petrochemical. "We hope that the project can serve as a model use case for the petrochemical business, traditionally a process industry, taking advantage of the 4th industrial revolution, proactively." ■

# Hanwha Corporation Sets Sights on EU Machine Tool Market

- Exhibiting lathes at the largest machine tool expo in Europe to boost sales, attract new clients and gain foothold in EU-area markets
- Showcasing Hanwha's world-leading technologies with collaborative robots and new models with an integrated automation system



Hanwha Corporation at the "EMO Hanover 2017 Machine Tool Exposition"

At the EMO<sup>1</sup> Hanover 2017 Machine Tool<sup>2</sup> Exposition, Hanwha Corporation will exhibit five automatic lathe models. EMO is one of the world's largest machine tool trade shows and this year from September 18th to 23rd, over 150,000 visitors from 2,200 companies from 45 countries attended.

Of the five automatic lathe models that were displayed at the exhibit, four were gang-type lathes that have a tool post that moves on two axes to machine the material – their model numbers were XD12III-H, XD20V, XD38II-N, and XD42H. The fifth lathe model a turret-type lathe that uses a rotating tool holder to change the cutting tool. It's model number was STL38HY.

The XD38II-N features a collaborative robot automation system that is designed to boost productivity of machining-forged products<sup>3</sup>. The XD12III-H is optimized to operate with high-precision and yield high-output. New upgrades have been added to the previous model, giving the XD12III-H a new competitiveness in the small component tool market. These products will spearhead Hanwha's efforts to identify new demand in the European machine tool market and promote the company's key products to potential customers.

Yeon-cheol Kim, CEO of Hanwha Corporation said, "This Expo will allow Hanwha to gain insight into global manufacturing technology trends while showcasing the excellence of our machine tool production capabilities," adding that "Hanwha will actively promote its leading technologies to build its presence in the largest machine tool markets in Europe: Italy, Spain and France."

Hanwha Corporation launched its machine tool business in 1977 and just 6 years later in 1983, it became the first Korean company to develop automatic lathes. Since then, our company has continued its success in research and development to capture and maintain its top position in the domestic CNC<sup>4</sup> automatic lathe market. ■

#### <sup>1</sup> EMO (Exposition Mondiale de la Machine Outil)

Europe's largest machine tool exhibition held on odd-numbered years alternatively in Germany and Italy, to be held from September 18th to 23rd in Hanover, Germany.

#### <sup>2</sup> Machine Tools

Machines for shaping and machining mechanical parts and components. Called "machines that make machines," these devices form the foundation of the machinery industry.

#### <sup>3</sup> Forged products

Products made with compressive force, such as hammering, to mechanically shape a product made from solid metallic materials.

#### <sup>4</sup> CNC (Computer Numerical Control) Automatic Lathe

Automatic lathes are machining systems designed for mass production with automated control of the machining operation. CNC automatic lathes leverage computers to control the machining in real time. CNC lathes employ a one-stop end-to-end process from material input to completion. These machines are indispensable tools used across all industrial sectors including automotive, electronics, health care equipment and mobile devices.