



2021 Hanwha Solutions
Sustainability Report

2021 Hanwha Solutions Sustainability Report

ABOUT THIS REPORT

Report Overview The 2021 Sustainability Management Report of Hanwha Solutions transparently discloses corporate responsibilities for the economy, society, environment, and sustainability management for active communication with stakeholders.

Reporting Standards First, this report was prepared in compliance with the standards and core options required under the Global Reporting Initiative (GRI) Standards. Second, it reflected recommendations under the Sustainability Accounting Standards Board (SASB) and the Task Force on Climate-Related Financial Disclosures (TCFD) to disclose activities performed to resolve main industrial issues. Third, it abided by the global sustainable management initiative indicators: 10 principles of UNGC and Sustainable Development Goals (SDGs) of UN. Finally, financial information was prepared based on the Korean International Financial Reporting Standards (K-IFRS).

Reporting Period The report contains financial and non-financial performance from January 1, 2020, to December 31, 2020. However, some outcomes include the first half of 2021 due to its significance and timeliness, and quantitative data indicates the last three years' performance (2018-2020) to analyze annual trends.

Reporting Scope The financial data in this report has been prepared based on the Korean International Financial Reporting Standards (K-IFRS), and non-financial data were listed by three divisions of Hanwha Solutions—Chemical, Q CELLS, and Advanced Materials. The corresponding information has been reported to the head office and all domestic production sites and offices.

Reporting Cycle Annual Report (first published in 2021)

Report Assurance Deloitte Anjin LLC independently audited the financial data in this report, and DNV Business Assurance Korea single-handedly verified non-financial data objectively and reliably.

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1. Introduction

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Hanwha Solutions is quickly being recognized as a global leader in energy and material technology-based solutions driven by the new vision of "Sustainable solutions for all, from energy to materials." Furthermore, it strives to fulfill the international task of a sustainable future to solve environmental, economic, and social problems worldwide.

CEO Message

Sustainable solutions for all, from energy to materials

Dear stakeholders, I am Koo Yung Lee, the CEO of Hanwha Solutions.

Since last year, we have suffered unprecedented confusion and unfortunate events due to the COVID-19 pandemic striking worldwide. Moreover, with floods, droughts, and fires occurring worldwide, immediate action is required for the climate crisis.

Therefore, Hanwha Solutions was launched in 2020 with the vision of "Sustainable solutions for all, from energy to materials," among the full swing hit of the global pandemic and climate crisis. This vision indicates our strong will and business direction to materialize sustainable growth by resolving environmental and social issues through energy and material solutions.

To take measures against climate change and fulfill our vision, Hanwha Solutions declares "Carbon Neutrality in 2050" for zero carbon emissions in all business areas by 2050.

Until 2030, we plan to reduce 35% of carbon emissions than 2018 and accomplish zero emissions by 2050. We have already declared to "expand K-RE100" implying that all domestic electric power production would be used as renewable energy. Moreover, since last year, we have been proceeding with a "low-carbon manufacturing process" and was Korea's first to level 1 for the "Carbon Certificate for Solar Modules," established by the government to minimize carbon emissions.

Hanwha Solutions is transforming every business into an eco-friendly business model for sustainable growth.

First, we develop easily degradable bio and biodegradable plastics and establish "resource recirculation" businesses, such as the Plastics-to-Chemicals (PTC) technology, which transfers waste plastic into raw materials. Second, our energy division is expanding businesses from solar power to wind power. Finally, we will launch new businesses of green hydrogen storage and distribution produced from renewable energy to be the world's no. 1 eco-friendly energy company.

Hanwha Solutions will step up its efforts into further reinforcing ESG (environmental, social, and governance) management to create social values and ensure a safe workplace based on labor-management cooperation and transparent management.

Our company was the first in the chemical and energy industry to acquire international standard certificates for both the Compliance Management System (ISO 19600) and Anti-Bribery Management System (ISO 37001) from Korea Management Registrar Inc. (KMR) in December 2020. Since February 2021, we have created a safe working environment through labor-management cooperation, verified by our nomination as No. 1 in safety in Yeosu Industrial Complex.

Our Board of Directors comprises four committees, including female and international members, who have various backgrounds and expertise in each field.

It is Hanwha Solutions' second year after establishment. Although the future is highly unpredictable, we will pave the way step by step in collaboration with our personnel, stakeholder, customers, business partners, and the local community. Therefore, we ask for your encouragement and advice to change crises into opportunities, and opportunities into huge successes. Thank you.

November 2021
President & CEO **Koo Yung Lee**

Company Profile

Founded in August 1965, Hanwha Solutions is a representative company in South Korea, and it provides solutions in various fields based on differentiated technologies and innovation. Its five representative business sectors—chemicals, solar energy, high-functional materials, distribution services, and real estate development—create synergies in providing social, environmental, and climate change solutions. Sustainability drives Hanwha Solutions, it plans to head toward a prosperous and sustainable future through its businesses.

Company Overview

Company Name	Hanwha Solutions Corporation		Head Office Location	Hanwha Building, 86, Cheonggyecheon-ro, Jung-gu, Seoul, Republic of Korea
Year Founded	1965		Credit Rating	Korea Ratings AA- (Stable) (as of April 2021) NICE Investors Service AA- (Stable) (as of April 2021)
CEOs	Koo Yung Lee, Yi Hyeon Nam*, Du Hyoung Ryoo, Dong Kwan Kim, Eun-Soo Kim			
Major Businesses	Chemical Division	South Korea's first PVC producer, who provides petrochemical-based products such as PO, TDI and CA		
	Q CELLS Division	A provider of smart solutions, from solar modules and system solutions to solar power plants and energy retail		
	Advanced Materials Division	A leader of future mobility that produces lightweight composite materials, solar materials and electronic materials		
	Galleria Division	A premium retail service provider that operates department stores, fashion and F&B businesses		
	City Development Division	A large-scale real estate developer and multifunctional high-tech industrial complex creator		

* Nominated the CEO of Chemical Division

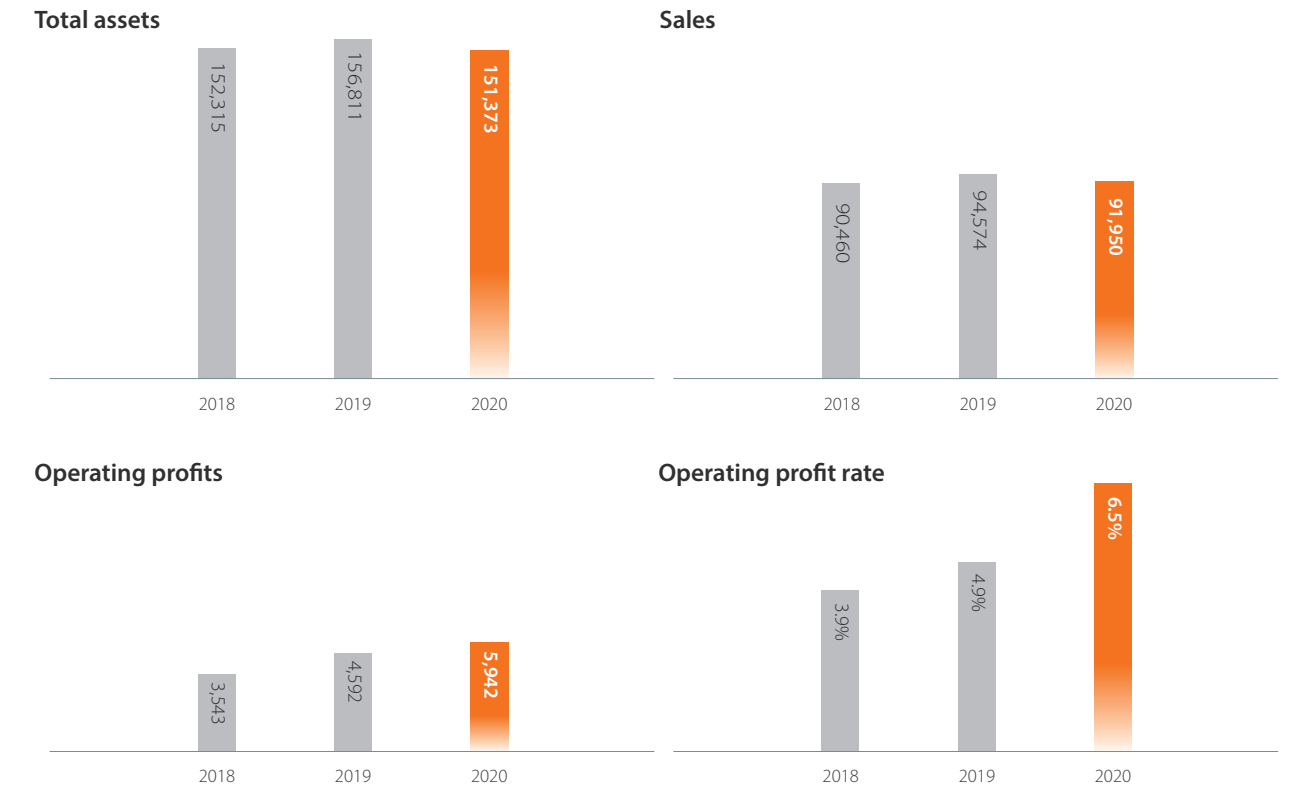
Vision and Strategy

Hanwha Solutions is quickly being recognized as a global leader in energy and material technology-based solutions driven by the vision of "Sustainable solutions for all, from energy to materials."

Vision	Sustainable solutions for all, from energy to materials				
Mission	We aim to deliver sustainable solutions for the planet through smart energy solutions and customer-focused materials.				
Business Statement	Chemical Division	Q CELLS Division	Advanced Materials Division	Galleria Division	City Development Division
	We push the boundaries of what's possible and develop customer-centric solutions to lead the way to a sustainable future.	Q CELLS provides affordable and smart energy solutions through technology and innovation to create a sustainable future for the planet.	As a global leader with advanced lightweight composites and film materials, we're developing sustainable solutions that make the world a better place.	We are a premium content producer that delivers on leading global trends and a differentiated customer experience as the premier retailer in South Korea.	We are creating future value by leading urban development projects in South Korea.

Financial Key Figures

Unit: KRW 100 million



Unit: KRW 100 million

	2018	2019	2020
Total assets	152,315	156,811	151,373
Sales	90,460	94,574	91,950
Chemical	40,221	34,805	33,265
Q CELLS	25,216	35,552	37,023
Advanced Materials	8,538	8,081	7,519
Galleria	6,636	5,936	4,527
Others	9,849	10,200	9,616
Operating profits	3,543	4,592	5,942
Operating profit rate	3.9%	4.9%	6.5%

* December 31, 2020, Based on consolidated financial statements

Our Business Solution (About our Business Divisions)



A global leader motivated to build a sustainable future with the best technologies and solutions

Established in 1965, the **Chemical Division** is a producer of PVC (polyvinyl chloride), the first in South Korea. We also produce LDPE (low-density polyethylene), LLDPE (linear low-density polyethylene), CA (chlorine and caustic soda), and TDI (toluene diisocyanate). By producing basic chemical products necessary in everyday life, we are improving the quality of life around the world. It pursues continuous growth as a creative and competitive chemical leader from basic petrochemical materials to high value-added businesses, including the eco-friendly plasticizer Eco-DEHCH, H-HCR (Hydrogenated Hydrocarbon Resin), and XDI (Xylylene diisocyanate). It is growing into a global eco-friendly company while prioritizing shared growth with customers, adding high product value, improving cost competitiveness, and developing eco-friendly products.



Raising the quality of our lives through clean energy

The **Q CELLS Division** is a global provider of complete energy solutions. We are actively pursuing businesses in major global markets by not only producing solar cells and modules in the mid-stream sector, but also securing downstream value chains, which includes renewable energy power plant development, construction, and operation as well as energy retail service. As a global energy leader, we further expand our growth potential and expertise based on optimized strategies according to energy market characteristics and policies.



Mutual growth with customers by advanced materials

The **Advanced Materials Division** has an innovative lineup of products and technology in the fields of lightweight composite materials, solar materials, and electronic materials. We have established local production and R&D centers in North America, Europe, China, and South Korea. Such connections have enabled us to expand our trusted partnership with various global partners.



No.1 Premium Contents Producer

Since its founding in 1976, **Galleria Division** has specialized in retail services throughout Korea, and now currently has five stores within the major cities across Korea: Seoul, Suwon (Gwanggyo), Cheonan, Daejeon, and Jinju. The Galleria Luxury Hall was Korea's first to introduce the concept of a luxury goods store and boasts a line-up of the most luxurious brands in Korea. Each local branch follows its path by ranking No. 1 in each region by providing differentiated customer experiences through trendy products and various contents.



Private leader of urban development

After a successful start in the Daedeok Techno Valley in 2001, the **City Development Division** has developed six large-scale complexes complex (approximately 13.45 million m² and 5.6 times of Yeouido) over the past 20 years. With six projects underway, we are leading the urban development industry and contributing to the revitalization of the local economy as through the impact of our multifunctional high-tech industrial complexes in Asan, Seosan, Gimhae, Hwaseong, and Yongin.

Global Network



Chemical Division

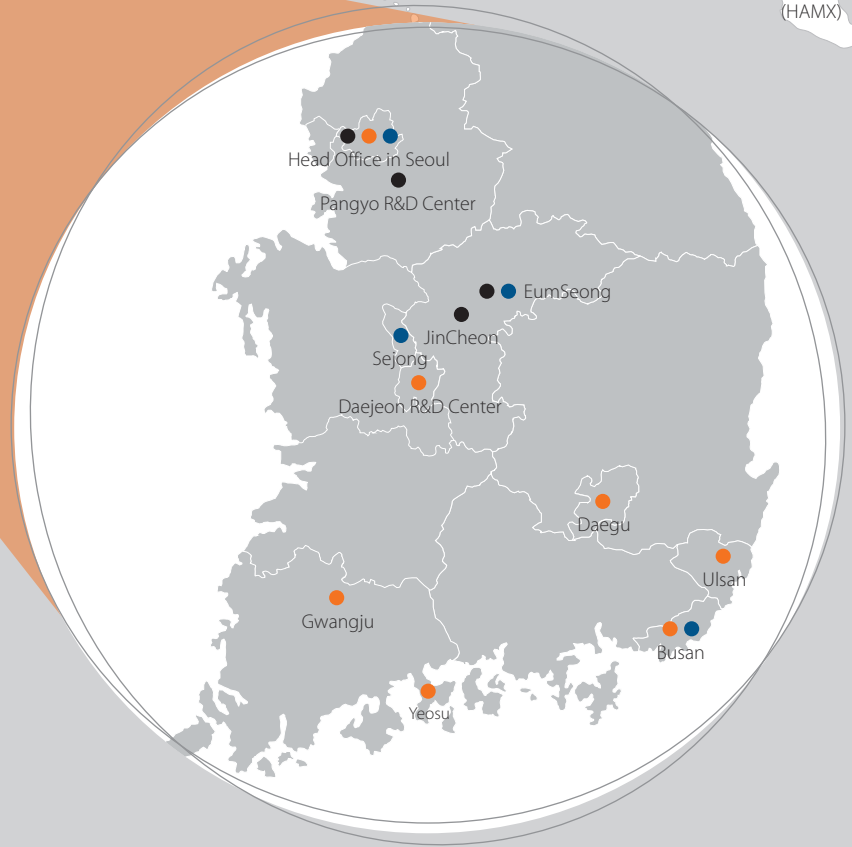
Domestic network (10 points)	Head Office, Daejeon R&D Center, Yeosu Production Site, TDI Production Site, Ulsan 1 Production Site, Ulsan 2 Production Site, Ulsan 3 Production Site, Daegu Branch Office, Busan Branch Office, Gwangju Branch Office				
Global Network (8 points)	<table border="1"> <tr> <td>Asia</td> <td>Hanwha Chemical (Ningbo) Co., Ltd., Hanwha Chemical (Shanghai) Co., Ltd., Hanwha Chemical Corporation Beijing Representative Office, Hanwha Chemical Corporation Guangzhou Representative Office, Hanwha Chemical (Thailand) Co., Ltd., Hanwha Chemical Malaysia Sdn.Bhd, Hanwha Chemical India Pvt. Ltd.</td> </tr> <tr> <td>Middle East</td> <td>International Polymers Company (IPC)</td> </tr> </table>	Asia	Hanwha Chemical (Ningbo) Co., Ltd., Hanwha Chemical (Shanghai) Co., Ltd., Hanwha Chemical Corporation Beijing Representative Office, Hanwha Chemical Corporation Guangzhou Representative Office, Hanwha Chemical (Thailand) Co., Ltd., Hanwha Chemical Malaysia Sdn.Bhd, Hanwha Chemical India Pvt. Ltd.	Middle East	International Polymers Company (IPC)
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Middle East	International Polymers Company (IPC)				

Q CELLS Division

Domestic network (4 points)	Head Office, Hanwha Solutions Corporation (EumSeong Plant), Hanwha Solutions Corporation (JinCheon Plant), Pangyo R&D Center								
Global Network (22 points)	<table border="1"> <tr> <td>Asia</td> <td>Hanwha Q CELLS Technology Co., Ltd. in China, Hanwha Q CELLS Malaysia Sdn. Bhd., Hanwha Q CELLS (Qidong) Co., Ltd., Hanwha Q CELLS Japan Co., Ltd., Hanwha Q CELLS Solar Power Sdn. Bhd., Hanwha Q CELLS Corp. New Delhi, Hanwha Q CELLS Technology (Shanghai) Co., Ltd.</td> </tr> <tr> <td>America</td> <td>Hanwha Q CELLS Canada Corp., Hanwha Q CELLS Chile SPA, Hanwha Q CELLS USA Corp., Hanwha Q CELLS America Inc., Q CELLS Do Brasil Consultoria Empresarial Ltda, Hanwha Q CELLS USA Inc.</td> </tr> <tr> <td>Europe/Middle East</td> <td>Hanwha Q CELLS GmbH (sales office in Germany), Hanwha Q CELLS GmbH (headquarter for technology and innovation in Germany), Hanwha Q CELLS GmbH, Italy, Hanwha Q CELLS GmbH, Israel, Hanwha Q CELLS SAS, France, Hanwha Q CELLS Turkey, Hanwha Q CELLS GmbH, UK, Ireland and Scandinavia, Hanwha Q CELLS GmbH (sales office in Netherland)</td> </tr> <tr> <td>Oceania</td> <td>Hanwha Q CELLS Australia Pty. Ltd.</td> </tr> </table>	Asia	Hanwha Q CELLS Technology Co., Ltd. in China, Hanwha Q CELLS Malaysia Sdn. Bhd., Hanwha Q CELLS (Qidong) Co., Ltd., Hanwha Q CELLS Japan Co., Ltd., Hanwha Q CELLS Solar Power Sdn. Bhd., Hanwha Q CELLS Corp. New Delhi, Hanwha Q CELLS Technology (Shanghai) Co., Ltd.	America	Hanwha Q CELLS Canada Corp., Hanwha Q CELLS Chile SPA, Hanwha Q CELLS USA Corp., Hanwha Q CELLS America Inc., Q CELLS Do Brasil Consultoria Empresarial Ltda, Hanwha Q CELLS USA Inc.	Europe/Middle East	Hanwha Q CELLS GmbH (sales office in Germany), Hanwha Q CELLS GmbH (headquarter for technology and innovation in Germany), Hanwha Q CELLS GmbH, Italy, Hanwha Q CELLS GmbH, Israel, Hanwha Q CELLS SAS, France, Hanwha Q CELLS Turkey, Hanwha Q CELLS GmbH, UK, Ireland and Scandinavia, Hanwha Q CELLS GmbH (sales office in Netherland)	Oceania	Hanwha Q CELLS Australia Pty. Ltd.
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Oceania	Hanwha Q CELLS Australia Pty. Ltd.								

Advanced Materials Division

Domestic network (6 points)	Head Office, Sejong Office, Eumseong Plant, Busan Office, Research Center, Lightweight Composite Material Development Center						
Global Network (9 points)	<table border="1"> <tr> <td>Asia</td> <td>Shanghai Co., Ltd. (HASH), Beijing Co.,Ltd. (HABJ), Chongqing Co., Ltd. (HACQ)</td> </tr> <tr> <td>America</td> <td>America LLC (HAUS), AZDEL, Inc. (AZDEL), Mexico S. De R.L. De C.V. (HAMX), North America Business Center (NABC)</td> </tr> <tr> <td>Europe</td> <td>Europe, s.r.o. (HAEU), European Global Business Center (EBC)</td> </tr> </table>	Asia	Shanghai Co., Ltd. (HASH), Beijing Co.,Ltd. (HABJ), Chongqing Co., Ltd. (HACQ)	America	America LLC (HAUS), AZDEL, Inc. (AZDEL), Mexico S. De R.L. De C.V. (HAMX), North America Business Center (NABC)	Europe	Europe, s.r.o. (HAEU), European Global Business Center (EBC)
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Europe	Europe, s.r.o. (HAEU), European Global Business Center (EBC)						



Galleria Division

Domestic network (7 points)	Head Office, Luxury Hall, Gwanggyo Branch, Time World, Center City, Jinju Branch, Gourmet 494 HANNAM
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City Development Division

Domestic network (6 points)	Anseong Techno Valley (760,330 m ²), West Ochang Techno Valley (892,561 m ²), Second Yongin Techno Valley (297,520 m ²), H-Techno Valley (793,388 m ²), Specialized complex in the Ulsan KTX station area (1,520,661 m ²), City Development Project of Pungho Jangcheon, Jinhae District (231,404 m ²)
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* Based on ongoing city development projects

NEXT BUSINESS SOLUTIONS

Hanwha Solutions fulfills sustainable life cycles for customers for a better future.

Chemical Division

Hanwha Solutions will develop eco-friendly materials to add value and sustainability in our daily lives.

H-HCR (Hydrogenated Hydrocarbon Resin)

H-HCR is a non-toxic, odorless, and eco-friendly adhesive material for hygiene products, such as diapers, sanitary napkins, bandages, and masks.



Eco-DEHCH

Eco-DEHCH is an eco-friendly plasticizer without endocrine-disrupting chemicals eliminated through hydrogenation technology, and is utilized for producing eco-friendly wallpaper, flooring, and baby mats.



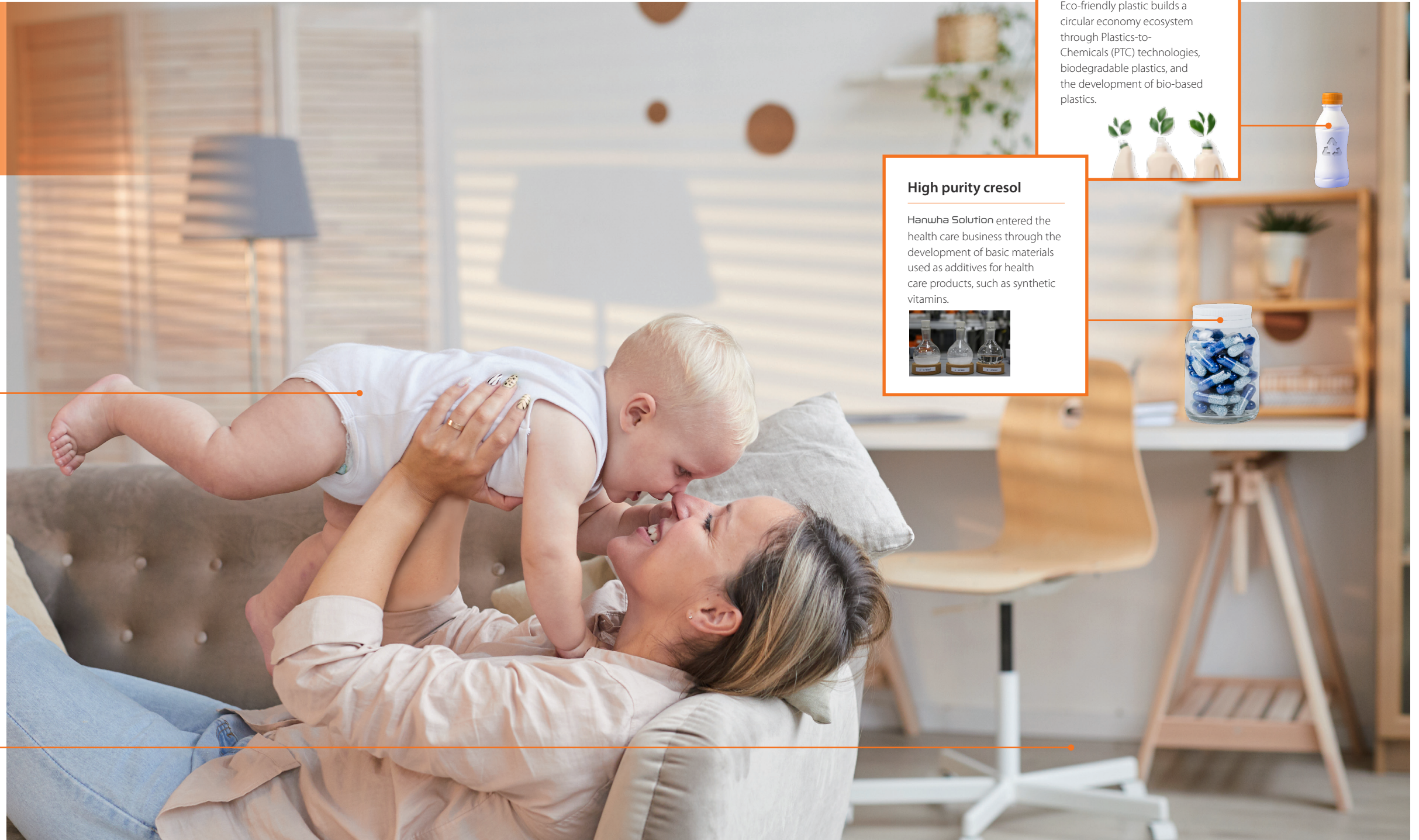
High purity cresol

Hanwha Solution entered the health care business through the development of basic materials used as additives for health care products, such as synthetic vitamins.



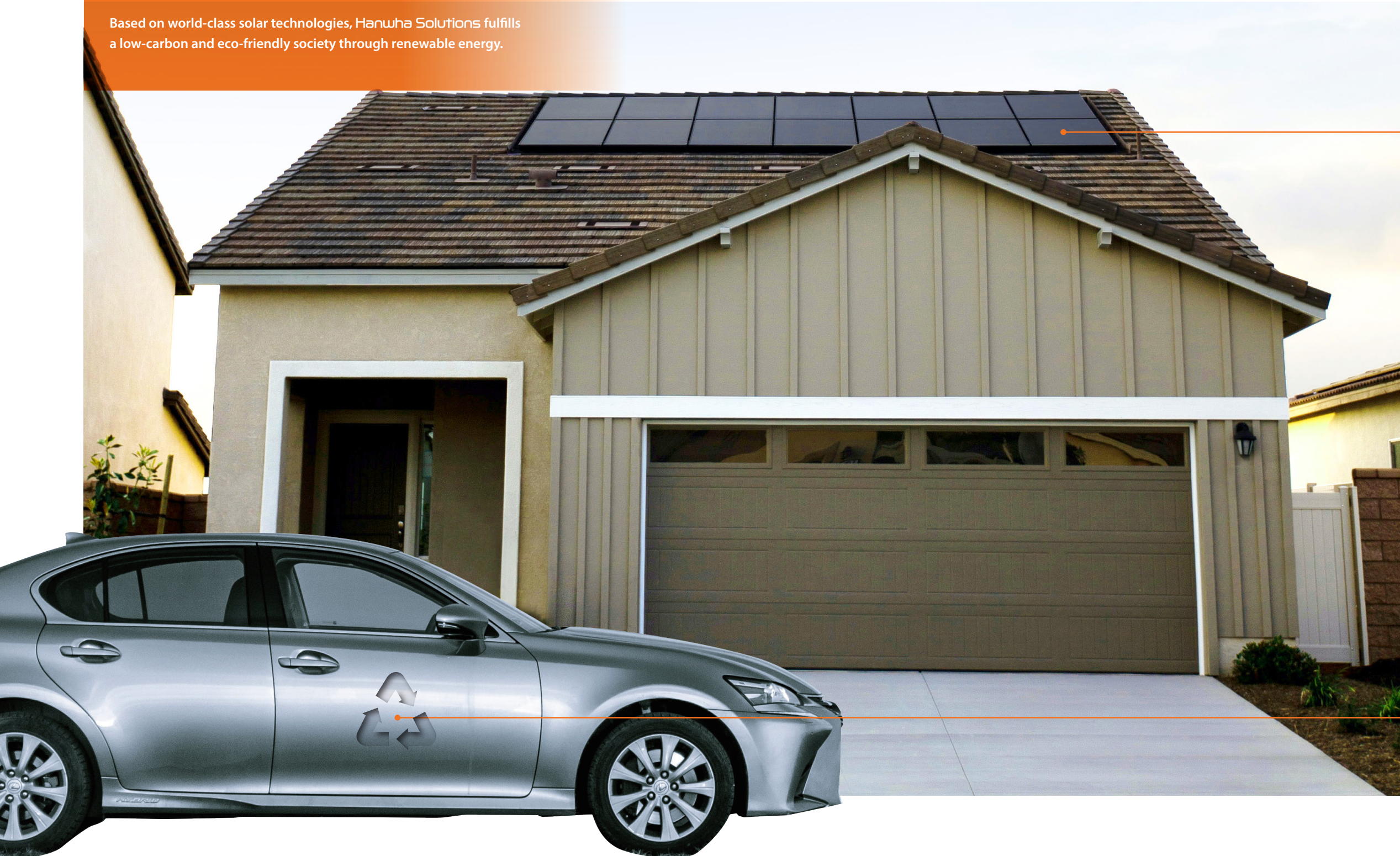
Eco-friendly plastic

Eco-friendly plastic builds a circular economy ecosystem through Plastics-to-Chemicals (PTC) technologies, biodegradable plastics, and the development of bio-based plastics.



Q CELLS Division

Based on world-class solar technologies, Hanwha Solutions fulfills a low-carbon and eco-friendly society through renewable energy.



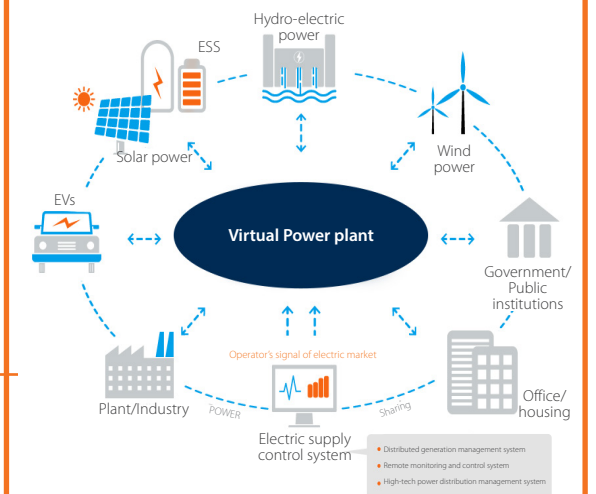
Next-generation solar panels (perovskite tandem solar cells)

It develops next-generation solar panels with better energy conversion efficiency than existing silicon solar cells and plans to establish a tandem cell production facility of 7.6 GW by 2025.



Virtual Power Plant (VPP) business through Energy Storage System (ESS)

It implements Virtual Power Plant (VPP) projects that integrate data from distributed power by increasing energy use efficiency of distributed power sources and materializing energy independence through a business model linked with solar energy generation and Energy Storage System (ESS).

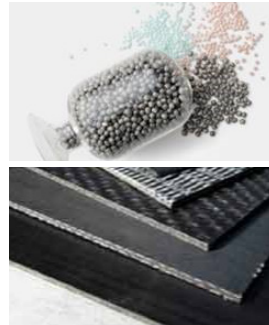


Advanced Materials Division

Hanwha Solutions grows by providing the highest quality products and R&D outcomes through advanced material technologies to protect human and environmental values.

Lightweight composite materials

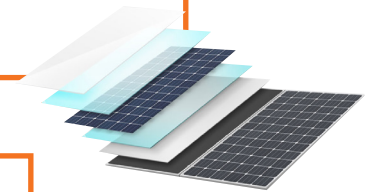
It possesses integrated technologies, from material development to part/product design, by researching high-functional composite materials for aircraft and auto parts.



Solar materials

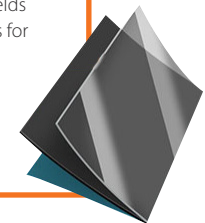
Based on more than 30 years of sheet manufacturing know-hows, it produces and supplies EVA and back sheets used for solar modules.

In 2010, it successfully localized EVA sheets, a core solar material.



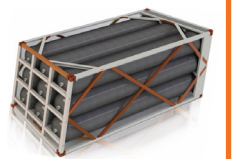
Electronics materials

It ensured great competitiveness in the domestic electronics industry by localizing flexible copper clad laminate (FCCL) materials and expanding fields by producing circuit boards for car electronics devices.



Hydrogen storage tanks

It possesses techniques in manufacturing ultra-light hydrogen storage tanks based on carbon fiber composite materials.



Galleria & City Development Division

Hanwha Solutions presents smart city lifestyles and pioneers a sustainable premium consumption culture.

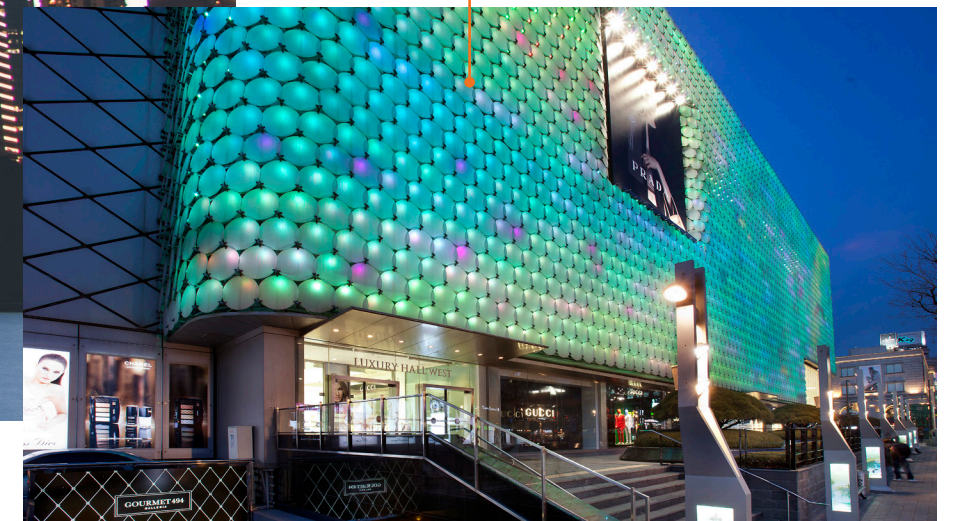


Smart City

It provides various smart city services through converged and integrated information and communication technologies (ICT) and builds low-carbon, eco-friendly cities.

Eco-friendly value-based consumption

The division leads the "Right! Galleria" campaign, which pursues environmental protection, respect of lives, and safety culture, to propose sustainable consumption culture to customers and raise the awareness of eco-friendly value-based consumption.



2. ESG Highlights

- 26 ESG Management
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- 34 Materiality Assessment

A photograph of a laboratory setup. In the foreground, a glass beaker contains a clear liquid, with a pipette tip resting inside it. Behind it, another beaker is visible, and further back, a conical flask sits on a stand. The background is slightly blurred, showing more laboratory equipment. The image is overlaid with a dark grey bar on the left and a white bar on the right, and a large orange block at the bottom right.

Hanwha Solutions strives to provide a better future and sustainable growth for the world through differentiated technology-based solutions in energy and materials.

ESG Management

ESG Management System

Hanwha Solutions manages various ESG (environmental, social, and governance) issues to respond against rapidly changing global environments and establishes. It also operates ESG management strategies and directions for each sector to promote sustainable management. Moreover, it not only proactively identifies ESG risk factors and strengthens countermeasures to prevent the emerging risks, but also seeks new business opportunities from an ESG management perspective and promotes sustainable corporation development by creating synergy effects. Furthermore, Hanwha Solutions will actively comply with global initiatives to achieve carbon neutrality, transparently share the results with stakeholders, and fulfill its duties for humanity and society.

Promotion Strategies of ESG Management



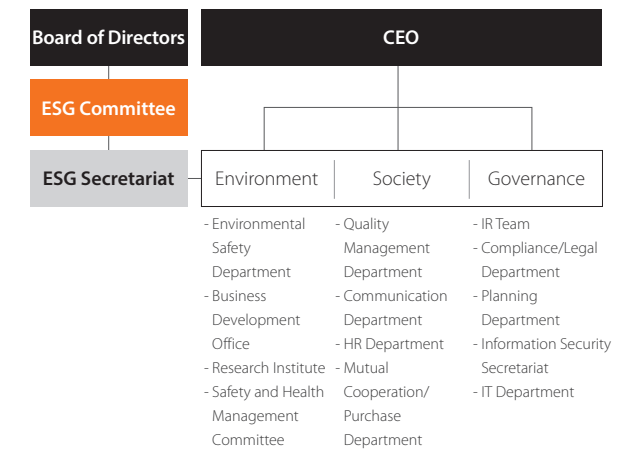
ESG Management Organization

In May 2021, Hanwha Solutions established the ESG Committee under the Board of Directors comprising non-executive directors to ensure independence. The ESG Committee faithfully fulfills its roles and responsibilities as the highest decision-making organization (by deliberations and resolutions) to respond against climate change and global environmental issues and enhance ESG-based corporate value. It also founded the ESG Secretariat as an independent organization under the Strategy Division to administer practical affairs and efficiently take general ESG measures. It not only responds more passionately to the social needs of stakeholders but also reinforces the executive ability of sustainability management through reviews and management of ESG initiatives individually implemented by departments company wide. For substantial ESG Committee operations, Hanwha Solutions will continue expanding mid- to long-term ESG policies and strategies by consistently improving internal proposals and ESG performance evaluations. Furthermore, it will sustainably promote transparent ESG management activities through reviews of core activities and plans through company-wide cooperation and support for sustainability management.

Organization of the ESG Committee

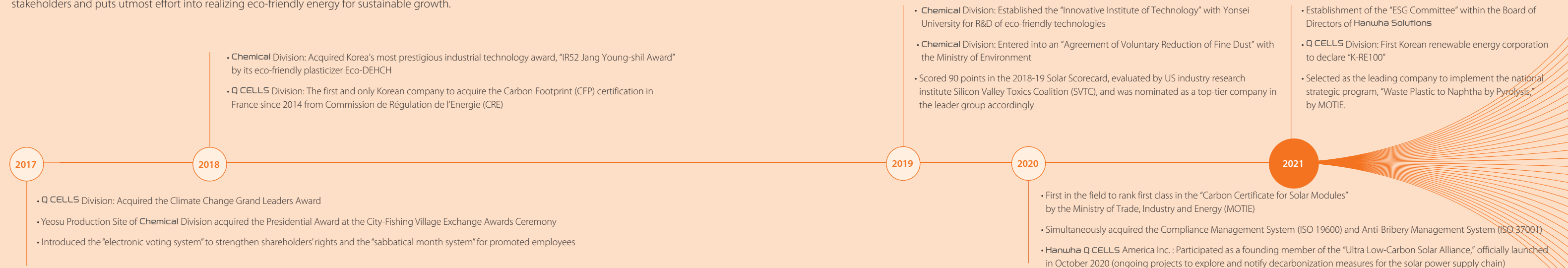
Classification	Name	Major Work Experience	Position	Area of Expertise
All Members	Ji-Hyeong Park	PhD, Economics, University of Wisconsin-Madison	Chairman	Business / Social
Outside Director (4 directors)	Jeong-Ho Seo	BA, Business School, Seoul National University Lawyer, WIZ Law Group (Current)	Commissioner	Governance
	Man-Gyu Choi	Vice-chef of Credit Support Headquarters, Woori Bank Outside Director, SKC Kolon PI Inc.	Commissioner	Business / Governance
	Han-Joo Lee	BA, Biology, University of Chicago CEO, Bepin Global (Current)	Commissioner	Business

ESG Management Organization

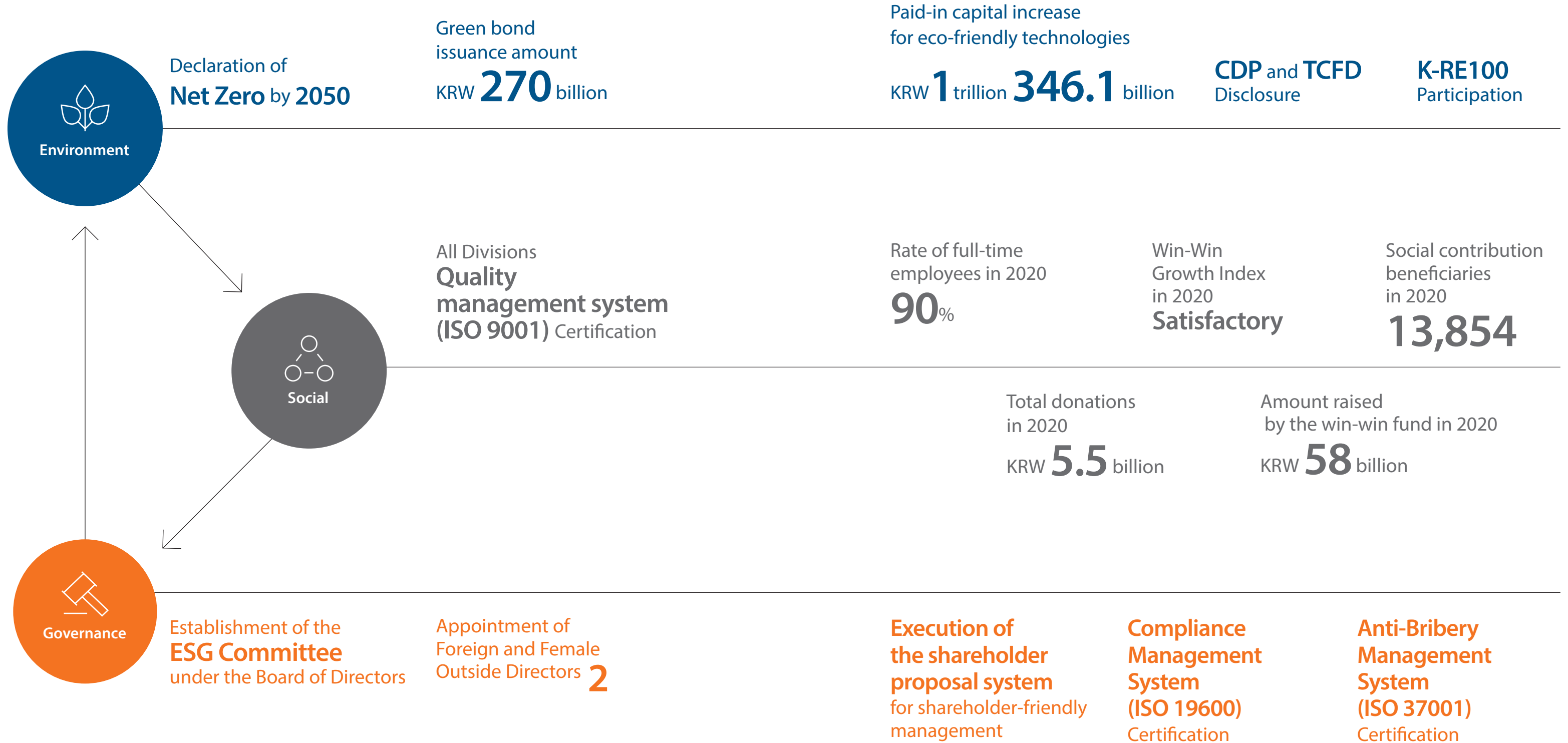


ESG History

Hanwha Solutions promotes communication management through transparent disclosure of ESG management activities to stakeholders and puts utmost effort into realizing eco-friendly energy for sustainable growth.



2020-2021 ESG Key Figures



Sustainability Commitments

UN SDGs Commitment

The UN Sustainable Development Goals (SDGs) are unified goals to be achieved by everyone worldwide. They consist of 17 main goals and 169 detailed targets for global environmental, social, and economical solutions until 2030. Therefore, Hanwha Solutions actively plans sustainability management and propels various activities for the detailed targets of the SDGs and will continue and lead economic growth and international sustainability development.

UN Sustainable Development Goals	Detailed targets	Main activities
Environment		
7. Ensure access to affordable, reliable, sustainable and modern energy for all	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	<ul style="list-style-type: none"> • Provide eco-friendly energy solutions, such as solar and wind power • Establish Green Hydrogen Value Chains • Participate in Hanwha's Happy Sunshine Program
12. Ensure sustainable consumption and production patterns	12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	<ul style="list-style-type: none"> • Research and develop eco-friendly plastics • Reuse waste solar panels and waste batteries • Study eco-friendly chemistry and advanced materials • Participate in the Cleanup Mekong Program
13. Take urgent action to combat climate change and its impacts	13.2 Integrate climate change measures into national policies, strategies and planning 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	<ul style="list-style-type: none"> • Declared Net Zero by 2050 • Disclose CDP and TCFD • Declared participation in K-RE100
15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	<ul style="list-style-type: none"> • Create the Hanwha Solar Forest • Fulfill the One River and One Mountain for Each Company Campaign • Implement the Adopting Happiness Project, the Mountain, Field, Swamp, and Wetland Preservation Project, and others
Social		
1. End poverty in all its forms everywhere	1.3 Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable 1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	<ul style="list-style-type: none"> • Produce "Let's Fight Together!" kits for emergency support for the COVID-19 vulnerable • Participated in the "Flower Bucket Challenge" and "See Art" campaigns • Created transparent donation culture through the "Bright World Fund" • Established countermeasures against COVID-19 for prevention at all workplaces
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations	<ul style="list-style-type: none"> • Operates sports teams for people with disabilities • Manages curriculum and fieldwork at "Hanwha Eco School"
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services	<ul style="list-style-type: none"> • Create a win-win cooperation fund worth KRW 58 billion • Signed "Fair Trade Agreements" with business partners
Governance		
17. Strengthen the means of implementation and revitalize the global partnership for sustainable development	17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships Data, monitoring and accountability	<ul style="list-style-type: none"> • Participated in the 2021 P4G Summit • Supported partners to acquire the ISO 45001 certification • Operate various win-win cooperation programs and support business partners with ESG management



UNGC Commitment

In January 2012, Hanwha Solutions joined the global initiative UN Global Compact (UNGC). It complies with UNGC's 10 principles in human rights, labour, environment, and anti-corruption and reflects them in every management task.



Principles	Classification	10 Principles of UNGC	Main activities
Principle 1	Human Rights	Business should support and respect the protection of internationally proclaimed human rights;	Hanwha Solutions observes the International Labor Organization convention and domestic labor laws.
Principle 2		make sure that they are not complicit in human rights abuses.	
Principle 3	Labour	Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;	Hanwha Solutions ensures and respects the basic rights of employees, such as the right of organization, collective bargaining, and collective action, and holds collective bargaining and quarterly Labor-Management Committee accordingly.
Principle 4		the elimination of all forms of forced and compulsory labour;	
Principle 5		the effective abolition of child labour; and	
Principle 6	Environment	the elimination of discrimination in respect of employment and occupation.	Hanwha Solutions provides equal employment opportunities and operates the job market to support employees to plan and manage their careers voluntarily and strategically.
Principle 7		Businesses should support a precautionary approach to environmental challenges;	
Principle 8		undertake initiatives to promote greater environmental responsibility; and	
Principle 9		encourage the development and diffusion of environmentally friendly technologies.	
Principle 10	Anti-Corruption	Businesses should work against corruption in all its forms, including extortion and bribery.	Hanwha Solutions was the first in the chemical and energy industry to acquire both international standards--the Compliance Management System (ISO 19600) and the Anti-Bribery Management System (ISO 37001).

Stakeholder Communication

Hanwha Solutions considers the following as main stakeholders customers, shareholders, investors, business partners, local communities, the government, and employees who directly or indirectly affect or are affected by significant management activities. It operates various communication channels for each stakeholder to identify their needs and reflect them while establishing and making decisions for business strategies. Hanwha Solutions will continue to fulfill fair and transparent management activities with its stakeholders through active communication.

Stakeholder Status & Major Communication Channels

Stakeholder	Key Concerns of Stakeholders	Communication Channels	Main Activities of Hanwha Solutions
Customers	<ul style="list-style-type: none"> Produce safe and competitive products Produce sustainable, eco-friendly products Personal Information Protection 	<ul style="list-style-type: none"> Homepage (regularly operated) On-site/invitation seminar (regularly operated) Customer satisfaction survey (annually) 	<ul style="list-style-type: none"> Dedicated organization to ensure quality and products that meet customer needs Secure manufacturing competitiveness Enhance customer satisfaction and reliability
Shareholders and Investors	<ul style="list-style-type: none"> Enhance corporate value Risk Management Activate shareholder-friendly management 	<ul style="list-style-type: none"> Annual shareholders' meeting Temporary shareholders' meeting (when necessary) Conference Calls (quarterly) Issue various reports (regularly issued) NDR and IR meetings (regularly held) 	<ul style="list-style-type: none"> Transparent disclosure through the publication of business reports, corporate governance reports, and sustainability reports The shareholder proposal system Shareholder return policy
Employees	<ul style="list-style-type: none"> Work and life balance Fair outcome evaluation Win-win labor-management relationship 	<ul style="list-style-type: none"> Grievance Center (regularly operated) Employee meeting (regularly held) Intranet bulletin board (regularly operated) Labor-Management Committee (quarterly held) 	<ul style="list-style-type: none"> Capacity building programs for employees Improve the performance evaluation system Employee welfare system Create a safe workplace and working environment
Business Partners	<ul style="list-style-type: none"> Expand win-win management Establish fair, cooperative relationships Fulfill fair trade 	<ul style="list-style-type: none"> Annual business partner meetings Training for business partners (regularly) 	<ul style="list-style-type: none"> Visits and technical support Arrange and implement four major fair-trade guidelines Enter into "Fair Trade Agreements" with business partners Create and operate win-win cooperation funds
Local Community	<ul style="list-style-type: none"> Social contribution activities to develop the community and create social value 	<ul style="list-style-type: none"> Social contribution projects (regularly) 	<ul style="list-style-type: none"> Social contribution activities Transparent donation culture
Government	<ul style="list-style-type: none"> Comply with laws and regulations Strengthen Public-Private Partnerships (PPPs) 	<ul style="list-style-type: none"> Partner with public institutions and government departments (regularly) 	<ul style="list-style-type: none"> Participate in public policy projects Cooperative projects with government and public institutions Faithful payment of taxes

Allocation of Economic Values to Stakeholders

Stakeholder	Calculation Criteria	2020
Corporation	Acquisition of tangible assets	432,159
Customers	Sales	5,717,317
Shareholders and Investors	Interest costs	95,584
Employees	Salary + Welfare + Retirement Benefits	592,809
Business Partners	Purchase costs + Outsourcing service costs	3,793,017
Local Community	Donations	4,113
Government	Tax and public imposts + Corporate taxes	93,740

* Cash expenditures of donations, the calculation criteria for communities, excluded those by employees and in-kind donations.

Materiality Assessment

Hanwha Solutions implemented a materiality assessment to identify major interests of stakeholders and sustainability management issues for the economy, environment, and society and effectively reflect assessment results in management. In 2021, a sustainability issue pool was organized based on ESG-related initiatives, global sustainability management standards, and media research analysis to prioritize sustainability issues through the synthetic consideration of benchmarking companies within the same industry and internal and external surveys.

Hanwha Solutions will identify and manage sustainability issues through regular materiality assessment and transparently disclose various corporate activities in its sustainability report to communicate with stakeholders.

Process of Materiality Assessment



Materiality Assessment Results

Materiality Analysis Matrix



Report Major Issues of the Materiality Assessment Result

No.	Classification	Sustainability Issues	Impact on Stakeholder					GRI Standards	Page
			Shareholder/ investor	Customers/ partners	Employees	Finance Administration	Risks		
1	Core Issue	Enhancement of business portfolio focused on future growth	●●●	●●○	●●●	●●●	●●	306-1	50-57, 72-73
2		Eco-friendly investment and business development	●●○	●●●	●●○	●●●	●●	-	44-49
3		Create economic outcomes and enhance financial stability	●●●	●●○	●●●	●●●	●●○	201-1	11, 16-23, 33
4		Response to climate change	●●●	●●○	●●●	●●●	●●●	305-5	40-43, 65-69
5	Common Issue	(Business-related) social contribution activities	●●●	●●○	●●●	●○○	●○○	413	100-103
6		Reinforce the occupational safety and health system	●●○	●●●	●●○	●○○	●○○	403	80-83
7		Reinforce R&D for new technological development	●●●	●●○	●●○	●●●	●○○	-	16-23, 44-57
8		Promote sustainable resource circulation activities	●●○	●●○	●●○	●○○	●○○	302-2, 306	72-73
9		Attract key talents and strengthen employees' abilities	●○○	●●○	●●●	●○○	●●●	401-1, 404-2	90-92
10		Strengthen governance independence and expertise	●●●	●●○	●●○	●○○	●○○	102-22, 23, 24	106
11		Ethical management - Strengthen anti-corruption	●●○	●○○	●●●	●○○	●○○	102-16, 17, 205-2	114-117
12		Connect ESG management activities with businesses	●●○	●○○	●●○	●○○	●●●	-	8-9, 26-27, 38-39
13		Fair evaluation and compensation for employees	●○○	●○○	●●○	●○○	●○○	404-3	92-93
14		Create eco-friendly business opportunities	●●○	●●○	●●○	●●●	●○○	-	48-49
15		Establish and reinforce sustainable management(ESG) strategy systems	●●●	●○○	●●●	●○○	●○○	102-19, 20, 27, 29, 32	26-27
16		Compliance	●●●	●●○	●●○	●○○	●●●	205, 206	114-117
17		Digital and work method transformations	●○○	●○○	●●●	●○○	●○○	401-2	91-95
18		Improve energy efficiency	●●○	●●○	●●○	●○○	●○○	302	40-41, 65-66, 123
19		Risk management	●●●	●○○	●●○	●●●	●○○	102-11	111-113
20		Management of harmful chemicals	●○○	●●○	●●●	●○○	●●●	403-7	74

3. Sustainable Solutions for the Green Planet

40 2050 Net Zero

44 Green Energy

50 Green Recycling

54 Green Hydrogen

Hanwha Solutions declared "Net Zero by 2050" to aggressively take actions against climate change. Moreover, it strives to invest in innovative eco-friendly technologies for a sustainable global environment.



SUSTAINABLE SOLUTIONS FOR THE GREEN PLANET

What practical solutions can companies provide to save the world from climate crisis?

Our world faces the joint task of climate crises, which has risen as a severe issue recently. The market demands companies to play a leading role in promoting ESG management and responding to climate change for a low-carbon society. Many companies declare to transform their businesses based on carbon neutrality and eco-friendly measures, and Hanwha Solutions is not an exception. Furthermore, it carefully and thoroughly considered matters from various angles to put this declaration into action. Hanwha Solutions will put its utmost effort into technological innovation and investment in energy and materials to turn the misfortune of climate change into a blessing through new business opportunities and practical solutions to society.

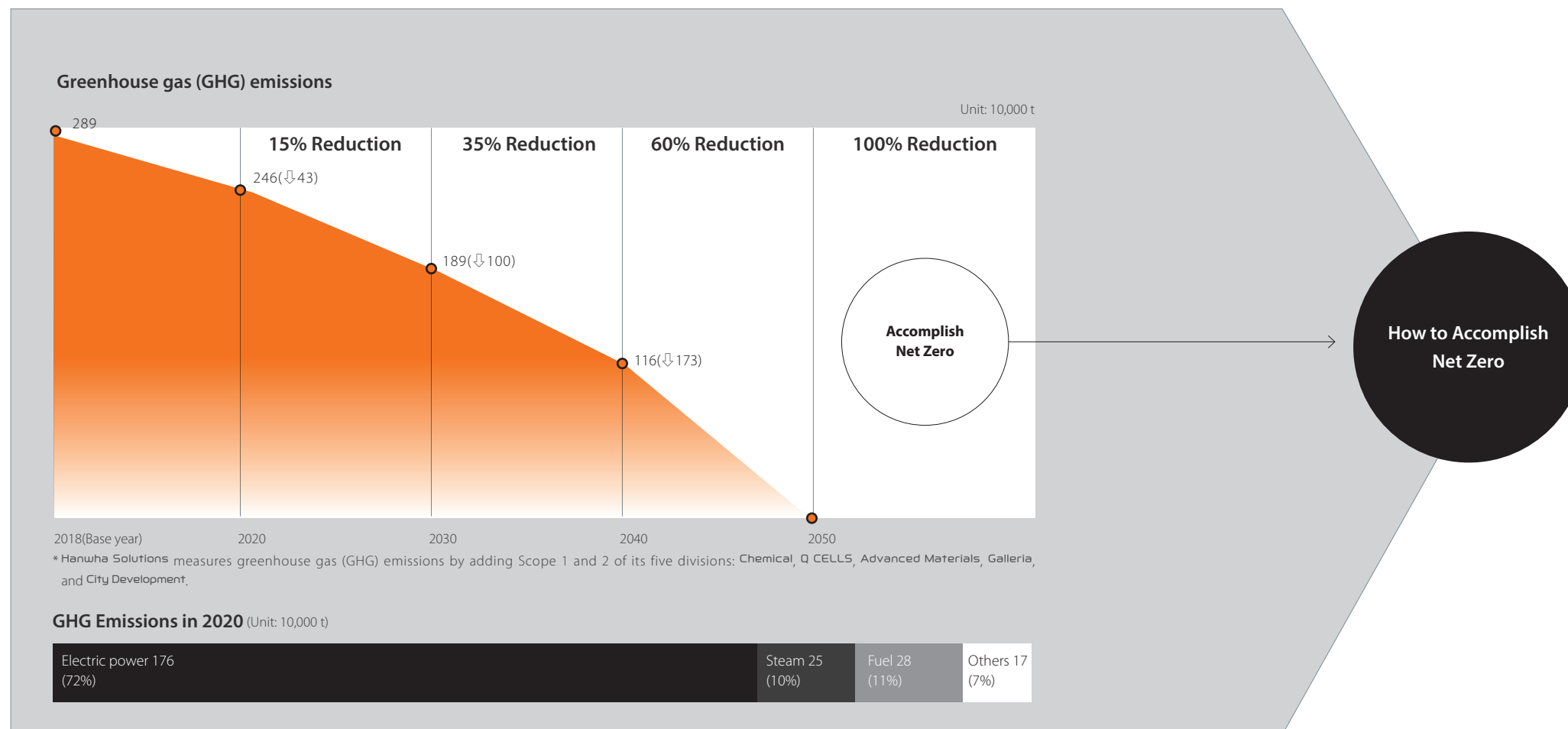


Green Planet 1

2050 NET ZERO

In November 2021, Hanwha Solutions has declared its goal for "carbon neutrality" by 2050 and will accomplish it by strengthening its new business portfolio based on carbon reduction and eco-friendly technologies. Furthermore, it will take the lead in driving the world toward a low-carbon era to fulfill social responsibility and respond against climate change.

2050 Net Zero Roadmap



How to Achieve GHG Reduction

Reduce GHG emissions within the workplace (Scope 1 and 2)

- Reduction of energy usage**
 - Change all processes to reduce energy use
 - Improve energy efficiency (annual target: 0.5% reduction)
 - Replace high-efficiency facilities, recover waste heat, and introduce energy management systems (FEMS, BEMS)
- Use of eco-friendly energy**
 - Increase usage of clean steam, such as byproduct hydrogen (hydrogen boiler)
 - Transfer fuel to hydrogen/ammonia
 - Change electric power to renewable energy, i.e., solar power, offshore/onshore wind power
 - Use eco-friendly cars (electric/hydrogen)

Reduce indirect GHG emissions (Scope 3)

- Capture, store, and use CO₂**
 - Capture CO₂ generated in processes, such as incineration
- Eco-friendly raw materials and products**
 - Use eco-friendly raw materials, i.e., Plastics-to-Chemicals (PTC)
 - Produce eco-friendly products, i.e., water electrolysis business, bioplastic, etc.

Low Carbon Product

First to Acquire France's "Carbon Footprint (CFP)" and Level 1 of Korea's "Carbon Certification"

In September 2020, the Q CELLS Division was the industry's first and only company to rank Level 1 in the "Carbon Certificate for Solar Module System," implemented by the Ministry of Trade, Industry and Energy (MOTIE) to reduce GHG emissions. MOTIE implemented the Carbon Certificate for Solar Module System to develop eco-friendly industries and reduce carbon emissions by quantifying and managing the total carbon dioxide emitted during solar module production processes. There are seven solar modules among the Q.PEAK DUO series that ranked Level 1, which will be supplied to Korean customers from the fourth quarter of 2020.

Furthermore, Hanwha Solutions was Korea's first to acquire the Carbon Footprint (CFP), a certificate issued in France that verifies the amount of carbon emission and is analogous to Korea's Carbon Certificate. The CFP evaluation results show Hanwha Solutions' calculated carbon emissions, which grants extra points when bidding on public procurement projects.



"Research of Localized CMS Material Development" for a Hydrogen Economy and Carbon Neutrality

In June 2021, the Chemical Division entered into an Agreement for Research of Localized Carbon Molecular Sieves (CMSs) in association with the Korea Evaluation Institute of Industrial Technology.

The demonstration project is promoted by the government and aims to build the carbon industry infrastructure in 2021. With the lead of Hanwha Solutions and in collaboration with Korea Carbon Industry Promotion Agency, Korea Carbon Industry Promotion Agency, Chungnam National University, and Korea Institute of Industrial Technology (KITECH), the project is scheduled to be completed by 2025. The high-efficiency CMS, entirely imported from Japan, is used as a material to selectively adsorb and separate desired gas molecules from industrial gases, such as carbon dioxide, generated in the steel manufacturing process. It is used as a core material to produce hydrogen by reforming natural gas and is thus expected to engage in accomplishing a hydrogen economy and carbon neutrality.

Low Carbon Partnership

Participation in the "K-Solar League" Sponsorship

The Q CELLS Division sponsors the "3rd K-Solar League" to raise awareness on solar energy and take measures against fine dust and climate crisis issues. This project is the Korean version of "Solar Bundesliga," the ranking of solar energy generation amount by German organizations, such as the Environmental Preservation Association, since 2003. The K-Solar League started in 2019 as a competition on the performance of solar energy supply between Korean local governments and civic groups, and Hanwha Solutions has been sponsoring this project for two years in a row to raise awareness of solar energy and respond against fine dust and climate crises.

Global Green Initiative



1. Participation in the Carbon Disclosure Project (CDP)

As the necessity of climate change information disclosure has been raised internally and externally, the Chemical Division has taken part in the Carbon Disclosure Project to publicize its climate change strategies and GHG reduction activities transparently. In 2014, it was recognized as an excellent company in the Carbon Management Industry (raw materials sector). Since 2020, the Chemical, Q CELLS, and Advanced Materials Divisions have all taken part in transparent disclosure of Hanwha Solutions' climate change-related information.



2. Disclosure of Information According to TCFD's Recommendations

According to the Task Force on Climate-Related Financial Disclosures (TCFD)'s recommendations, Hanwha Solutions unveiled carbon information and the financial impact of climate change-related corporate activities. It also transparently disclosed climate-related information and risks to stakeholders in the financial market, including but not limited to a decision-making governance and strategy system on climate change, and carbon neutrality goals.



Awarded to: **Telehouse**

3. Acquisition of the Carbon Trust Standard (CTS) Certification

In 2013, the Chemical Division was Korea's first chemical company to acquire the global CTS certification for carbon energy management for its continuous efforts in GHG reductions. This certificate is presented by Carbon Trust, an international consulting company in climate change response. It verifies the companies' excellent energy management, such as through the reduction of GHG emissions. It will continue to settle eco-friendly green management in Korea's chemical industry and propel innovative energy reduction activities to become a top-tier global chemical company.



4. Declaration of Participation in "K-RE100"

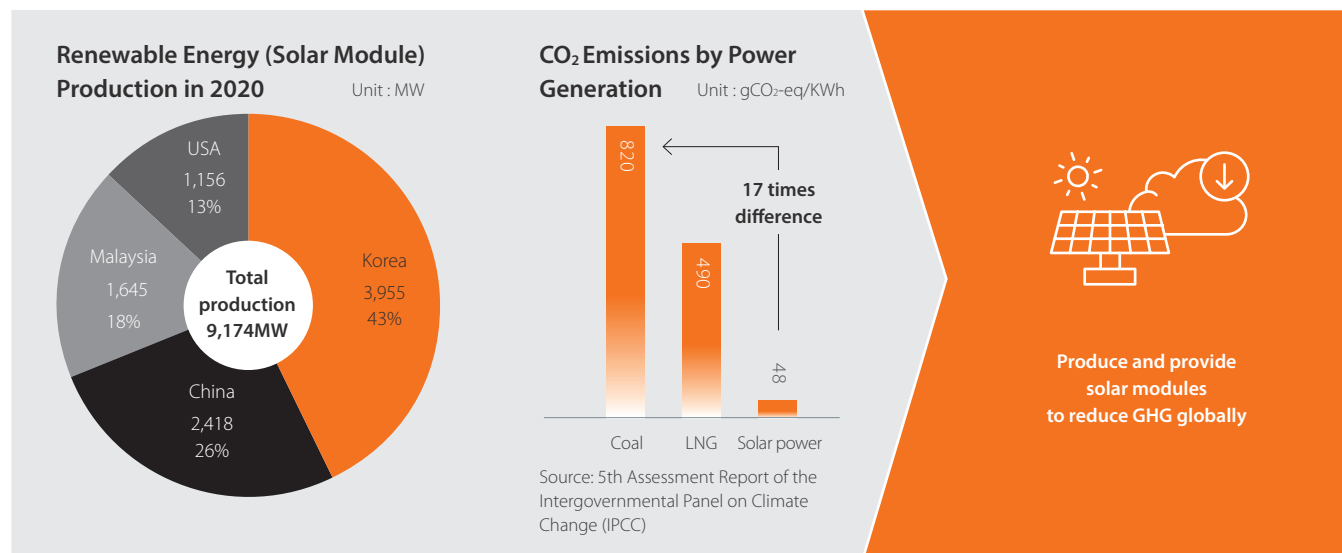
In September 2021, Hanwha Solutions declared to practice "K-RE100" introduced by the Ministry of Trade, Industry and Energy (MOTIE) for its domestic workplaces. To accomplish this goal, it puts continuous effort into the phased transferring of products and power into renewable energy through the green premium system, power purchase agreements (PPAs) with third parties, and private power stations. It plans to use renewable energy for 100% of the electric power required for business. Its mid-to long-term plans concern the parallel application of K-RE100 and other measures that consider the electric power consumption amount and unit price of renewable energy. Furthermore, it will expand its efforts overseas by localizing and applying RE100 in international workplaces.

Green Planet 2

GREEN ENERGY

Hanwha Solutions is growing into a leading global company that takes action against climate change. As a global leader in new and renewable energy, it is expanding its portfolio in various renewable energy sectors, including but not limited to the technological development of next-generation solar modules, wind power generation development, expansion of hydrogen energy businesses, and distributed generation-based energy businesses. Moreover, it broadens research and investments.

2020 Hanwha Solutions' Renewable Energy Business



2020 Hanwha Solutions' Renewable Energy Business

The Energy Storage System (ESS) Business

The Q CELLS Division displays expertise in not only solar modules but also in inverters to utilize solar power-generated electricity and ESS to store electricity. It supplies various electric energy utilizing systems to national and international markets: Germany, France, Italy, the United States, Canada, Australia, Korea, and Japan.

Green Energy Solution (GES) Business

In November 2020, the Q CELLS Division signed an MOU with Pyeongchang-gun and Korea Midland Power on wind power projects in Pyeongchang-gun, including the Construction of the 40 MW Wind Power Plant in Pyeongchang-gun Project. Moreover, it has won and is proceeding with the "41 MW Floating Solar Power Plant in Hapcheon Dam, Gyeongnam," which has the largest capacity in the world, and licensed floating solar power plants in Korea.

Supply of High-Durability, Eco-Friendly Modules Appropriate for Aquatic Environments

The Q CELLS Division supplies modules that use lead (Pb)-free materials and solar modules with higher environmental performance. This enhances practical national land utilization, as solar modules can be used not only on unused sites and roofs but also in moist reservoirs and lakes.

Promotion Plans of R&D on Renewable Energy

Investment in "Perovskite" Tandem Cells, a Next-Generation Solar Power Technology

The Q CELLS Division is developing "tandem cells," referred to as next-generation solar technologies. This technology is manufactured by stacking perovskite on silicon solar cells, which improves efficiency by more than 20% than existing crystalline-structured silicon solar modules. In 2020, Q CELLS was selected as a research institute to perform national tandem cell assignments and is securing basic source technology and commercializing tandem cells accordingly. Its mid- to long-term plan aims at creating the ecosystem of Korea's solar material industry to dominate the future market.

2020 Renewable Energy Performance

100,000 German households subscribe to Q CELLS' green electricity service within a year

More than 100,000 households subscribed for "Q.ENERGY" a German household power supply business, in February 2021, a year after the Q CELLS Division entered the business. Q.ENERGY runs an electric power retail business that supplies eco-friendly electricity generated in German and Austria renewable energy power plants to general households. Q CELLS will become a top-tier global company by actively targeting the global market through differentiated strategies—reasonable electricity fares, eco-friendly electric power, and customized solutions.



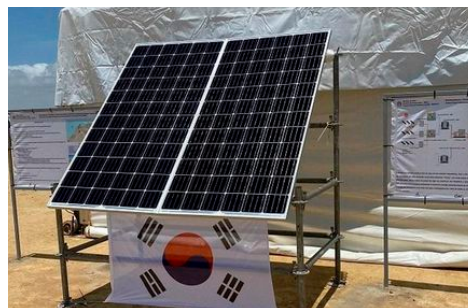
Solar modules installed on households in Augsburg, Germany by Q CELLS

Participant in Berlin's "Solar City Master Plan"

In September 2021, the Q CELLS Division entered into partnerships with local companies and civic cooperatives for joint participation in the solar city master plan in Berlin, Germany, and Berlin announced this earlier last year to accomplish its carbon neutrality goal by 2050. The master plan concerns the installation of 4.4 GW of solar power plants to meet 25% of Berlin's electricity demands, so Hanwha Solutions plans to install solar power on commercial and domestic building roofs to supply eco-friendly electricity to users.

Entrance into South Africa's Largest Solar Power Business

The Q CELLS Division will supply solar modules to South Africa's largest solar power generation project by the Angola government. This project requires the establishment of seven power plants of 370 MW in six Angola provinces, with the first power plant to be completed in the third quarter of 2022. Q CELLS will supply solar modules, and Portuguese company MCA will fulfill engineering, procurement, and construction (EPC). This project aims to meet the electricity demand of 2.4 million residents in Angola and reduce approximately 940,000 t of carbon dioxide annually. Hanwha Solutions plays a significant role in providing better electricity usage environments for communities through solar power plants.



Green M&A

Acquisition of "RES Méditerranée SAS"

Hanwha Solutions acquired 100% of shares of specialized French renewable energy developer "RES Méditerranée SAS (hereafter "RES France")" for roughly EUR 727 million (approx. KRW 984.3 billion) to aggressively expand its global development business.



Hanwha Solutions' acquisition of RES France has not only increased global renewable energy business rights to 15 GW but also secured its wind power competency. Moreover, Hanwha Solutions will jump up as a top-tier domestic and international eco-friendly energy solution leader through aggressive investments in technologies and companies coping with climate change for "carbon neutrality by 2050."

Effect of Acquisition of RES France

- Added the wind power business to its existing solar power business
- 5 GW of pipeline secured by RES France subsequently after the 5 W acquisition of Spain/Portugal and the United States / Korea, respectively ⇒ total global project pipeline: 15 GW
- Able to implement private investment projects (IPP) through its power generation assets

Acquisition of US Energy Software "Company Growing Energy Labs"



In August 2020, the Q CELLS Division acquired Growing Energy Labs (GELI), a US software company and main actor of the virtual power plant (VPP) business. Through data analysis technologies, GELI self-develops and sells energy management systems (EMS) that control commercial solar power generation facilities and energy storage systems (ESSs).

This M&A is expected to expand Q CELLS' business scopes, from its existing solar cell and module-oriented manufacturing businesses to rental businesses of solar power packages (PV+ESS) and enter into an electricity transaction agreement afterward. Furthermore, Hanwha Solutions will speed up to transform into a next-generation energy provider.

Effect of Acquisition of GELI

- Utilization of software technologies, including big data and artificial intelligence (AI)
- Analysis of users' usage patterns after data collection through GELI's self-developed AI technologies
- Arrangement of the basis of expanding the distributed power-based electricity generation and retail business

Green Investment

Hanwha Solutions implements various green financing activities, such as increasing paid-in capital, issuing national/international green bonds, and raising funds for green energy development cooperation to invest in eco-friendly ESG for low-carbon society transformation.

Hanwha Solutions' Plan to Use Recapitalized Eco-Friendly Investments
 In March 2021, Hanwha Solutions recapitalized KRW 1.3 trillion (31,414,000 shares) to invest in next-generation eco-friendly businesses.

Classification	Purpose	Content	Amount	Investment share
Solar power	Facility funds	Development and production of next-generation solar power products	KRW 400 billion	30%
	Operating funds	Distribution of solar generation-based energy	KRW 300.1 billion	22%
	M&A	Acquisition of solar generation-related business assets	KRW 410.4 billion	31%
Green hydrogen	Facility funds	Production of green hydrogen	KRW 100 billion	7%
		Storage and distribution of green hydrogen	KRW 135.6 billion	10%
Sum			KRW 1 trillion 346.1 billion	100%



Issuance of Green Bonds

Hanwha Solutions successfully issued CNY 1 billion of ESG-certified green bonds in an overseas public offering. Sustainalytics, a global assessment institution for sustainability management, stated a second party opinion (SPO) that Hanwha Solutions attained over a certain level in ESG management and is qualified to issue green bonds. Moreover, it acquired the Green 1 (G1) certificate, the highest level for ESG green bond certificates, from Korea Ratings and the NICE Investors Service, respectively, to issue KRW 100 billion worth of ESG green bonds in Korea. Hanwha Solutions plans to procure green bond and use roughly KRW 1.3 trillion of capital increase secured in March this year to develop and produce next-generation solar products (i.e., perovskite), acquire solar generation assets, raise solar generation capabilities, and produce energy based on distributed solar power generation (VPP). Moreover, it will develop water electrolysis technologies to produce hydrogen, expand hydrogen tank businesses to further store and distribute hydrogen, and do M&A of companies with core technologies to further expand investments to accelerate energy transition, carbon neutrality, and eco-friendly energy.



“The Industrial-Financial Cooperation Program for Green Energy Development” by Hanwha Group and Korea Development Bank (KDB)

In May 2021, Hanwha Group and Korea Development Bank (KDB) signed an agreement for the “The Industrial-Financial Cooperation Program for Green Energy Development.” Hanwha Group will be supplied up to KRW 5 trillion funds in the next five years. It plans to invest the provided funds in expanding eco-friendly energy businesses, such as solar power and hydrogen. Furthermore, Hanwha Group and KDB will join forces to arrange KRW 100 billion to promote small- and medium-sized enterprises (SMEs) of green technology fields to create a low-carbon industrial ecosystem. Hanwha Group and KDB plan to raise KRW 30 billion, respectively, and KRW 40 billion from the private sector so that SMEs can stably secure funds to obtain competitive core technologies. Significantly, the KDB chose the Hanwha Group as the first target for industrial-financial collaboration in low-carbon and eco-friendly energy sectors, which implies its acknowledgment of Hanwha Group’s qualifications as a prestigious global eco-friendly company and its efforts and performance for ESG management. In line with the zero-carbon era, global green energy leader Hanwha will continue to take action against climate change and lead environmental management actively.



Participation in the Korean Green Finance Classification System (K-Taxonomy)

The Korean Green Finance Classification System (K-Taxonomy) stipulates unified definitions and standards on ESG investments and clean technology and presents qualifications for green bonds to promote companies’ effective development of eco-friendly business models. Hanwha Solutions participates in the industry council organized by the Ministry of Environment and Ministry of Trade, Industry and Energy (MOTIE) to contribute to K-Taxonomy establishment. Furthermore, the final draft will be finalized at the end of 2021 to be applied as practical guidelines to build eco-friendly green business and investment strategies.

Green Planet 3

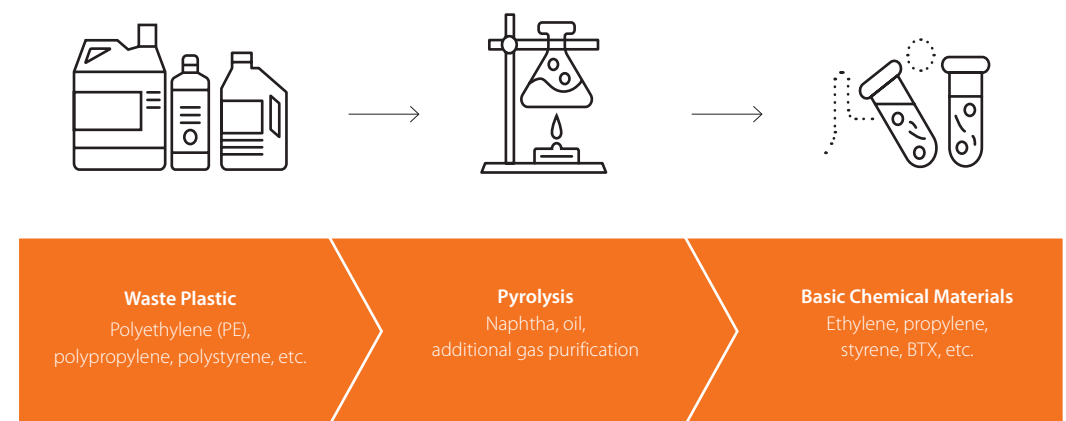
GREEN RECYCLING

Hanwha Solutions makes various efforts to reuse the world's limited natural resources efficiently and sustainably. It leads the way in realizing a recirculation economy society by transformations from the previous linear business structure (production-use-disposal) to a recirculation business structure (production-use-regeneration).

Commercialization of Plastics-to-Chemicals (PTC) Technologies

Plastics-to-Chemicals (PTC) Technologies

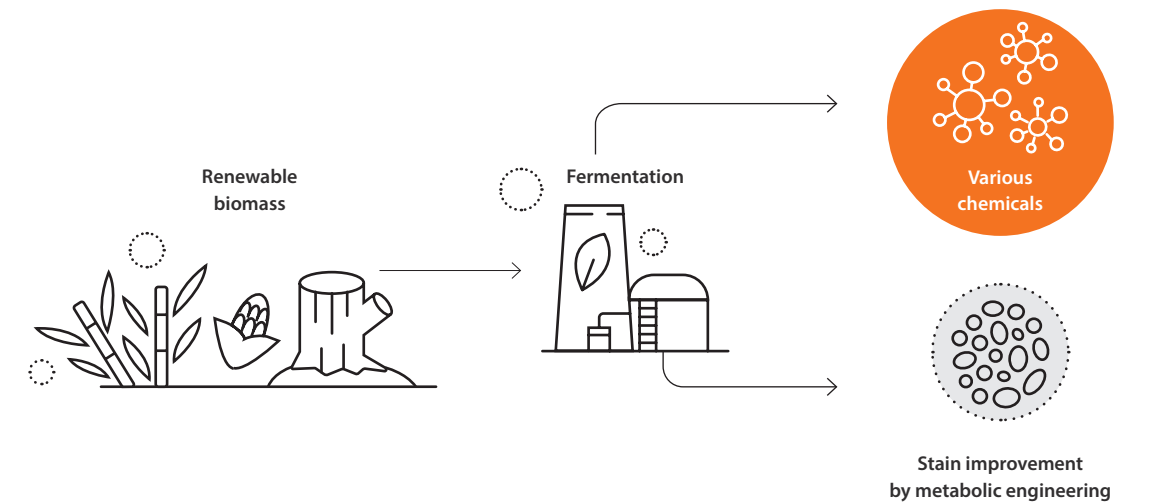
In January 2021, Hanwha Solutions and the Korea Institute of Energy Research (KIER) signed an MOU for "Development of Eco-Friendly Plastics-to-Chemicals (PTC) Technology" to jointly develop technologies to transform waste plastic pyrolytic oil into high-quality chemical materials. Hanwha Solutions was nominated as the lead company for the national project "Waste Plastic to Naphtha by Pyrolysis" by the Ministry of Trade, Industry and Energy (MOTIE) in April 2021 and conducted relevant research accordingly. Hanwha Solutions will transform naphtha generated from waste plastic through PTC technologies from the Naphtha Cracking Center (NCC) into basic plastic materials, such as ethylene and propylene. By enabling the reuse of plastics, it will build a recirculation economy system.



Commercialization of Biochemical

Bio-Based Plastic Technologies

Deviating from the conventional chemical industry based on fossil fuels, the Chemical Division Chemical uses biomass raw materials and propels R&D on bio-based plastic to produce eco-friendly products. Its research focuses on the "polymerized bio-based plastic" method, which derives fermentable sugar from biomass extracted from renewable plants to produce monomers for polymerization, and the "combined bio-based plastic" method, which polymerizes biomass-based monomers and petroleum-based monomers. Most resources use recyclable biomass raw materials so CO₂ emissions are significantly and efficiently reduced than the existing production method of petroleum-based plastics.



[Special Case] MOU Signed with Chungcheongbuk-do to Activate Pyrolysis of Waste Plastics

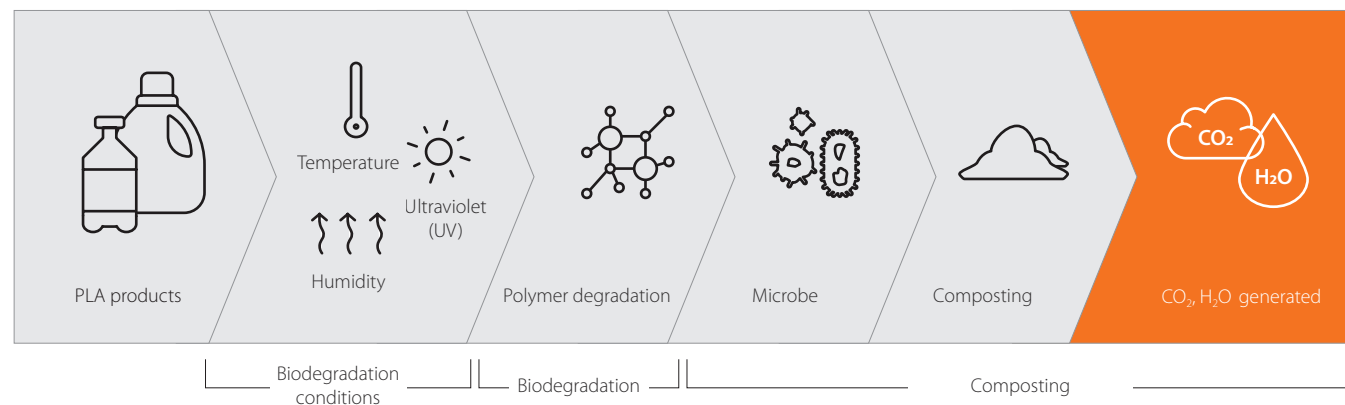


In August 2021, Hanwha Solutions and Chungcheongbuk-do Province signed an MOU for a resource recirculation economy that recycles waste plastics as resources to recycle rapidly increasing plastic waste because of the rise of single-person households and contactless orders for COVID-19 quarantine measures. Hanwha Solutions will realize regional resource recirculation economies through value chain constructions connecting Hanwha Corporation/ Machinery to Hanwha Solutions and the development of leading waste plastic pyrolysis techniques.

Commercialization of Biodegradable Plastic

Biodegradable Plastic Technologies

The Chemical Division makes polyethylene degradable to secure biodegradable PO compound composition technologies, improving competitiveness and property over existing bioplastics. Therefore, developing and commercializing degradable polyethylene composite materials are expected to effectively improve waste issues by replacing most used plastic products, such as disposable bags, food containers, agricultural films, and fishing gear and nets. Furthermore, Hanwha Solutions develops products with outstanding decomposition functions underground and under the sea through existing polyester polymer manufacturing methods to alleviate severe marine pollution incurred by microplastics.



[Special Case] "Industrial-Financial Cooperation Program for Green Energy Development" by and between Hanwha Compound and SPC PACK

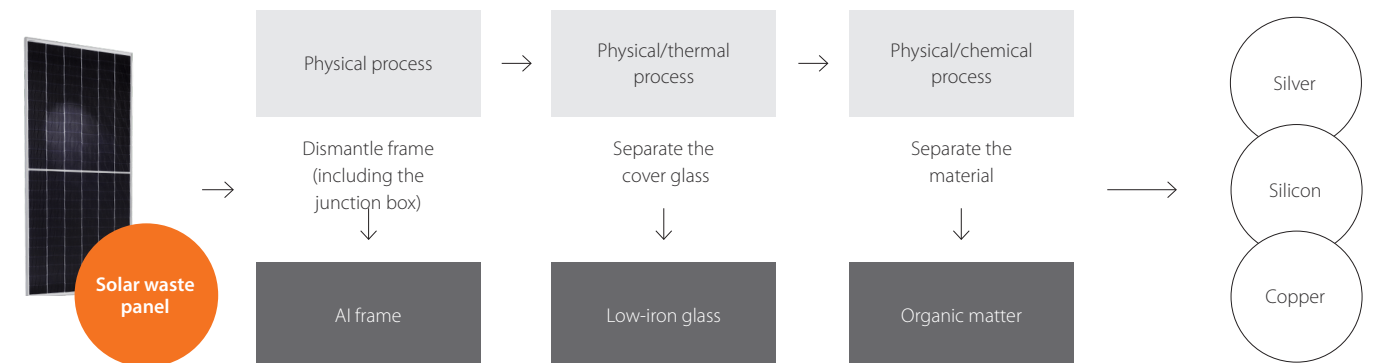


In June 2021, Hanwha Compound, a wholly owned subsidiary of Hanwha Solutions, signed an MOU with SPC PACK, a package manufacturing subsidiary of the SPC Group, to develop and apply eco-friendly materials. Hanwha Compound's compound technologies were applied to maintain the excellent processability and soil degradability of polylactic acid (PLA) while strengthening its fragility, as it tends to break more easily than general plastics. Hanwha Compound's technologies will be applied in SPC Group's Paris Baguette, Baskin Robbins, and Dunkin Donuts from the second half of this year.

Recycling Solar Panels

Recycling Solar Panels

The world's mounting interest and investment in solar power rapidly increased the installation of solar panels, raising concerns about the generation of carbon dioxide during solar module productions and disposal of expired solar panels (waste panels). Q CELLS leads and produces eco-friendly solar panel worldwide and fulfills responsibilities for a sustainable future by including solar panels in the Extended Producer Responsibility (EPR) System, resolves waste issues by reusing and recycling modules, and prepares resource circulation.



[Special Case] "Participation in the "Extended Producer Responsibility (EPR) of Solar Panels"



In August 2019, Q CELLS jointly signed an MOU with the Ministry of Environment and the Ministry of Trade, Industry and Energy (MOTIE) to introduce the Extended Producer Responsibility (EPR) policy. Moreover, it will pay the government "waste panel disposal fees" for the funds to activate waste solar panels, complete the recycling center, and develop technologies by 2022. In Korea, EPR will be implemented in earnest from 2023, and Hanwha Solutions will build a waste solar panel recycling system for eco-friendly recycling.

Green Planet 4

GREEN HYDROGEN

Hanwha Solutions has been developing capabilities throughout its entire business cycle, from production to supply of hydrogen, based on caustic soda (CA) electrolytic technology accumulated over 30 years. Hanwha Solutions supply green energy without carbon emissions based on its technical skills and aims to become a top-tier hydrogen production and supply company by entering national and international green hydrogen markets.

Supply of solar modules and ESS for hydrogen fueling stations

The Q CELLS Division will supply renewable energy from solar and wind power plants for green hydrogen production.

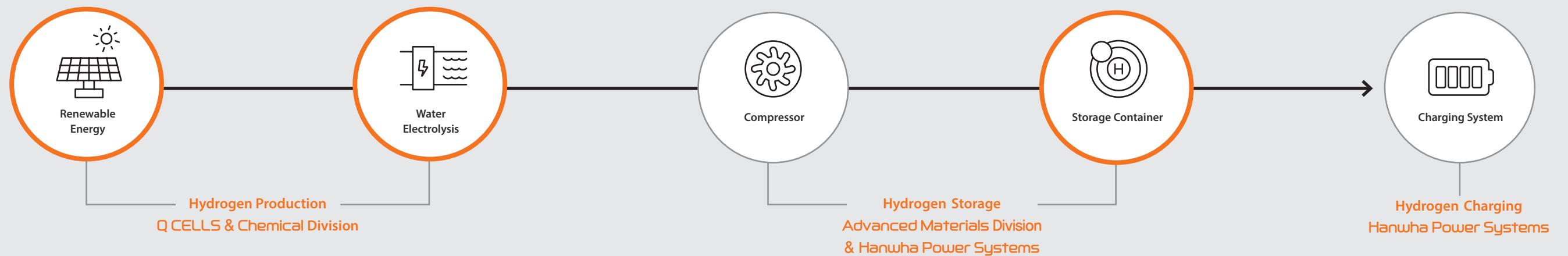
Acquisition of US hydrogen tank company "Cimarron"

In December 2020, the Advanced Materials Division signed a contract to be a wholly owned subsidiary of US high-pressure tank company Cimarron. Cimarron's world-class technical skills accelerated the expansion of green hydrogen storage and transportation businesses in high-pressure hydrogen tanks. Also, Hanwha Solutions added tanks for hydrogen transportation tube trailers, ultrahigh-pressure tanks for charging stations, and aerospace tanks to its existing tanks for hydrogen vehicles.

Development of water electrolysis technology "Anion Exchange Membrane (AEM)"

In 2021, the Chemical Division has secured materials and parts technology for the next generation "Anion Exchange Membrane (AEM)" water electrolysis system, optimized for renewable energy usage. Based on these technologies, it focuses its research power on designing and manufacturing large-capacity systems. The anion exchange membrane water electrolysis technology possesses the advantages of currently commercialized alkaline water electrolysis and cation exchange membrane water electrolysis. So, it can produce high-efficiency, high-capacity water electrolysis systems with less investment than previous systems.

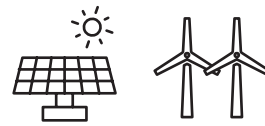
Hanwha Solutions Builds Its Green Hydrogen Business Model



The Q CELLS Division improves the quality of our lives through its clean energy businesses from solar to wind and green hydrogen.



Green hydrogen **Establishment of a green hydrogen production complex**



- Produces and supplies clean energy and power to generate hydrogen produced by electrolysis through renewable energy, such as solar and wind power

- Ongoing development of a green hydrogen production complex based on renewable energy

The Chemical Division will become a leading company in the global green hydrogen industry by being the world's first in commercializing and increasing the MEA water electrolysis capacity.



Source material	MEA	Stack

- Non-platinum (high-efficiency catalyst)
- Anion exchange membrane with high conductivity/durability

- Development of continuous membrane electrode assembly (MEA) process

- Stack design and production based on flow path and thermal analysis

The high-pressure vessels with composite materials can be used in various fields economically and efficiently, including but not limited to production, transportation, and storage of hydrogen.



Hydrogen Fuel Storage **Hydrogen transportation** **Charging Stations**



- High-pressure tank (Working pressure at 350~700 bar)
- Applications (Hydrogen fuel tanks for hydrogen fuel cell drones, passenger cars, commercial vehicles, trains, and ships)



- High-pressure tank (operating pressure 350~700 bars)
- More than 4 times the transportation efficiency Compared to steel products
- Lightweight and increased storage capacity
- 20FT, 40FT customized modules available



- Ultra-high-pressure tank (Maximum pressure up to 900 bar)
- Package-type design
- Highly efficient process

Hydrogen supply for car fuels



- 1. Refine brine**
Remove impurities from brine
- 2. Conduct electrolysis**
Decompose brine from an electrolyzer to raw caustic soda material and hydrogen
- 3. Classify raw materials**
Transfer raw materials to the caustic soda production and hydrogen fabrication processes
- 4. Highly purify hydrogen**
Purify 99.99% of hydrogen
- 5. Supply to hydrogen fueling stations**
Supply hydrogen for vehicle fuel through a hydrogen car

Hanwha Solutions will enter the hydrogen market for car fuel with an estimated annual amount of 370,000 t and KRW 3.2 trillion in 2030 and aggressively establish a hydrogen ecosystem for hydrogen production, storage, and transportation. Moreover, Hanwha Solutions decided to supply Hyundai Glovis with hydrogen for car fuel to support its ongoing construction project of hydrogen charging networks at expressway rest areas. It will supply 48 t of hydrogen for two years from July 2021 and expand its supply according to the expanding hydrogen charging infrastructure. The hydrogen to be supplied will be produced in the caustic soda production process of the Yeosu Plant, and the produced hydrogen will be converted into 99.99% pure hydrogen for car fuel through a refining process. Finally, Hyundai Glovis will supply the provided hydrogen to local hydrogen fueling stations. From this point on, Hanwha Solutions will gradually expand the hydrogen supply for car fuels and establish the hydrogen value chain infrastructure to fulfill production for supply.

[Special Case] Implementation of the "Green Hydrogen Complex" Construction Project in Pyeongchang

In August 2021, Hanwha Solutions signed an agreement with Gangwon-do Province and Korea Gas Technology Corporation to establish a "Green Hydrogen Demonstration Complex." It aims to commercially transport green hydrogen by establishing a water electrolysis facility that produces up to 290 t of green hydrogen annually in the site of 725 m2 at Daegwallyeong-myeon, Pyeongchang-gun, Gangwon-do, Rep. of Korea. This facility will supply hydrogen to nearby hydrogen refueling stations for the next 15 years. The entire green hydrogen supply produced through the electricity of Gangwon-do wind power plants will transport hydrogen buses, trucks, and cars through hydrogen fueling stations. According to the agreement, Hanwha Solutions will verify the green hydrogen business model based on renewable energy and activate Gangwon-do's economy and Korea's hydrogen ecosystem.

4. ESG Performance

Environment

- 62 ESH Management System
- 65 Response to Climate Change
- 70 Environment Management
- 80 Safety and Health Management

Social

- 86 Quality Management
- 90 Talent Management
- 96 Win-Win Management
- 100 Sharing Management

Governance

- 106 Corporate Governance
- 111 Risk Management
- 114 Ethics and Compliance Management
- 118 Information Security



Hanwha Solutions strives to meet the Environmental, Social, and Governance (ESG) needs of various stakeholders and pave the way for a sustainable future.

Environment

ESH Management System | Response to Climate Change |
Environment Management | Safety and Health Management

Hanwha Solutions provides green solutions for everyone by adapting an eco-friendly management philosophy that contributes to global environmental conservation for a sustainable future for humankind.

Key Performance in the Response to Climate Change

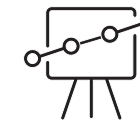


Participation in the climate change initiative
Information disclosure for the Carbon Disclosure Project
(CDP) and the Task Force on Climate-Related
Financial Disclosures (TCFD)

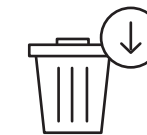


Declaration of
2050 Net Zero
Road Map

Key Performance in Environment Management



Final disposal rate of performance management
of resource circulation exceeding the baseline target
by **159%** (Q CELLS Division)



Reduction of waste generation
by **16%** compared to that
of the previous year

Key Performance in Safety and Health Management



Number of serious disasters
0 cases



Evaluation of safety management in workplaces
**Awarded with
the grand prize**

ESH Management System

Hanwha Solutions strives to contribute to the most eco-friendly and safest future, recognizing environment, health, and safety management as a unique opportunity for corporate management to fulfill its duties toward sustainable corporation development and social responsibility as part of a company that provides smart and eco-friendly solutions.

Environment, safety, and health

Environment, safety, and health policy (ECO-YHES)

ECO-YHES refers to the environment, safety, and health policy of the Hanwha Group that was first announced among Korean companies in 1991. It is the unique core value of Hanwha business management that combines the meaning of "Health, Environment, and Safety (HES)" and "YES."

We at Hanwha Solutions have set environment, safety, and health as the main management philosophy to achieve sustainable

development, fulfill our social responsibility, and to create a safe and comfortable work environment as part of a leading company of energy and material solutions. We put the environment, safety, and health system in place based on "ECO-YHES."

Environment, safety, and health policy

1. We establish an advanced ESH management system and promote continuous performance improvement to build a safe and healthy society and preserve the global environment.
2. We contribute to carbon neutrality through our efforts to reduce pollutant emissions and efficiently use all the resources and energy required for business activities.
3. We promote the health of our employees and minimize the possibility of potential accidents and property damage by creating a safe working environment and continuously improving.
4. We strive to achieve an advanced ESH culture that satisfies stakeholders—such as employees, partners, customers, and local residents—and complies with relevant regulations.

Strategic system of environment, safety, and health

Mission	We contribute to a sustainable future society by fulfilling our social responsibility of sustainable development through advanced ESH activities.		
Vision	Leading company in ESH globally		
Strategy	System Level Up	Strengthening risk management	Improving the mind
Strategic Task	<ul style="list-style-type: none"> ESH management system Strengthening partners and the construction safety management system 	<ul style="list-style-type: none"> Reinforcement of accident prevention and response activities Enforcement of compliance 	<ul style="list-style-type: none"> Building an autonomous safety management culture Strengthening competence in risk discovery

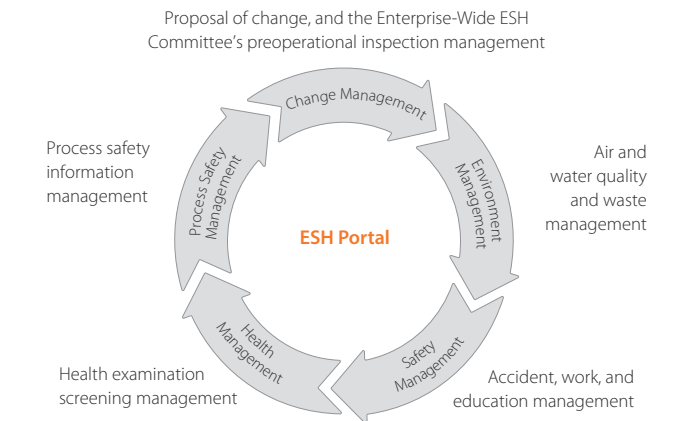
Organization to promote the environment, safety, and health

Hanwha Solutions established a plan for the enterprise's environment, safety, and health. To execute this plan systematically, we have created the Enterprise-Wide Environment, Safety, and Health Committee consisting of the CEO as chairman, an enterprise-wide environment and safety executive, and plant-wide environment, safety, and health manager. The committee convenes every month to discuss major environmental and safety issues and thoroughly review whether related acts and regulations, such as those related to the prevention of serious disasters, are observed. In particular, we strengthen the enterprise-wide corporate governance that is responsible for ESH by making major decisions regarding the ESH management plan and eco-friendly management through the committee and ESG Committee. We also discuss major issues related to accident prevention and environmental safety through the Plant-Wide Environment, Safety, and Health Committee, which was separately established for each plant and inspects and deals with issues. The committee of each plant provides a comfortable and safe environment for workers through the management of environmental impact, safety education, safety management for partners, and assessment of the work environment which promotes a "safety first" culture.

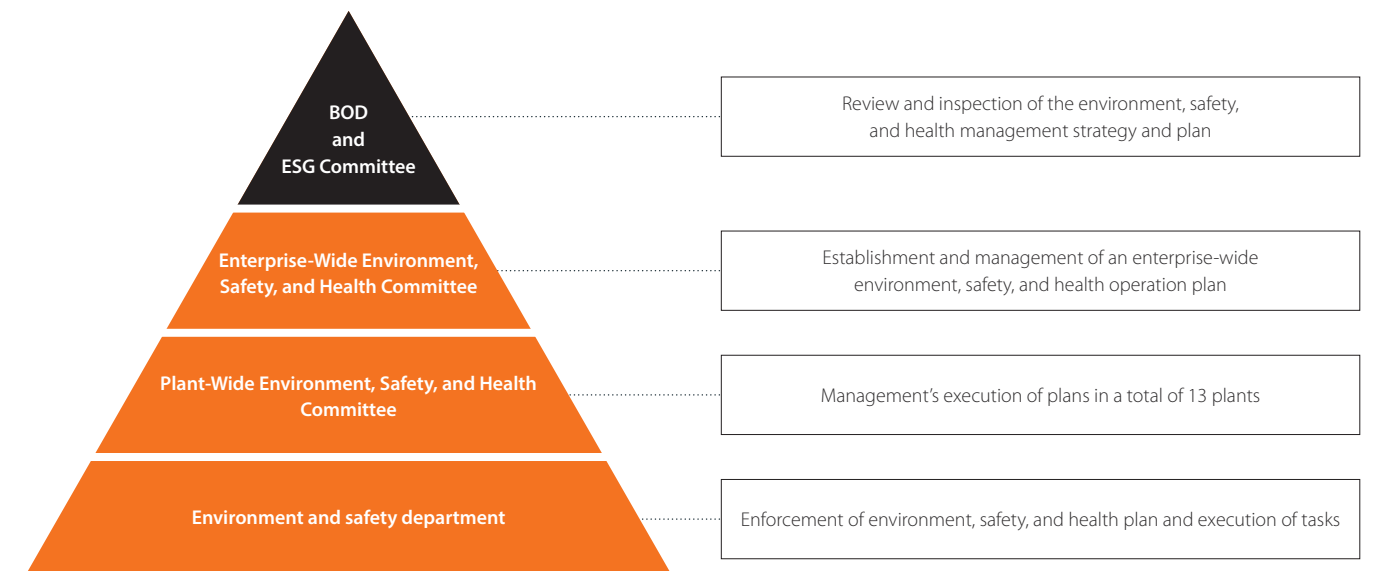
Building an integrated environment and safety management system based on digital transformation

Hanwha Solutions has implemented a scientific and advanced system based on data analysis by developing the enterprise-integrated digital information management system (ESH Portal) to proactively respond to the digital transformation era. We have selected the tasks to implement a "Smart Disaster Prevention System," "Integrated ESH System," and "Chemicals Management System Upgrade," which are under development, to build a foundation of digital information management in the field of environment and safety. In the future, we plan to increase work productivity through continuous upgrading and preemptively manage related risks.

Operation system of the ESH Portal System



Organization to promote the environment, safety, and health



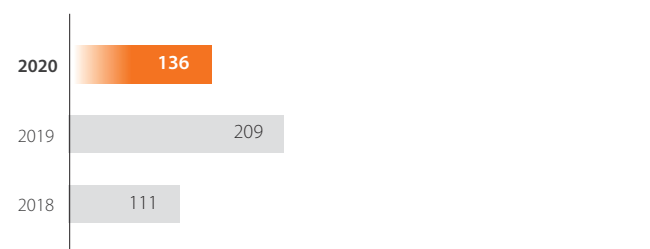
Management of Change (MoC) system The MoC system exists to manage change for each phase of the process and trace and manage process safety information through the linkage with Process Safety Management (PSM) and related systems. With MoC, safety risks can be prevented, and systematic MoC can be achieved. In addition, drawings, facilities, and process safety information can be managed efficiently according to the changes, which ensure the execution of the safest processes in every phase.

Main functions of the MoC system

PSM Tracking	It provides optimized management items (drawings, facility specifications, whether the risk is evaluated, etc.) by default according to the characteristics of changed items, thereby preventing users from omitting the management items.
MoC Interlock	It manages the minimum requirements that should be satisfied for each phase in the MoC, thereby preventing the omission of any such requirement by ensuring the completion of each phase before the next starts.
History Management	It supports the checking of information about education, attached files, risk assessment, licenses and permits concerning MoC, and fulfillment status all in one place.
Punch List Monitoring	It monitors to complete the punches before operation by managing the measure status on the punches, which are performed in the preoperational inspection phase.

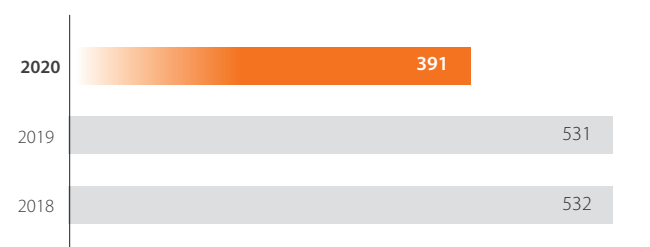
Cost of investment in the environment

Unit: KRW 100 million



Cost of investment in safety and health

Unit: KRW 100 million



Investment in the environment, safety, and health

Minimizes the emission of all pollutants generated during the business and production activities of Hanwha Solutions and invests in the environment, safety, and health steadily every year. It has invested around KRW 52.7 billion to build air and water pollutant reduction facilities, energy efficiency improvement facilities, integrated ESH systems, etc.

Record of major investment in the environment, safety, and health in 2020

Divisions	Environment	Safety and Health
Common		Implementation of a DT-based integrated ESH system
Chemical	Additional installation of an Ulsan polyvinyl chloride (PVC) stripping facility Improvement of the TDI air pollution control facility	Installation of the Yeosu PVC local exhaust ventilation
Q CELLS	Project to improve wastewater sludge content	Reinforcement of protection devices for process safety
Advanced Materials	Installation of a low nitrogen oxide (NOx) burner for boiler	Replacement of aging emergency broadcasting equipment



Yeosu PVC reuse facility (Capacity of 2,000 t/day, KRW 9.1 billion investment)

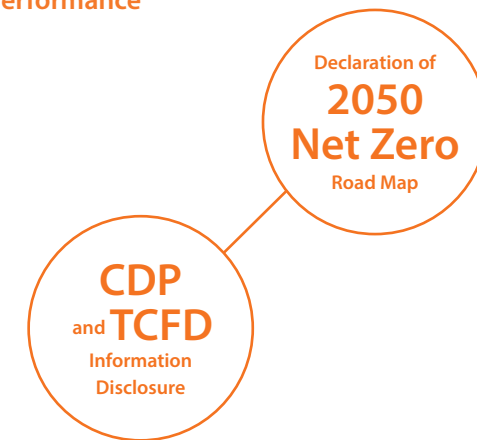


Improvement of TDI air pollution control facility (KRW 1.1 billion investment)

Response to Climate Change

In parallel with the deepening crisis of climate change, including global warming and particle pollution, the era of carbon neutrality and low-carbon transition has begun worldwide. Hanwha Solutions promotes various activities, such as declaring the 2050 carbon neutrality target, to actively cope with the global climate change issue as a global eco-friendly energy company.

Key Performance



2050 Net Zero Roadmap

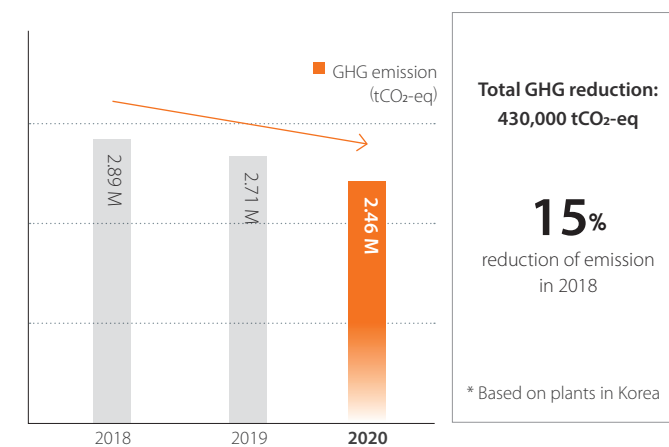
In recent years, properly responding to the risks of climate change has become the most important goal around the world. Hanwha Solutions has declared the “2050 Net Zero Road Map,” which contains our will and measure to participate in the active movement toward carbon neutrality, joined by every nation and company, and achieve carbon neutrality by 2050. We have established a strategy not only for the management of GHG emissions in our plants but also for the increase in efficiency and circulation rate of various resources, including energy, to achieve the 2050 carbon neutrality target. We are also leading the development of a carbon-neutral society together with all our stakeholders through the reinforcement of an eco-friendly portfolio and the technical development of low-carbon production involving the use of cutting-edge solar power and eco-friendly materials.

Activities against climate change

Management of GHG emission

Hanwha Solutions has been designated as a company subject to GHG reduction in a carbon emission trading scheme. We have established a mid- to long-term plan to reduce GHG emissions before the adoption of the third phase (2021–2025). Furthermore, the major GHG emission performances in plants around the world are reported to the executive management, including the CEO, that is in charge of them. The guidelines and procedures for the effective management of GHG emission in plants have been enacted, and monthly GHG emission in each plant is calculated to monitor whether the emission allowance is being observed. The transparency and objectivity of data regarding GHG emissions are ensured every year through third-party verification. We have also put an optimized management system in place so as not to exceed the GHG emission allowance when investing in facility expansion for production and reviewed whether the GHG reduction process needs to be reintroduced.

Status of major GHG emissions in 2020



* The GHG emission is calculated by summing Scope 1 and Scope 2 in five divisions: Chemical, Q CELLS, Advanced Materials, Galleria, and City Development.

Scope 3 GHG management Hanwha Solutions has managed the Scope 3 emission from 2020 for more responsible GHG emission management encompassing the entire process of business and management beyond the simple production process. We also monitor the GHG generated by raw materials and service purchases for production, waste generated during the product operation, and GHG emissions from investment asset items. We will lead in the creation of an environment for GHG reduction, which can be made together with various stakeholders by steadily expanding the future management scope.

GHG reduction activities

Hanwha Solutions has participated in the declaration of carbon neutrality and GHG reduction policies in Korea to promote various GHG reduction activities that aim to minimize the effects of climate change.

The Q CELLS Division has declared the Renewable Energy 100% (RE100) in domestic plants, the first to do so among domestic renewable energy companies, and extended this to all divisions in September 2021. We will drive genuine GHG reduction activities through the Green Premium Scheme and self-generated renewable energy under the K-RE100 scheme introduced in 2021 by the Ministry of Trade, Industry and Energy (MOTIE) for electricity consumers to selectively purchase renewable energy power.

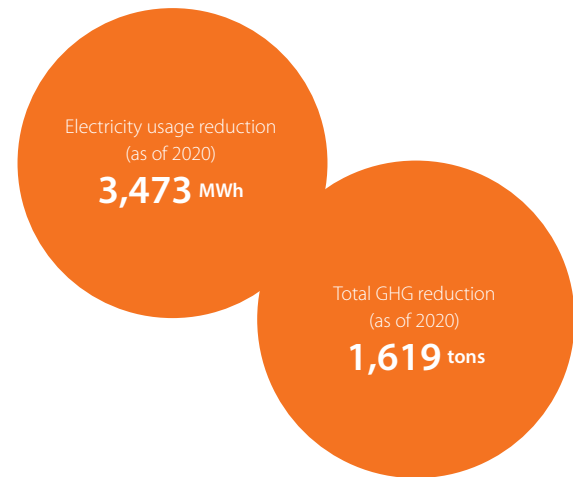
Status of GHG emission (as of 2020, by division and emission source) Unit: 10,000 t

Category	Chemical	Q CELLS	Advanced Materials	Galleria	City Development	Sum
Electricity	155.2	14.4	3.8	2.6	0.01	176.0 (72%)
Steam	25.3	-	-	-	-	25.3 (10%)
Fuel	25.8	0.5	1.4	3	-	28.0 (11%)
Others	13.2	3.1	-	-	-	16.3 (7%)
Sum	219.5 (89%)	18.0 (7%)	5.2 (2%)	2.9 (1%)	0.01 (0%)	245.6

Expansion of renewable energy use in plants

Solar power generation in plants

Hanwha Solutions produces renewable energy directly by installing solar power generation facilities in idle sites, rooftops, and parking lots in every plant and we changes the energy production and consumption structures in plants into low-carbon energy systems. Currently, enterprise-wide solar power generation facilities with a capacity of around 2.5 MWh are installed, and we plan to continuously expand the renewable energy power generation to ease into a low-carbon business system.



Cases of major GHG reduction and energy efficiency improvement

Main Reduction Activity	Effect of GHG Emission Reduction
Heating process optimization (liquefied natural gas/electricity/steam), heating source change, etc.	1,816 tCO₂-eq
Installation of new equipment through process improvement	808 tCO₂-eq
Initiatives such as the use of steam produced by waste heat and cost reduction of utility through the improvement of reactor operation methods	90,629 tCO₂-eq
Replacement of equipment, e.g., change of carburetor types and installation of a heat exchanger	23,908 tCO₂-eq
Generation and use of new and renewable energy (NRE) power	1,619 tCO₂-eq

Task Force on Climate-Related Financial Disclosures (TCFD) report

We at Hanwha Solutions will disclose our strategy to combat climate change for the resolution of the global climate crisis, risk management, and governance, and major reduction activities in this detailed report according to the recommendations of the TCFD.

Recommendations of the TCFD	Status and Activities of the Response by Hanwha Solutions																												
Corporate governance	The corporate governance of the organization about risks and opportunities in relation to climate change is disclosed.																												
a) Description of the supervision of the Board of Directors (BOD) that manages and supervises the risks and opportunities related to climate change	The BOD, the major decision-making body, convenes quarterly for final decision-making and approval of the major project reviews and investments, including climate change-related issues and responses. We have built enterprise-wide governance to proactively respond to mid- to long-term climate change by recruiting overseas experts in energy infrastructure and future project fields as new outside directors. Furthermore, Hanwha Solutions installed the ESG Committee consisting of all outside directors, in May 2021. The ESG Committee is the decision-making body on major businesses and strategies to combat climate change. It meets every quarter to deliberate on the mid- to long-term ESG strategy, carbon neutrality policies, and response strategies to climate change-related risks and to supervise the implementation status of strategies in relation to climate change.																												
b) Description of the executive management that evaluates and manages the risks and opportunities related to climate change	The CEO of Hanwha Solutions is positioned at the top of the decision-making body that reviews and decides major strategies and energy and climate change policies and risks for climate change and ESG management. The risk and opportunity factors related to climate change are reported to the CEO every month. Moreover, the performance of the response activities to climate change, such as the GHG emission intensity reduction, is reflected in the key performance index (KPI) of the CEO to achieve a more substantial GHG reduction performance and link this to the mid- to long-term management performance. And running a monetary compensation system based on this KPI.																												
Strategy	The actual and potential impact of climate change-related risks and opportunities on important businesses, strategies, and financial plans of the organization are disclosed.																												
a) Description of climate change-related risks and opportunities	Hanwha Solutions analyzes climate change-related issues and risks from a short-term perspective every year and identifies emerging risks until 2030, which is the mid-term GHG reduction target year. The long-term issues and risks until 2050, which is the carbon neutrality target year, are also analyzed.																												
	<p>Major climate change-related risks and opportunities</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Period</th> <th>Risk Factor</th> <th>Financial Impact</th> <th>Status of Response by Hanwha Solutions</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Transformation risk</td> <td>Short-term</td> <td>Strengthening of plastic regulations and application of plastic tax</td> <td>Cost increase</td> <td> <ul style="list-style-type: none"> • Presentation of the circulation economy business model through the recycling of plastic, etc. and development of bioplastics </td> </tr> <tr> <td></td> <td>Introduction of carbon tax and enforcement of a carbon certification system</td> <td></td> <td> <ul style="list-style-type: none"> • Acquisition of global carbon certification through low-carbon materials and process technology development </td> </tr> <tr> <td rowspan="2"></td> <td>Short-term, mid/long-term</td> <td>Purchasing of emission permits according to the enforcement of GHG emission trading scheme and increasing the demand of GHG emission reduction</td> <td>Cost increase, penalty surcharge</td> <td> <ul style="list-style-type: none"> • Classification and management of an emission permit as an intangible asset • Management of GHG emission and establishment and implementation of GHG reduction strategies (2050 Net Zero) • Monitoring of new national renewable energy policies and regulations of chemical industries </td> </tr> <tr> <td></td> <td>Increase in demand for energy efficiency enhancement for GHG emission reduction</td> <td>Cost increase</td> <td> <ul style="list-style-type: none"> • Installation of reduction facilities for better energy efficiency and wider use of new and renewable energy </td> </tr> <tr> <td></td> <td></td> <td>Increase in demand for disclosure of the ESG and climate change response and management status</td> <td>Decrease in customers and corporate value decline</td> <td> <ul style="list-style-type: none"> • Proactive response to global initiatives such as the CDP and promotion of information disclosure • Introduction of eco-friendly energy technology through participation in the international green energy expo </td> </tr> </tbody> </table>	Category	Period	Risk Factor	Financial Impact	Status of Response by Hanwha Solutions	Transformation risk	Short-term	Strengthening of plastic regulations and application of plastic tax	Cost increase	<ul style="list-style-type: none"> • Presentation of the circulation economy business model through the recycling of plastic, etc. and development of bioplastics 		Introduction of carbon tax and enforcement of a carbon certification system		<ul style="list-style-type: none"> • Acquisition of global carbon certification through low-carbon materials and process technology development 		Short-term, mid/long-term	Purchasing of emission permits according to the enforcement of GHG emission trading scheme and increasing the demand of GHG emission reduction	Cost increase, penalty surcharge	<ul style="list-style-type: none"> • Classification and management of an emission permit as an intangible asset • Management of GHG emission and establishment and implementation of GHG reduction strategies (2050 Net Zero) • Monitoring of new national renewable energy policies and regulations of chemical industries 		Increase in demand for energy efficiency enhancement for GHG emission reduction	Cost increase	<ul style="list-style-type: none"> • Installation of reduction facilities for better energy efficiency and wider use of new and renewable energy 			Increase in demand for disclosure of the ESG and climate change response and management status	Decrease in customers and corporate value decline	<ul style="list-style-type: none"> • Proactive response to global initiatives such as the CDP and promotion of information disclosure • Introduction of eco-friendly energy technology through participation in the international green energy expo
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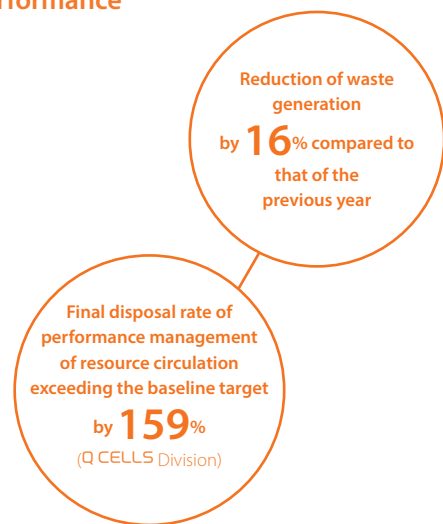
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	<table border="1"> <tr> <td>Physical risk</td> <td>Short-term</td> <td>Damage to plants and infrastructure due to extreme weather conditions such as typhoons and heatwaves</td> <td>Cost increase, asset value decline</td> <td> <ul style="list-style-type: none"> • Training of expert personnel to properly respond to emergencies • Minimization of damage through proactive response systems and risk assessment </td> </tr> <tr> <td></td> <td>Mid/long-term</td> <td>Increased power usage in plants due to global average temperature rise owing to global warming</td> <td>Increase in the operation cost and product quality maintaining cost</td> <td> <ul style="list-style-type: none"> • Development of a measure to increase energy efficiency for maintaining the right temperature in a storage tank </td> </tr> </table>	Physical risk	Short-term	Damage to plants and infrastructure due to extreme weather conditions such as typhoons and heatwaves	Cost increase, asset value decline	<ul style="list-style-type: none"> • Training of expert personnel to properly respond to emergencies • Minimization of damage through proactive response systems and risk assessment 		Mid/long-term	Increased power usage in plants due to global average temperature rise owing to global warming	Increase in the operation cost and product quality maintaining cost	<ul style="list-style-type: none"> • Development of a measure to increase energy efficiency for maintaining the right temperature in a storage tank
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b) Description of the impact of climate change-related risks and opportunities on businesses, strategies, and financial plans of the organization	<p>Hanwha Solutions views the request to transition to the low-carbon and renewable energy era and the market change according to climate change as an opportunity factor for the company's sustainable growth. We quantify and manage the GHG emitted in the production process, such as of solar power, and secure the competitiveness of eco-friendly products through the acquisition of low-carbon certification for our products.</p> <p>In addition, it is important to jointly manage the climate change-related risks in the entire value chain, from the supply of raw materials to the sale of final products. Thus, we are committed to the creation of a low-carbon industrial ecosystem engaged in the expansion of research and development for low-carbon materials and processes for each business division.</p> <p>Furthermore, Hanwha Solutions will proactively drive forward the green hydrogen industry, which is attracting attention as eco-friendly energy around the world, through the vertical integration of hydrogen production from Chemical - Q CELLS - Advanced Materials. To do this, we are intensively investing in the green hydrogen sector by raising funds for the green energy fostering industry and paid-in capital increases and issuing green bonds.</p>										
c) Description of the flexibility of management strategies considering various climate change-related scenarios such as those below 2°C	<p>Hanwha Solutions has analyzed the reduction goal establishment that meets the requirements of an international initiative for carbon neutrality in connection with the International Energy Agency's (IEA) Beyond 2°C Scenario (B2DS), IEA Sustainable Development, and Nationally Determined Contributions (NDCs) scenarios, and we set an annual reduction target of 2.5% or more considering climate change scenarios and the Science Based Targets initiative (SBTi), etc. (60% reduction target by 2040, 100% reduction target by 2050).</p> <p>We have established Scopes 1 and 2 GHG reduction strategies generated in the plants to achieve the 2050 carbon neutrality target considering the technical maturity, new and renewable energy expansion, unit price, and new business and climate change scenarios, and we aim to minimize GHG emissions more proactively through indirect GHG emission management of Scope 3.</p> <p>For domestic plants where NDC scenarios are applied, eco-friendly energy has become more widely used when promoting new businesses, and detailed promotion strategies such as the transformation of steam, fuel, and power into 100% clean energy starting 2030 have been established. In addition, transformation measures, including the purchase of new and renewable energy, reduction in power and steam emissions, expansion of eco-friendly steam production using byproduct hydrogen, Carbon Capture, Usage and Storage (CCUS) technology application, etc. will be applied step-by-step through participation in the Korean RE100 (K-RE100) initiative.</p> <p>Moreover, we aim to contribute to the GHG reduction of Scope 3, which emits GHG indirectly through the activities of Hanwha Solutions, expanding the use of green raw materials such as the Plastics-to-Chemicals (PTC), the application of processes such as water electrolysis, and the production of green products such as bioplastic.</p> <p>We aim to reduce emissions in 2019 by 10% in 2030 and have predicted that carbon neutrality will be achieved by 2050 if the aforementioned measures are applied.</p>										

Recommendations of the TCFD	Status and Activities of the Response by Hanwha Solutions
Risk management	The organization discloses its methods for identifying, assessing, and managing climate change-related risks.
a) Description of the organization's process for identifying and evaluating climate change-related risks	<p>As the uncertainties of the business environment have been rapidly increasing in recent years because of climate change, Hanwha Solutions defines this as a serious risk. Thus, we are evaluating and managing climate change-related risks and opportunities across the entire enterprise every year according to "Risk Management Tips" based on the environmental safety management system.</p> <p>We have installed the Carbon Neutrality Promotion Team led by the Planning Division Head of Hanwha Solutions under the Carbon Neutrality Promotion Committee for the enterprise-wide management of climate change-related risks. The Carbon Neutrality Promotion Team is composed of two parts: carbon neutrality growth and construction of eco-friendly plants, thereby intensively identifying and managing the risks in relation to eco-friendly businesses, and the response to global environmental regulations.</p> <p>The major risks are reported to the Carbon Neutrality Promotion Committee every quarter. Then, this committee establishes the mid- to long-term response to the selected risks and reports this to the executive management team, BOD, and ESG Committee to identify and analyze the climate change-related risks that may influence the enterprise-wide sales activities and businesses.</p>
b) Description of the organization's process for managing climate change-related risks	
c) Description of the method for integrating the procedure that identifies, assesses, and manages climate change-related risks into the overall risk management system of the organization	
Indexes and reduction targets	If the given information is financially relevant, the indexes and reduction targets to be used in the assessment and management of the climate change-related risks and opportunities are disclosed.
a) Disclosure of the indexes used by the organization to assess the climate change-related risks and opportunities according to the business strategies and risk management procedures	<p>Hanwha Solutions has declared the goal of 2050 Net Zero to proactively cope with climate change in 2021, and we have established detailed plans to fulfill it. As part of our strategy to achieve our more responsible carbon-neutral goal, all divisions have decided to participate in K-RE100.</p> <p>Currently, Hanwha Solutions quantitatively identifies the impact of business activities on the environment and manages indexes such as Scopes 1 and 2 GHG emissions, GHG emission intensity, and energy usage to assess the climate change-related risks and opportunities.</p> <p>In 2020, a total of 2.46 million tCO₂-eq of GHG was emitted, an amount reduced by 15% compared to that of the 2018 reference year. A total of 46,960 GJ of energy was used.</p>
b) Disclosure of GHG emission and related risks according to Scope 1 (direct emissions), Scope 2 (indirect emissions), and Scope 3 (other indirect emissions)	<p>We at Hanwha Solutions disclose the direct and indirect GHG emissions through the Environment, Safety, and Health Performance Report and Sustainability Report every year and fulfill our responsibilities as an eco-friendly company by disclosing Scope 3 emission management data from 2020.</p>
c) Description of goals used by the organization for the management of climate change-related risks and opportunities and its performance compared to its goals	

Environment Management

Hanwha Solutions is striving to minimize the negative impact on the environment by building an eco-friendly business system at a global level and strengthening systems for environmental management in our plants.

Key Performance



Promotion of environmental management

The goal and performance of environmental management

Hanwha Solutions have established an environmental management system that considers environmental perspectives across the overall business management for continuous environmental improvement, as we have moved away from one-dimensional thinking patterns such as simple cost burdens and regulatory responses to environmental problems. For more systematic environmental performance management, we establish annual quantitative goals for major environmental indicators such as air and water quality, waste, GHG, and energy, set up investment plans to achieve them, and continue our efforts to reduce environmental pollutants.

Environmental management systems (ISO 14001) Certification

Hanwha Solutions considers the environment, safety, and health-related items across the business and management activities to ensure the steady execution of environment, safety, and health management. We have also adopted and now operate an ESH management system that complies with the global green management standards through the acquisition of the ISO 14001 certification, another major feat since our Chemical Division's acquisition of the environmental management system certification in 1995.

Hanwha Solutions also verifies and manages our environmental safety performance through an external examination every year.

In particular, because of the implementation of the environmental management system and systematic performance management records in the Chemical Division, the division was declared as having the best environmental management system in 2019.

ISO 14001 certification status

Chemical

Yeosu Factory, TDI Factory, Ulsan 1 Factory, Ulsan 2 Factory, Ulsan 3 Factory

Q CELLS

Jincheon Plant, Eumseong No. 2 Plant

Advanced Materials

Sejong Plant, Eumseong Plant, Busan Plant

Management of environmental impact

Hanwha Solutions is doing its best to manage energy consumption according to the global request for green energy transformation and to protect the atmospheric environment, water resources, and soil in regional societies, minimizing the impact of business activities on the environment.

Management of atmospheric environment

Hanwha Solutions deeply empathizes with the gravity of worsening air pollution and the need for improvement and is committed to the reduction of fine dust generation and air pollutant emission to minimize the impact of corporate activities on the atmospheric environment. We are prepared to employ strategies such as the additional installation of air pollution control facilities and monitoring of air pollutants emissions.

Management of nonpoint sources of pollution and odor-causing substances

Hanwha Solutions has built a system to manage air pollutants and odor-causing substances to minimize the risk and inconvenience for regional societies near the plants. We constantly strive to minimize hazardous chemical substance emission from nonpoint sources of pollution by conducting periodical leak detection and repair (LDAR) procedures on our sources and measuring and managing emission concentration of pollutants in real time by installing a telemetry system (TMS) inside the process equipment. In 2020 we installed five fixed odor detectors at the site's boundaries to measure odor caused by toluene, butyraldehyde, and i-butyl alcohol. We also identify the source of odor in factories by creating odor maps and minimizing odor generation by removing odor-causing substances in advance through continuous patrolling and inspection.

Environmental performance in 2020 and environmental goal in 2021

Environmental goals and achievements in 2020			
Category	Unit	2020 Goal	2020 Performance
The emission intensity of air pollutants (NOx, SOx, dust)	kg/	2.30	2.21
The emission intensity of water pollutants (COD, BOD, SS)	KRW 100 M	11.00	9.61
The emission intensity of waste	ton/	0.99	0.83
The emission intensity of wastewater	KRW 100 M	73.4	72.3

2021 Goal

Environmental load reduced by 3% compared to that of the previous year
(air and water pollutant emission, waste cost burden charge, waste intensity, GHG emission, etc.)

Social promise and activities of Hanwha Solutions to reduce the emission of air pollutants



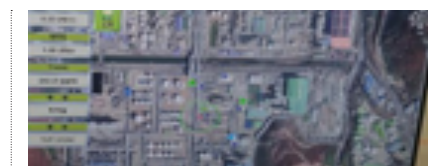
Participation in voluntary agreement to reduce fine dust

The Chemical and Q CELLS Divisions are actively participating in activities to reduce fine dust generation in Korea through the "Voluntary Agreement to Reduce Fine Dust" with the Ministry of Environment (MoE) in 2018. In particular, we are currently exerting more aggressive reduction efforts, including the adjustment of equipment running time during periods of ample fine dust generation.



Activities to reduce fugitive dust emission

The Yeosu Factory in the Chemical Division conducts various activities to reduce air pollutants in the Gwangyang Bay area. The factory increased the capacity of prevention facilities for complete combustion of volatile organic compounds issued during the production of resin products and installed dust collection facilities to collect pollutants from storage or packaging facilities. In addition, the factory strives to create a safer and cleaner atmospheric environment by improving the equipment that reduces the fugitive emission of harmful air pollutants used in the production process into the atmosphere.



Reduction of NOx emission through improvements of pollution control facilities

The Ulsan Factory in the Chemical Division has invested around KRW 300 million for the replacement of equipment to reduce the emission of NOx, which is a typical air pollutant. Through the replacement of the NOx burner used in the plasticizer process, the factory has achieved an annual reduction of 12 tons.

Water resource management

The demand for water quality environment management has increased because of global water quality contamination and water resource shortage. Each of Hanwha Solutions factories runs its own water quality analysis laboratory to check the characteristics (pH, COD, SS) of waste generated per process every day. By introducing equipment that can analyze 11 specific materials hazardous to water quality at the same time, the factory strictly self-regulates emission concentration so that the concentration of water-quality substances in the wastewater discharged from the factory can be managed within 30% of the legal limit at all times.

The Chemical Division runs its own laboratory to analyze water quality for each plant and analyzes and manages the pollution degree of generated wastewater per process and the emission concentration of specific materials hazardous to wastewater quality. In addition, the division is committed to preventing harmful liquid substances from flowing out of the factory by installing closed-circuit television (CCTV) cameras within the final rainwater drainage and by monitoring the liquid's characteristics.

The Q CELLS Division performs various activities to reduce water usage in its plants. By recycling wastewater generated during the process into washing water used in the air pollutant prevention facility, it saves 35,868 m3 of water per year. Wastewater discharge intensity of the current year was also reduced by 4% compared to that of 2019. Furthermore, the division continues its efforts to improve water environment pollution by reducing wastewater treatment sludge by 130 t through its investment to improve its moisture content in the wastewater treatment plant.

The Advanced Materials Division traces and manages the emission concentrations of pollutants by commissioning an analysis from external institutions once per quarter to manage the degree of pollution of wastewater within the plant. The division continues its efforts to reduce water pollutants by changing and improving wastewater treatment chemicals to further reduce pollutants. Furthermore, it has installed CCTV cameras at the final wastewater and stormwater discharge outlets to monitor the area and prevent hazardous chemical substances from flowing out of the plant.

Management of soil contamination

Hanwha Solutions conducts tests on its soil regularly to prevent contamination caused by waste generated during the process phase and to protect the surrounding ecosystems, thus controlling the soil environment. Moreover, for hazardous chemical substances that induce soil contamination, underground storage facilities are excluded, and separate storage facilities are installed to minimize their effect on the soil.

Waste management

Hanwha Solutions makes an effort to build a virtuous resource cycle system in the whole process of production, from the purchasing of raw materials, transportation, and product sales to overall business activities. It facilitates the recycling of waste by setting a resource circulation goal and sets the annual reduction target of raw and subsidiary materials as the KPI to reduce and manage waste emission.

In particular, the Q CELLS Division has assigned and enforced the annual circulation usage and final disposal rates of resources according to the Resource Circulation Performance Management Scheme from 2020 and recorded a surplus achievement of 159% compared to the reference target of the final disposal rate in 2020. It has also achieved a reduction in the intensity of waste acid generation by 26% among the designated waste by reducing chemical substances used in the solar cell manufacturing process.

Activities to reduce waste Hanwha Solutions minimizes waste generation by conducting intensive management of waste generation sources and building a circular economic system through the strict separation of generated waste and the maximization of resource recycling.

To check whether waste generated in the production process impacts the surrounding environment, we conduct waste analysis regularly and block the environmental impact due to waste by thoroughly managing the waste repository, etc. The stored waste is transported to a disposal company via a vehicle from a specialized consignment company and properly disposed. The whole process is recorded, managed, and monitored through the "Allbaro System" of the Government. We also conduct yearly due diligence on the consignment disposal company to thoroughly ascertain that the waste discharged is legally disposed.

[Special Case]

Hanwha Solutions-Korea International Trade Association (KITA) expansion of the plastic circular economy model through the installation of IoT-based collecting boxes of plastic PET bottles

Hanwha Solutions, Oysterable—an eco-friendly startup—and the KITA installed Internet of Things or IoT-based plastic polyethylene terephthalate (PET) bottle-collecting boxes in the Coex Convention and Exhibition Center (Coex)



in Seoul in January 2021, providing a direct experience of plastic circular economy to the citizens and promoting the reduction of carbon dioxide (CO₂) emission through the establishment of the culture of separating plastic waste.

Transparent PET bottles collected through the boxes are recycled into raw materials used in sheets, filament yarn, staple fiber, etc. Citizens who have separated and discharged transparent pieces of plastic are given points through an application and are encouraged to actively participate in the virtuous cycle of resources by allowing them to exchange these points for upcycled products such as clothes made from plastic waste.

Currently, six collecting boxes are installed in Coex. For the goal of collecting 5 t of plastic PET bottles, which can produce 10,000 upcycled T-shirts a year, an additional 6 boxes will be installed in the future.

Activities to reduce waste

Production of recycled raw materials through waste from the SuperLite production process



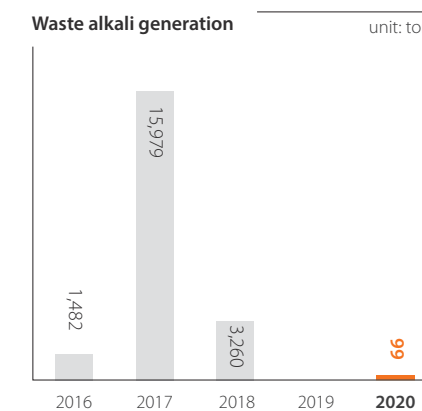
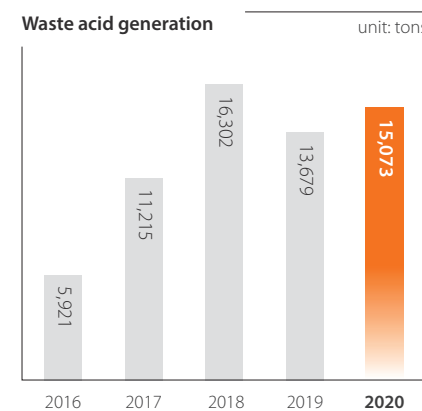
"SuperLite," one of the represented product groups in the Advanced Materials Division, is a lightweight reinforced thermoplastic (LWRT) material attracting attention for its eco-friendliness and lack of adhesives. Furthermore, waste generated during production is postprocessed to make the recycled material "pellet," thereby raising the eco-friendliness of the whole process, from product development and use up to disposal, reducing waste and contributing to the promotion of a circular economic system.

Introduction of a recycling facility for waste parts and technical development



As the use of eco-friendly energy products such as solar power and electric cars becomes more prevalent, much attention is paid to the creation of a resource circulation ecosystem by recycling waste parts. Hanwha Solutions promotes the ecosystem of a virtuous resource use cycle by introducing a facility that recycles solar power waste modules, technical developments such as reuse of the energy storage system (ESS) of an electric car battery linked with solar power, and building a cooperative system.

Reduction in waste alkali generation



The Q CELLS Division has built its own wastewater treatment system to effectively reduce waste alkali generated during the etching process. The generation of waste alkali is inhibited through the input of wastewater treatment chemicals such as neutralization agents after checking the treatment reaction when waste alkali is introduced to the treatment plant, thereby reducing waste alkali generation and treatment cost in 2017 by 99%.

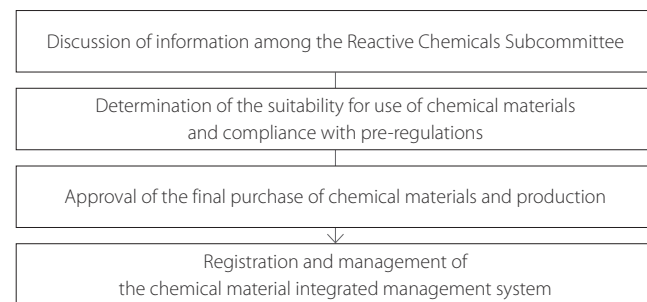
Stewardship of hazardous chemical substances

Hazardous chemical substances management system

Hanwha Solutions has built a chemical material management system that encompasses the life cycle of chemical materials. Information regarding all chemical materials used in the enterprise and for each plant are stored in a database that runs advanced systems, including queries about the products' hazards, product material safety data sheet (MDDS) management, partner's material information management, etc.

We've also formed the "Reactive Chemicals Subcommittee" in parallel to check in advance whether safety is secured through a strict process and review before it is used when introducing a new chemical material. In addition, we have implemented legal management of environmentally regulated materials by periodically reviewing and thoroughly managing domestic and overseas chemical-related laws.

Process of introducing new chemical materials



Main chemical management activities by division

Chemical
<ul style="list-style-type: none"> Reinforcement of chemical management standards and response to accidents Strengthening of the response to environmentally regulated substances and prereview of new chemical materials
Q CELLS
<ul style="list-style-type: none"> Continuous monitoring of the detector's alarm in the event of a chemical leakage Strengthening of the prereview procedure fulfillment when new chemicals are warehoused Periodical training to enhance reaction capability in case of chemical accidents
Advanced Materials
<ul style="list-style-type: none"> Expansion of the alternative use of nonhazardous chemicals Strengthening of the prereview of new chemicals

Reinforcement of the facility management that handles hazardous chemical substances

Hanwha Solutions appoints a manager in charge of hazardous chemical substances per process who inspects facilities that handle hazardous chemical substances at least once a week. We also manage various hazardous chemical substances at all times in a safe environment through facility evaluation and corrosion trend management. Aged facilities' service lives are predicted in advance and are replaced regularly. Those who handle chemical materials are individually supplied with protective gear to use on-site, and the disaster resources are placed with nearby equipment and devices to be used immediately in an emergency to ensure the safety of employees and customers and environmental protection.

Green analysis

Hanwha Solutions thoroughly manages the eco-friendliness and safety of our products for the sustainable future of our customers and the environment. We do not only conduct quality control of products through existing environmentally regulated hazardous material analysis and analysis and management of total volatile organic compounds (TVOCs) and the European Union's registration, evaluation, authorization, and restriction of chemicals' (EU REACH) substances of very high concern (SVHC) but also secure the reliability of our analysis through our research and analysis institute's acquisition of the Korea Laboratory Accreditation Scheme (KOLAS) certification.

Environmental regulations Analysis of hazardous substances	<ul style="list-style-type: none"> Analysis of Restriction of Hazardous Substances Directive (RoHS) I and II regulated substances, five organotin compounds, etc. Analysis of phthalates (chemical additives used to soften plastic) Analysis of other hazardous materials and heavy metals upon request by the client
Analysis and assessment of TVOCs	<ul style="list-style-type: none"> Analysis of raw materials, products' raw materials, and products' TVOCs, formaldehyde (FA), and individual volatile organic compounds (VOCs) <ul style="list-style-type: none"> TVOCs and FA: total volatile organic compounds and aldehyde analysis VOCs: substances that cause photochemical smog by creating oxidizing substances such as ozone through photochemical reactions in the atmosphere TVOCs and FA emission assessment: raw materials and products for building materials, automobile interior materials, etc.
Analysis of EU REACH SVHCs	<ul style="list-style-type: none"> Analysis of 201 substances of very high concern in EU REACH Additional analysis of products upon the client's request

Management of low-carbon and eco-friendly products

Development of eco-friendly products

Hanwha Solutions strives to protect the environment and provide safe products by developing eco-friendly technologies for a sustainable tomorrow.

Development of eco-friendly plasticizer (ECO-DEHCH)

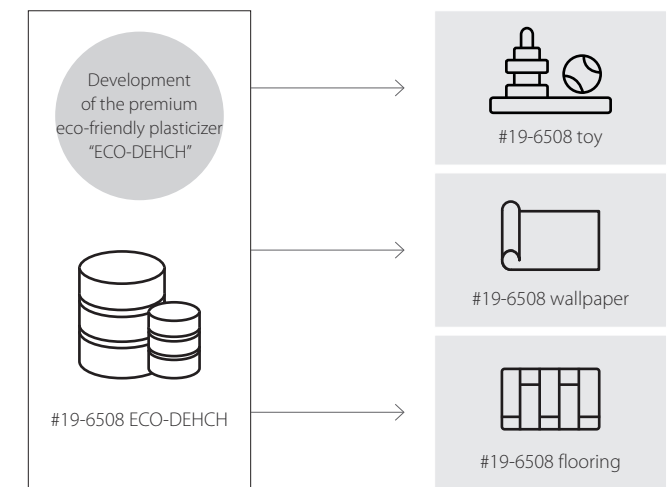
The Chemical Division has developed the eco-friendly plasticizer, which is the perfect non-phthalate plasticizer in response to the rapid growth of the eco-friendly market, and expanded its production steadily since commercial production started in 2019. Plasticizers are additives to improve processability by softening the PVC plastic found in wallpaper or floor materials. This eco-friendly plasticizer performs excellently without using harmful phthalates and similar ingredients by applying hydrogenation technology. Because it does not generate environmental hormones, it is highly usable in the production of eco-friendly products such as eco-friendly wallpaper, flooring, baby mats, and toys.

ECO-DEHCH was first commercialized worldwide in 2017, and we have since secured international eco-friendly certifications for the product, including certification for food packaging materials in Europe through the safety inspection and toxicity test of the US Food and Drug Administration (FDA). We are continuously endeavoring to develop high-quality eco-friendly plasticizers with added value.

Eco-friendly plasticizer (ECO-DEHCH)

After eight years of research, Hanwha Solutions' Chemical Division commercialized the world's first phthalate-free plasticizer and applied hydrogenation technology to the dioctyl terephthalate (DOTP) plasticizer, which is gaining popularity as an eco-friendly plasticizer, to completely remove phthalate-based components. Thus, it is a premium eco-friendly plasticizer that even solves environmental hormonal concerns.

"Green Chemistry" of Hanwha Solutions



Development of new eco-friendly materials with high value added

Development of PSR for eco-friendly wallpaper	Eco-friendly EPP packaging material	Eco-friendly EPP buoy development	Eco-friendly EPP sound insulation material
<ul style="list-style-type: none"> Development of Hybrid PSR (EL-103H) wallpaper that can minimize production slowdown and viscosity increase even under low VOC conditions to provide an eco-friendly wallpaper that is less harmful to the human body 	<ul style="list-style-type: none"> The development of eco-friendly packaging material using expanded polypropylene (EPP), which resists shock, does not require a separate packaging material, and can be easily recycled in response to the demand to replace existing packaging materials that have become the main culprit of environmental pollution, such as disposable products * EPP is mainly found in existing automobiles because of its strong repeated shock and corrosion resistance. 	<ul style="list-style-type: none"> Development of nontoxic eco-friendly buoys made with EPP to prevent environmental pollution and establish a safe aquatic product supply base 	<ul style="list-style-type: none"> Hanwha E&C collaboration with EPS Korea Co., Ltd to develop EPP+EPS laminated 60 mm eco-friendly sound insulation material No generation of fine plastic and hazardous substances because no chemical additives are used Effective reduction of light-impact and heavy-impact sound and increased heating efficiency in winter

Eco-friendly product certifications

Since 2021, Hanwha Solutions has been quantitatively marking and managing the environmental impact of all of our processes, from raw material collection to disposal of main products, for the sake of eco-friendly production. It also promotes the acquisition of environmental labeling for seven environmental certification indicators certified by the MoE, including carbon footprint, water footprint, ozone layer influence, acid rain, eutrophication, resource footprint, and photochemical smog.

Status of eco-friendly product certifications

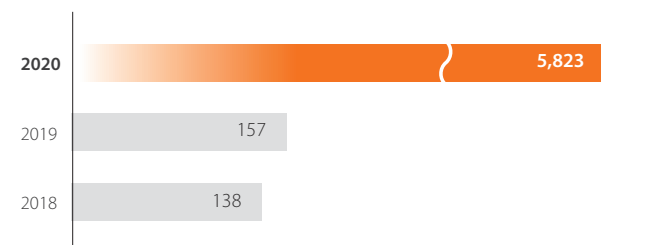
Type	Current Acquired Certifications	Investment Cost
Q.PEAK DUO	A total of 52 products acquire certification in 2020 (100% certified)	Around KRW 21 million
Korean Standards (KS) certification of high-durability eco-friendly modules	Certifications of seven models produced in 2020 are acquired.	Around KRW 90 million

Purchase of eco-friendly products

Hanwha Solutions established the "Guidelines on the Purchase and Management of Eco-friendly Products" to proactively promote green purchases. We consider the eco-friendliness of all supplies and raw materials that have an impact on production by purchasing eco-friendly certified materials and fixtures and high-efficiency and environmentally improved facilities when purchasing goods according to the guidelines.

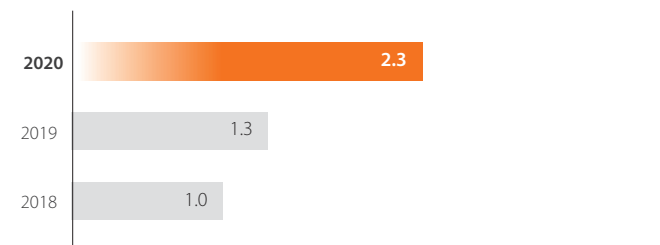
Sales (products with green certification and carbon footprint, etc.)

Unit: KRW 100 million



Purchase (products that acquired the MoE's Eco-label)

Unit: KRW 100 million



Nature conservation activities

Environmental cleaning in local communities

Hanwha Solutions performs environmental cleaning activities around its plants to preserve ecosystems and the environment in local communities.

Chemical

Yeosu Factory

- One Site One Stream Campaign: Stream cleaning activity around the plant per quarter
- Cleaning activities in Yeosu National Industrial Complex and the Yeosu area (Ssangbongcheon Stream and Ungcheon Water Park)

Ulsan Factory

- Cleaning activities such as One Site One Stream (Mugeocheon Stream), One Site One Mountain (Samho Mountain), and nearby ocean areas (Jinha Beach)
- Creation of flower complexes in regions of the plants and conservation activities conducted in mountains, fields, swamps, and wetlands

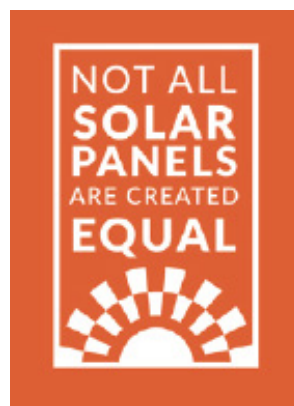
Q CELLS

- Environmental cleaning activities conducted in local communities (twice a year)

Advanced Materials

- One Site One Stream Campaign: stream cleaning activity around the plant per quarter
- Happy spore adoption project: cleaning activities conducted every month within a 1 km radius from the plant up to the nearby intersection (in cooperation with the local government)
- Cleaning Day Event in the plant: activities conducted to reduce nonpoint pollution sources in the plant

[Special Case] Hanwha Q CELLS joins the "Ultra Low-Carbon Solar Alliance" for solar supply chain decarbonization



As a founding member of the "Ultra Low-Carbon Solar Alliance," Q CELLS America of Hanwha Solutions in the United States is taking the lead in seeking and promoting measures to decarbonize the solar power supply chain.

The "Ultra Low-Carbon Solar Alliance," which was officially launched in October 2020, is an alliance of solar photovoltaic (PV) industry players that seek ways to minimize greenhouse gas emissions related to the production and transportation of PV materials and products, focusing on embodied carbon, and benchmark companies that have successfully done this minimization.

Hanwha Solutions is one of the leading players in the global solar PV industry, and we will continue to work to promote sustainability across the solar industry through PV decarbonization together with the "Ultra Low-Carbon Solar Alliance."



Conducting marine cleaning activities



Conducting environmental cleaning activities in local communities

Special REPORT

Response to COVID-19 and assistance

In 2020, we faced the unprecedented COVID-19 pandemic, which changed our daily lives completely. Hanwha Solutions is making an effort to fulfill its corporate social responsibility through activities that protect the safety of its employees and partners' employees during the national crisis and prevent infection in local communities.

Countermeasures against COVID-19

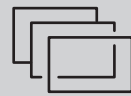
Hanwha Solutions has prepared the Response Instruction Manual and produced and supplied the COVID-19 Overcoming Kit to all employees to prevent COVID-19 infections and minimize their damage to the systematic response. Furthermore, we strongly recommend that all nonessential and pregnant employees work from home to participate in the social distancing campaign of the government, that face-to-face meetings be minimized, and that unnecessary gatherings such as group training, banquets, and dinners be prohibited. The employees in the headquarters and plants are divided into two groups to enforce an alternate work from home scheme. A flexible commuting hour (7:00 a.m. to 10:00 a.m.) was made available for the employees who need to commute to work to alleviate public transport congestion. In addition, Hanwha Solutions conducts joint annual leave, etc. to actively prevent the further spread of COVID-19 and encourages all employees to participate in social distancing campaigns.

COVID-19 prevention activities

Installation of a thermal imaging thermometer at the entrances of office buildings and plants



Installation of transparent partition acrylic plates on tables in working spaces (personal offices, meeting rooms) and group spaces (canteen, etc.)



Placement of hand sanitizers in common areas and conducting of regular quarantine activities



Provision of face masks and painkillers for those who are preparing for vaccination



Activities to support COVID-19 in local communities

“Flower Bucket Challenge” Campaign

The “Flower Bucket Challenge,” which started in February 2020, is a public interest relay campaign to purchase flowers from farms whose sales channels have been cut because of COVID-19. Air purification plants were given to students and teachers who required eco-friendly classrooms through Child Fund Korea, and flowers and plants were supplied to Hanwha Q CELLS Disabled Sports Division, whose events were canceled, and other groups whose activities were limited because of the pandemic. The Flower Bucket Challenge is relayed such that the person who has been nominated participates in the campaign and then recommends the next participant. Lotte Chemicals tapped Hanwha Solutions to participate in the campaign in the middle of the relay of the petrochemical industry.

“One Heart See Art” Campaign

In collaboration with the Green Umbrella Child Fund Korea, Hanwha Solutions held the “One Heart See Art Campaign” for disadvantaged children affected by the spread of COVID-19. The One Heart See Art Campaign was targeted at children from low-income families without sufficient care because of COVID-19 to provide art education for their psychological stability and, consequently, showcase to the audience their online exhibition of completed paintings for mental reassurance. The audience voted for the most impressive artwork after viewing the paintings exhibited on the website. Once the required number of votes was reached, Hanwha Solutions offered a donation for the treatment of children with emotional problems to the Green Umbrella Child Fund Korea. Furthermore, Hanwha Solutions sponsored art therapy education for the psychological stability of 362 children in 34 regional childcare centers for this campaign in Seoul, Daejeon, Yeosu, and Ulsan from December 2020 to February 2021.

“Overcome Together,” emergency assistance for those vulnerable to COVID-19

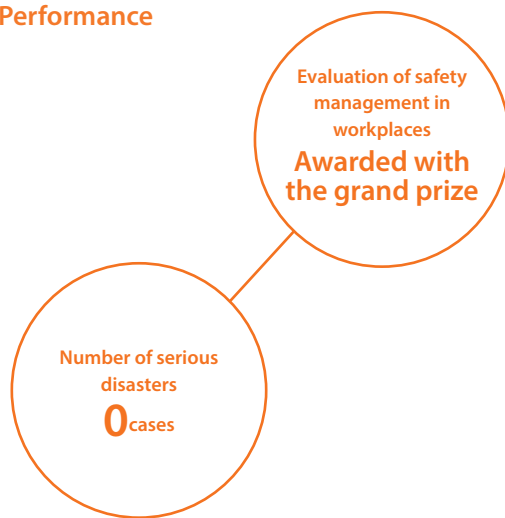
Hanwha Solutions has not only helped prevent the spread of COVID-19 by manufacturing and supplying the aforementioned preventive kits consisting of face masks, N antibacterial chips, hand sanitizers, etc. but also helped ease the community's difficulties by delivering food, including instant rice and noodles. This assistance started in March 2020 and is still ongoing to further prevent the spread of COVID-19 in local communities by delivering relief goods to disadvantaged and self-isolated people who are most vulnerable to the disease.



Safety and Health Management

Hanwha Solutions strengthens sustainable company growth by creating an environment that prioritizes employee safety based on the safety and health management system and continuous support for the spread of safety and health culture in partner companies.

Key Performance



Control of safety and health management Safety and health management system

We at Hanwha Solutions view safety in all businesses and processes as our priority (safety first philosophy) and wish to operate the safety and health management system systematically and proactively. Because of this, we execute policies and address issues according to the plan-do-check-act (PDCA) cycle. We also do our best to promote a safety culture by enacting the 10 Primary Safety Rules and applying the three strikes law to employees or partners who violate the tips.

Certification of the safety and health management system

Hanwha Solutions has acquired the ISO 45001 certification, which is the new international standard, for all plants, upgrading the existing OHSAS 18001. We have also established and executed a plan for the safety and health of our plant workers through annual external examinations and continued improvement of activities through ceaseless monitoring. Moreover, the Sejong Plant in the Advanced Materials Division acquired the certification for Business Continuity Management Systems (ISO 22301) from 2017, which aims to restore and normalize business in a short time in the case of dangerous situations such as terrorism and natural disasters, and reinforced the stability of business and process operations by improving its emergency response by living up to the given standard.

Operation of the safety and health management system according to the PDCA Cycle



Prevention of serious disasters

Hanwha Solutions continually enhances safety management in our plants to provide a disaster-free and safe workplace for all employees and partners' workers. In particular, we provide crisis management manuals to cope with various emergencies, such as fires and hazardous chemical spills, systematically and efficiently, and we practice a contingent plan for each situation. In addition, we have put a continuous safety diagnosis system in place by forming an exclusive organization for the discovery and improvement of accident-related risks, and we continue to work on the prevention of accidents by building various smart disaster prevention systems, including the real-time monitoring of closed spaces, mobile site monitoring using CCTV cameras, etc.

Securing mandatory safety and health capability

Hanwha Solutions provides a measure to fulfill the mandatory safety and health capability for strict compliance with the Serious Disaster Punishment Act, effective starting in 2022, and safer industrial environmental management. We will establish a detailed plan to implement the safety and health management system, secure the required personnel and budget for disaster prevention by the second half of 2021, and we will prepare manuals and guidelines that contain the related internal rules to enforce across the enterprise.

Strengthening competence in responding to chemical emergencies

Hanwha Solutions is committed to minimizing the damage caused by chemical emergencies through the enhancement of response competence, evaluation of external chemical spills, preparation of emergency training scenarios, and conduction of regular joint training sessions with response teams. In particular, the Jincheon Plant of the Q CELLS Division has created a chemical safety alliance with four small- and medium-sized enterprises that handle hazardous chemicals in industrial complexes and, since 2017, has been holding joint training sessions within the alliance for the safe management of chemicals to minimize damages caused by chemical accidents.



Emergency training to cope with chemical spills

[Special Case] Yeosu Factory, awarded the grand prize in the evaluation of best safety management in a workplace in Yeosu Industrial Complex in 2020

The Yeosu Factory of Hanwha Solutions has been awarded the grand prize in the evaluation of best safety management in a workplace in the Yeosu Industrial Complex in 2020, recognizing its process safety management and accident prevention activities for partners. The Public Achievement Deliberation Committee of Yeosu City selected 4 companies in the evaluation of 55 workplaces in the Yeosu Industrial Complex based on which company best maintains an accident-free workplace, organizes activities for the prevention of serious occupational accidents, and invests the most in facilities. In the end, the Yeosu Factory given first place.

Hanwha Solutions was recognized as a company with cutting-edge process safety management and safety management systems (PSMs/SMSs) and the smartest investment in facilities such as gas detectors and fire extinguishing equipment. In particular, it earned a high score because of its accident prevention activities for partners' employees, which involves jointly inspecting the risk work and safety management plan with partners. Hanwha Solutions will do its best to maintain the best SMS in all plants in the future.



Spreading safety and health culture

Diagnosis of safety culture

Hanwha Solutions quantitatively assesses the level of safety culture using the Safety Culture Diagnosis (ECO-YHES Will 2.0) Tool of the Hanwha Group every year. We remove emerging risk factors and improve vulnerable areas based on the assessment results, thereby improving accident prevention and safety culture through the establishment of an advanced safety culture. The safety culture diagnosis is composed of five sections: safety leadership, continuous safety management, line responsibility scheme, education and training, and communication. We have been committed to spreading a safety culture by including our partners in the diagnosis target since 2020.

Safety inspection activities in the plant

Each of Hanwha Solutions' plants handles the safety management risks and issues by conducting four or more enterprise-wide safety inspections every year, during thawing and winter periods and before long holidays, and conducts a regular self-inspection through the environmental safety department directly under the plant manager. In addition, for large-scale construction and other projects, a review by an environmental safety expert is always conducted in advance so that no environmental safety-related problems arise. Hanwha Solutions strives to establish advanced safety culture through the MoC of safety consciousness levels and the safety behavior of our employees and partners via continuous safety management.

Diagnosis results of the safety culture level in 2020

	Chemical	Q CELLS	Advanced Materials	Average Score
Safety leadership	82.5	72.6	80.1	78.4
Continuous safety management	85.2	75.3	81.5	80.7
Line responsibility scheme	83.6	72.9	80.4	79.0
Education and training	84.3	75.0	80.6	80.0
Communication	84.6	73.9	80.2	79.6
Average score	84.0	73.9	80.6	79.5

Safety inspection together with the labor union and company

The Yeosu Factory of Hanwha Solutions performs a safety inspection of industrial sites together with the labor to prevent serious disasters and create a safer work environment. We are committed to maintaining accident-free plants based on the monthly site inspection.

Education and training for safety and health

Hanwha Solutions values regular environmental safety and health education for the management of a comfortable and safe work environment, through which the competence of safety management is enhanced.

The Chemical Division provides professional environmental safety education through the technical education center, which is a specialized educational department. It has transitioned from the previous forcing of education into participative learning, which includes debates and hands-on practice for the improvement and systematization of safety education, and developed a curriculum with a high association with the on-site work.

The Q CELLS Division uses an educational curriculum provided by professional environmental safety institutions to allow the employees to complete at least one course for strengthening the work competence in the environmental safety department every year. Furthermore, it offers education to improve work capability, such as education for risk evaluation and preparation of process safety reports, targeting employees in charge of environmental safety in each department.

[Special Case] Yeosu Factory of Hanwha Solutions awarded the excellent environmental safety management of resident partners

The Yeosu Factory of Hanwha Solutions awarded resident partners in the name of the general executives after selecting the most outstanding partners for each section by evaluating their environmental safety accident rate, compliance with the management system, improvement of nonconformance issues, and voluntary participation of employees in management activities. Hanwha Solutions will do its best to continuously inspire the will to create a safe joint environment with partners and spread a culture that puts safety first.

The Advanced Materials Division provides education to improve the competence of safety environment management supervisors and professional training for accident prevention. It also fosters improvement in fulfilling process safety management in plants and enhancement of related employees' competence through the specialized education for PSM.

Safety and health for partners

Management of safety and health for partners

Hanwha Solutions creates a sound safety culture along with our partners through various assistance programs that aim to improve our partners' management capability in safety and health.

Industrial health management

Environmental management of the workplace

The work environment of Hanwha Solutions' plants is inspected by external professional institutions semiannually. We are committed to fostering a comfortable work environment by checking the possible exposure of employees to hazard factors that may occur in the plants, such as hazardous chemicals and noise, and by establishing the recommendations and preventive measures based on the inspection results. In addition, hazard

factors discovered through the investigation of raw and subsidiary materials before they are brought into the plant are reviewed and managed in advance and substituted with nonhazardous factors so that they do not affect the workplace. In addition, local exhaust devices are installed, and processes are improved to maintain a safe environment.

Activities to enhance the health of employees

Hanwha Solutions allows employees taking out a group accident insurance to improve the work environment and promote disease prevention. We are also committed to improving the quality of medical checkups and early discovery and prevention of diseases via health management through spousal health checkups and support for family medical expenses, as well as by designating a regional general hospital as a medical checkup institution for each plant. The health management office in each plant runs various health enhancement programs such as antismoking and healthy dietary management campaigns and creates a sound health culture for employees through customized one-to-one psychological counseling in collaboration with the community health center.

Support program for the safety and health of partners

<p>Win-win cooperation program for safety and health</p>	<ul style="list-style-type: none"> • Execution of the win-win cooperation program for safety and health hosted by the Ministry of Employment and Labor (MOEL) and the Korea Occupational Safety and Health Agency (KOSHA) - Partners' representatives and employees, safety and health managers of the parent company, and external safety and health professional organizations form a win-win cooperation group to support the establishment of a safety and health system for partners 	<p>Support for partners to acquire the ISO 45001 certification</p>	<ul style="list-style-type: none"> • Support for partners to acquire the certification for the international standard for strengthening competence in environmental safety management and the prevention of occupational accidents - Production, distribution, and education of safety and health management guidebooks for partners
<p>Support for safety diagnoses and consultations</p>	<ul style="list-style-type: none"> • Chemical <ul style="list-style-type: none"> - Meeting with representatives of partners and joint inspection - Monthly evaluation of activities for safety and health management and rewarding of excellent partners through the Partners' Safety and Health Council • Q CELLS <ul style="list-style-type: none"> - Formation of a risk assessment task force along with partners and support for consultations for the acquisition of certifications • Advanced Materials <ul style="list-style-type: none"> - Annual risk assessment to remove risk factors in processes, targeted at inside partners - Quarterly safety diagnosis for outside partners and inspection of safety management status 	<p>Support for safety and health education</p>	<ul style="list-style-type: none"> • Chemical <ul style="list-style-type: none"> - Annual safety education and diagnosis for all partners - Monthly campaigns to raise the safety consciousness for all employees • Q CELLS <ul style="list-style-type: none"> - Safety education support for the prevention of exposure to hazardous risk factors - Opportunities to participate in safety culture establishment programs • Advanced Materials <ul style="list-style-type: none"> - Environmental safety seminars for the management team of partners (once a year or more) - Execution of the "Safety Leader Fostering Program" for enhancing partners' individual capability in safety management

Social

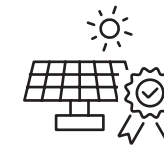
Quality Management | Talent Management |
Win-Win Management | Sharing Management

Hanwha Solutions will be a top-tier global company that puts people and society first.
It deeply considers social and economic values worldwide and strives to pioneer
sustainable growth as well as an according future for the world.

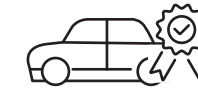
Key Performance of Quality Management



The Quality Management System
(ISO 9001) certification acquired by all
divisions



The Quality Controlled PV (QCPV)
acquired by the Q CELLS Division



The International Automotive Task Force
(IATF 16949) Certification acquired by the
Advanced Materials Division

Key Performance of Talent Management



Digital transformation training courses
to strengthen employees' capabilities



Systematic welfare systems
for a work-family balance



Reverse mentoring to activate
communication with the MZ generation

Key Performance of Win-win Management



Win-Win Growth Index in 2020
Satisfactory

Persons



Amount of win-win cooperation funds
KRW **58** billion



Diffusion of ESG management
to business partners

Key Performance of Sharing Management



Number of social contribution
beneficiaries in 2020
13,854 Persons



757 hours of volunteer activities
by employees in 2020



Total donations in 2020 Approx.
KRW **5.5** billion

Quality Management

Hanwha Solutions conducts strict management to consistently improve manufacturing processes, evidenced by its acquisition of the Quality Management System (ISO 9001) certification to meet quality and service standards required by global customers.

Key Performance



Quality Management System

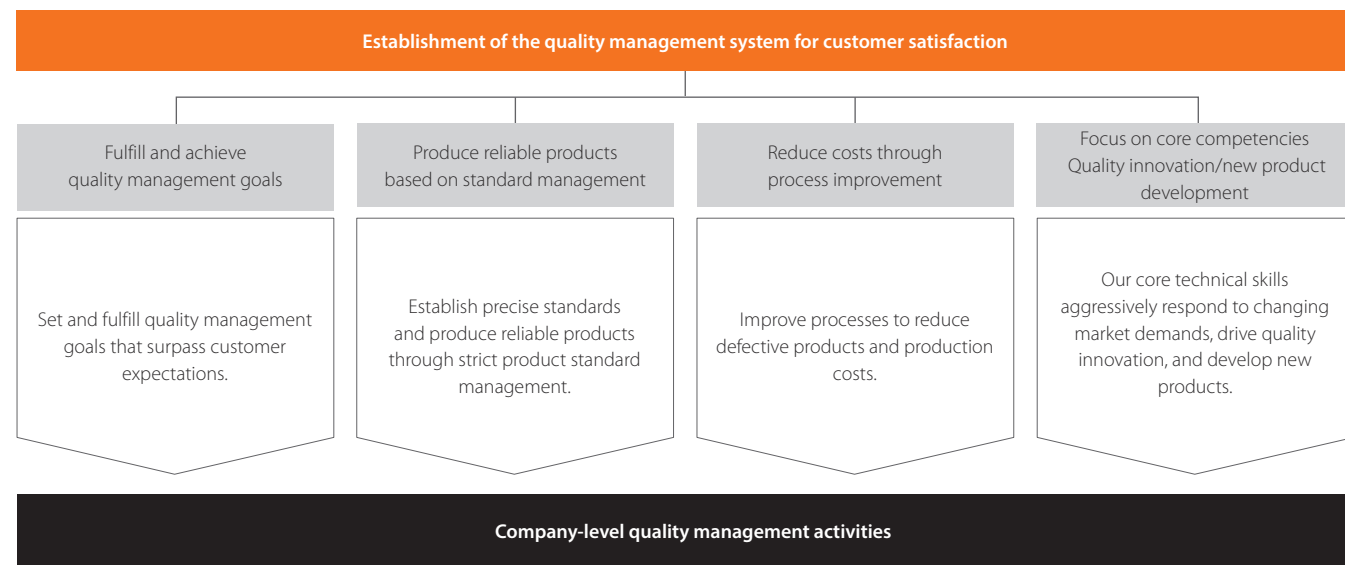
Quality Management Policy

Hanwha Solutions fulfills customized quality management through administration of companywide quality policies and policies tailored for each production site. All employees are fully aware of the company-level quality policies and act accordingly. Hanwha Solutions' quality management standards are stricter than the International Electrotechnical Commission (IEC) certification and the Verband Deutscher Elektrotechniker (VDE) test. Accordingly, it will grow into a top-tier global company with the highest-quality products and services according to its standards.

The Operation Process of the Quality Management System

Hanwha Solutions have established the Quality Management System to meet the global standard ISO 9001 and customer requirements. Moreover, it continuously monitors manufacturing processes and seeks and fulfills improvements. All manufacturing processes of Chemical Division interact with every quality management system and are carried out by organizations having expertise in each stage for effective and integrated management. Each system, including the chemicals management system, purchasing system, and standardized production system, works according to a strict quality management system, from purchasing raw and subsidiary materials to product delivery. Subsequently, aftercare is provided to optimize the practicality of products for customer-oriented quality management.

Quality Management System



The Q CELLS strictly operates eight procedures for new product development, from T1 to T8, to priorly detect and take measures against quality-related issues of new products. Furthermore, relevant departments, including the Development, Quality, and Purchase Departments, execute cooperative projects to stably supply high-quality raw materials.

The Advanced Materials Division has established Integrated Manufacturing Execution Systems (MES) with SAP to conduct quality control through a tracking system, from raw materials, intermediate processes to final products. It also minimizes human errors through periodic internal audits and priorly takes care of product safety and quality risks. Moreover, according to the car Original Equipment Manufacturing (OEM) and IATF 16949 process, the division operates a quality system for car composites. Accordingly, it established a 5-step Advanced Product Quality Planning (APQP), from product planning to mass production, to check and improve the new car development process and maximize product quality stabilization.

Quality Management Activities

Efforts to Secure Product Competitiveness

Hanwha Solutions constantly seeks measures for quality innovation to strengthen the global competitiveness of its products and operation performance.

The Chemical Division conducts Total Operation Performance (T.O.P) activities, joined by all employees, and Sales and Operation Planning (S&OP), a strategic meeting for each business division, to secure resources and effectively operate to enhance customer satisfaction. T.O.P activities concern all executives and employees suggesting all kinds of ideas that can substantially improve the productivity of production site managers. The proposed tasks of employees are selected as KPI goals to improve manufacturing competitiveness by levels of importance and review. Awards are provided according to task effectiveness, motivating employees to actively launch new tasks. High-quality alternatives are being developed, and profitable items are being discovered to secure cost competitiveness and reduce the percentage of defective products through improved manufacturing processes and automated analysis. Furthermore, the manufacturing plant carries out the Digital Transformation Project to reduce operating costs through effective and automated operations.

Status of product and service quality certifications

Chemical

- Acquired the Quality Management System (ISO 9001:2015) Certification

Q CELLS

- Acquired the Quality Management System (ISO 9001:2015) Certification
- Implemented global certification inspections (IEC, UL, MCS, JPEC, KEMCO) for solar module products
- The first and only company to acquire the Quality Controlled PV (QCPV) Certification by "TÜV Rheinland"

Advanced Materials

- Acquired International Automotive Task Force (IATF 16949) and Quality Management System (ISO 9001:2015) Certifications
- Acquired the Business Continuity Management System (ISO 22301) Certification (Sejong Office)
- Ranked top level in the evaluation of regular car OEM suppliers

The Manufacturing Division of the Q CELLS Division takes the role of a control tower of domestic and overseas plants and secures the competitiveness of products and services. The Manufacturing Division consists of three departments—Manufacturing Planning, Manufacturing Development, and Manufacturing Quality—which strives to boost the efficiency of design, engineering, and production and reduce operating and maintenance costs. The division shares the best manufacturing practice cases with national and international plants to satisfy global customers' quality requirements and improve manufacturing systems.

The Advanced Materials Division operates a quality management office to resolve general quality issues for domestic materials and molded parts. It also puts the utmost effort into customer satisfaction and provides prompt solutions for severe quality problems in overseas branches through quick business trips.

Strengthening Quality Management Capabilities

Hanwha Solutions is well aware of the significance of systematic quality management of products and services at production sites and operates various support training programs to strengthen quality management capabilities and acquire professional skills and knowledge.

The Chemical Division provides quality enhancement training for influential employees who improve the effectiveness and outcome of the Quality Management System. Assessments on each employee's capabilities and eligibilities engage in developing knowledge and skills for practical affairs. In particular, the Quality Assurance Team includes qualified and eligible team members with competency and skills to establish the Quality Management System for Customer Satisfaction. The development of the Quality Internal License (H-QIL) System contributes to developing employees' roles and capabilities.

The Q CELLS Division operates various training programs for the quality team, process team, production team, and equipment team, which take care of high-quality production processes. Strict HR quality management is implemented for new professionals or personnel transferred from other processes through a particular training period and job capability assessment before earnestly working for practical affairs. The HR team operates a step-by-step certification system to strengthen all professionals' expertise in the production process and supports and inspires employees to acquire certificates for self-development and competitiveness.

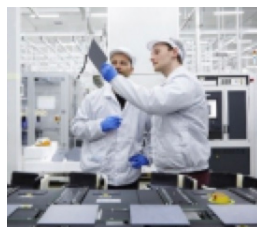
The Advanced Materials Division provides annual training with external professional organizations and in-house instructors to develop a quality management organization and companywide auditors to improve quality management. Moreover, it constantly trains and supports professional human resources to acquire certificates through quality management engineering courses, ISO 9001 auditing courses, and VDA 6.3 auditing courses.

Enhancing Customer Values

Promoting Customer Satisfaction

Hanwha Solutions separately operates a Technical Service Organization to meet national and international customers' quality and product needs and enhances and materializes customer values through sincere cooperation with the Sales Team, which directly communicates with customers. Moreover, it proactively responds to market changes by constantly monitoring the latest industrial-technological trends. In 2021, it established a Digital Transformation Task Force Team (TFT) to improve market intelligence and build an automatic work process to determine customer needs by each department. It automatically collects, refines, saves, and visualizes relevant information and data on the market, clients, and competitors—boosting the effectiveness and reliability of information collection.

[Special Case] The Industry's First to Acquire TÜV Rheinland's New Quality Controlled PV (QCPV) Certification



In November 2020, the Q CELLS Division became the first company to acquire the Quality Controlled PV (QCPV) certification for its solar modules by TÜV Rheinland, a world-class verification institution. QCPV presents a new standard for monitoring, testing, and recognizing solar module quality and consists of three items: short- and mid-term reliability assessment, on-site sampling inspection by external expert, and materials and components audits.

To be a global leader in quality innovation, the Q CELLS Division will introduce QCPV as a formal quality review for its future products.

Strengthening Communication with Customers

Hanwha Solutions operates a large variety of communication channels, from online and offline management activities to community operations, to activate interactions and reflect customers' opinions in products and management. Therefore, the company actively reflects customer needs and resolves claims to prevent consumer damage and improve satisfaction levels.

The Chemical Division visits clients regularly to provide and support technical guidance, identifies customer needs and inconveniences for quality improvement and product development, and implements the "Hello Orange" Program to get close to customers and promote product satisfaction. Its Quality Call Center (QCC) operations support the collection and processing of various issues, including product quality issues and it is equipped with a system that promptly replies within 4 hours after inquiries.

Apart from the above, various online and offline operations for active customer interactions include the annual processing technology seminars and on-site seminars. The Chemical Division implements annual customer satisfaction surveys to improve unsatisfactory services and impress consumers with its products and services.

The Q CELLS systematically operates customer claim response processes for prompt countermeasures and minimization of quality-related risks and it has conducted annual customer satisfaction survey for national and international customers. Through survey results, Q CELLS endeavors to identify customer needs to meet their expectations.

The Advanced Materials Division systematically manages the history of customer claims via the VOC system in SAP ERP. It collects and manages claims on production processes, defective product types, and other reasons and analyzes claim types and quality adequacy to identify and improve product weaknesses. Advanced Materials uses these analyses as a basis to provide customers with optimized products and services. Moreover, its customer satisfaction monitoring system and performance indicators take corrective measures against items with poor performance and implement long-term improvement activities.

Claim Response Process



[Special Case] Establishment of the Smart QR Code System



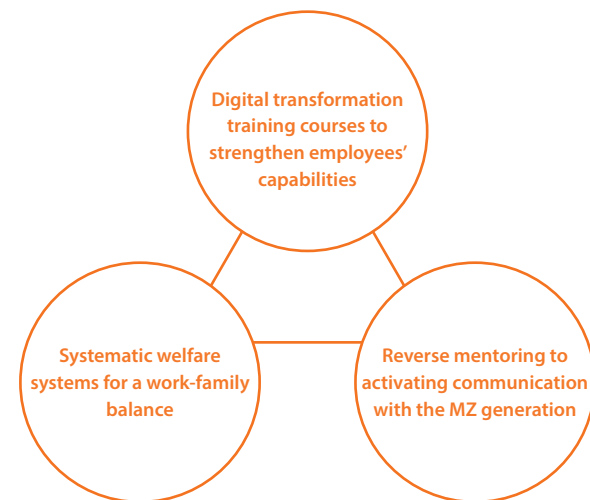
For Digital Transformation, the Chemical Division introduced a new QR code and built a digital system to raise information accessibility through smartphones. The system enabled the Chemical Division to conveniently share data online with clients, including product catalogs, Technical Data Sheets (TDSs), and MSDS. Furthermore, the company website is linked with the information to boost clients' convenience and accessibility.



Talent Management

Hanwha Solutions fully recognizes the values professional talents bring and strengthens human resource capabilities accordingly by operating various systematic programs. It strives to support its human resources to be a first mover in the ever-changing business environment and to lead innovation and change. Moreover, it passionately creates a productive and healthy organizational culture to pave the road for a sustainable future by labor and management collaborations.

Key Performance



Recruitment of Employees

Non-discriminatory employment

Hanwha Solutions observes the International Labor Organization convention and domestic labor laws to prohibit child labor and forced labor and promote equal employment, promotion, salary, and training, regardless of gender, religion, political views, social status, nationality, or race. Its recruitment system provides equal opportunities out of respect for all applicants. Moreover, it hires highly talented people with excellent skills and potential to expand its global business and secure future competitiveness. Applicants with disabilities are granted additional points during the recruitment process for stable and non-discriminatory recruitments.

Employment Expansion of Talents with Disabilities

In July 2019, Q CELLS formed a sports team for people with disabilities and provided employment opportunities by hiring athletes with disabilities in Chungbuk. The sports team for people with disabilities includes 40 athletes from 7 sports and consists on the intellectual soccer team, visual soccer team, swimming, weightlifting, rowing, shooting, and goalball. It is Korea's largest sports team for people with disabilities. Hanwha Solutions will continue to support safe and pleasant jobs and support social lives for vulnerable social groups.

Efforts to Secure Professional Talents

Hanwha Solutions secures excellent global talents through various channels, such as industry-academic internships and scholarships, to fuel new growth engines. For example, Hanwha Solutions hires outstanding talents with bachelor's, master's, and doctoral degrees studying business-related fields and operates industry-academic internships to provide full-time jobs for excellent graduates.

Hanwha Solutions plans to hire competent national and international talents in solar power and green hydrogen through various channels, especially the R&D personnel of perovskite tandem solar cells, high-pressure hydrogen tank, and water electrolysis. It will continuously find and secure the industry's most talented people with profound experience and excellent technical skills.

Capacity Strengthening Program for Employees

Job Market Operations

Hanwha Solutions operates its "Job Market" program on the company bulletin board to motivate each employee's voluntary and strategic career management. When required, new positions are posted on the bulletin board to encourage applications from internal candidates. This program allows the company to find the right person for the right job and employees to work for tasks corresponding with their aptitudes, which boosts engagement and satisfaction levels.

Introductory Course for Interns

The Q CELLS introduced the metaverse platform "Gather Town" for the two-day introductory course for recruitment-linked internship in 2021. As COVID-19 makes offline group education difficult, a metaverse-based online office platform was used for online courses to comply with the government's quarantine guidelines and overcome the limitations of contact-free one-way communications. Participants created avatars and walked around in teams to rooms and lecture halls as they liked and had a good time with their colleagues in various programs, such as the orientation, job training, and team building programs. This opportunity boosted interns' understanding of the company, businesses, and products through intensive training courses to make them proud and foster a sense of belonging, along with support of soft-landing. Hanwha Solutions will continue to expand and use the metaverse platform for various training and recruitment programs.

Developing Job Expertise

Hanwha Solutions operates job training in each division to foster key talents as the next-generation company leader with upgraded expertise and provides customized professional training programs for practical affairs. It also provides language programs to improve business communication skills to interact with customers worldwide. Furthermore, Hanwha Solutions creates a culture that stimulates employees' growth through various capacity strengthening programs, such as the leadership building program to produce next-generation Hanwha Solutions leaders.

Strengthening Digital Abilities

Hanwha Solutions implements its digital ability strengthening training for each division to lead and take action in the digital transformation (DT) era with a digital mindset.

The Chemical Division operates an intensive education system on Citizen Data Scientist (CDS) training to strengthen employees' digital competencies. It prioritizes chemical engineering majors in the CDS training due to their highest needs for digital skills in tasks, which provides effective data analysis courses, from basic courses to practical on-site courses. Based on the Advanced Analytics (AA) certification system, which consists of four steps, the Chemical Division promotes the advancement of employees' digital skills through regular training courses for field engineers and researchers. The Q CELLS Division conducted the online "Basic Digital Transformation Course" to develop employees' fundamental digital capacity and secure professional talents. It also provided content using Python and excel to boost information application and data analysis skills. Furthermore, Korean plants have built a Data Scientist Learning Organization by publicly recruiting applicants to construct a smart factory and realize digital transformation. Accordingly, employees receive data analysis training and spread their knowledge to affiliate teams before fulfilling Change Agent activities for DT acceleration and tasks related to various pending processing issues and smart factory construction.

The Advanced Materials Division planned a basic training course to raise understanding of digital technologies for digital transformation. It provided employees with an eight-hour training course to strengthen their basic skills, including the DT framework, digital innovation paradigm, and major technologies. It also conducted the "Digital Transformation Workshop" for in-house digital transformation personnel to analyze digital transformation trends, digital management strategies, and successful cases. The training provides new knowledge and assignments, which are practically used for the Advanced Materials Division tasks. Furthermore, the division promotes Microsoft's Teams application-based collaboration for practical use of technologies in the future, along with support and provision of various programs to automate and visualize tasks through Self-RPA and Self-BI training.

Technical Development Training

Hanwha Solutions is establishing an independent technical development roadmap to train technical engineers professionally. Customized courses are provided, from introductory courses for new employees to advanced courses for department managers, along with general competency courses for divisions. Furthermore, the company is planning and operating professional competency courses separately for six different fields—production, quality, maintenance, relay, inspection, and environmental safety—to practically train and develop high-class technical talents.

Re-Employment Services for Retirees

Through career planning and scheduling, Hanwha Solutions provides re-employment and start-up programs for retirees aged over 50 or older to ensure stable and happy years after retirement. Services start with counseling and continue with competency training required for re-employment and start-ups, and post-management is supported for three months after graduating from the program to understand the new knowledge and skills fully.

Performance Assessment and Compensation System

Fair Performance Assessment System

Hanwha Solutions reorganized its goal management system to provide systems and an environment that encourage employees to accomplish their goals. These goals include “strategic goals” and “operation goals.” Challenging strategic goals are established to create new values, and operation goals are required for each position and duty. The number of goals must be minimized to raise the success rate. The team leader and members actively communicate and regularly update each other with feedback to achieve goals, with the establishment of the ongoing regular performance record system. Moreover, Hanwha Solutions plans to encourage collaboration based on the Microsoft Teams Application for a contact-free work environment to prevent COVID-19. Teams will also manage the goal management system through double-way feedback on the outcome.

Reasonable Compensations

Hanwha Solutions executes a reasonable compensation policy based on the comprehensive assessment of employee performance, corporate sustainability, and related issues. At the end of every year, executives, team leaders, and team members participate in the HR assessment to grade each employee’s performance outcome, making the assessment not only fair and objective but also providing fast career growth opportunities. Therefore, Hanwha Solutions motivates young and talented people to make ceaseless efforts and take on challenges to reach their full potential. In 2020, the “Restricted Stock Unit” was reorganized for employees to concentrate on accomplishing sustainable long-term growth.

Operation of the Restricted Stock Unit System

Hanwha Solutions operates a carried interest system called the Restricted Stock Unit (RSU) system, which grants rights for convertible stocks after the vesting period. From 2020, executives have been compensated according to their position and performance, and reliable and transparent decision-making has been encouraged to share long-term shareholder values and strengthen win-win growth between the company and employees.

Welfare for Employees

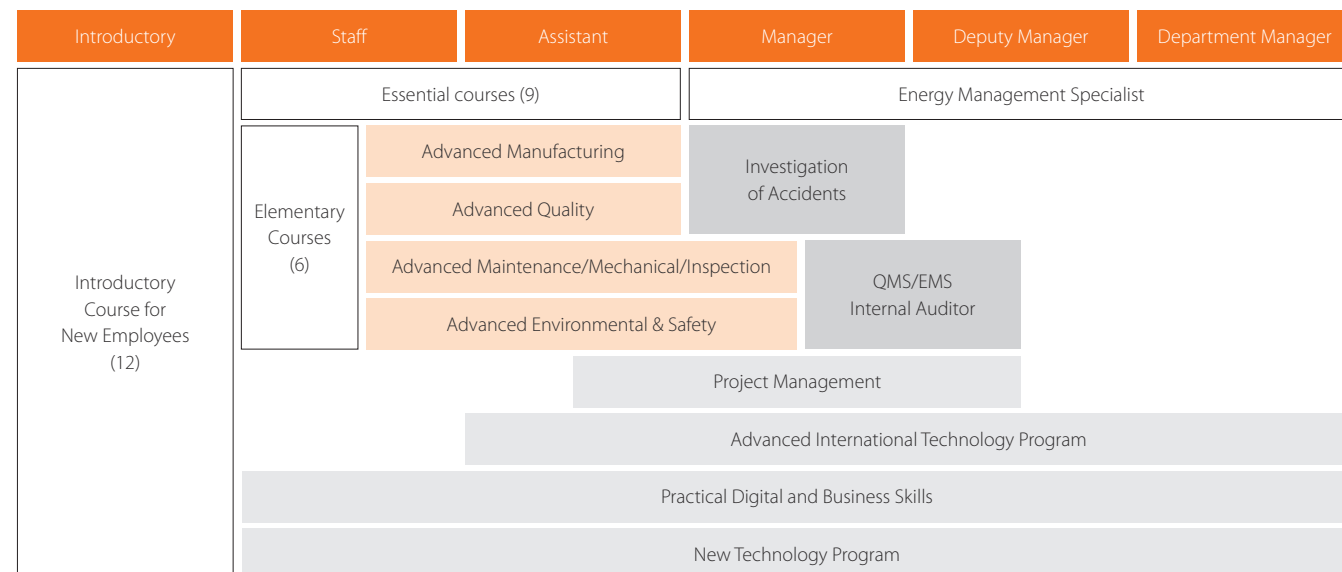
Promoting Work-Life Balance

Hanwha Solutions operates a variety of programs to encourage employees to enjoy a work and life balance to spend more time with families and make childbirth and parenting less challenging. It also makes efforts to create a corporate culture that promotes the work and life balance to satisfy workers.

Welfare System

Hanwha Solutions encourages and motivates employees to focus on their duties by providing a higher quality of life through its various welfare programs. Only essential stay-behind members come to the workplace, whereas others work from home to prevent the spread of COVID-19, and a free working environment is supported by flexible work and commuting hours. Furthermore, counseling is provided in collaboration with external professional institutions for employees’ mental health and stress management, along with comprehensive health examinations and medical support for employees and their families.

The Chemical Division’s General Technical Development Roadmap



Pregnancy support policy



Mom's Package
A dedicated package including system guidance, work support products, and congratulatory gifts for pregnant employees



Infertility support system
Up to 30 days leave for up to 3 times (first 30 days of paid leave), and up to KRW 2 million for support



Permitted period for prenatal diagnosis
Guarantees paid regular checkups up to 4 hours per day



Reduced working hours during pregnancy
Reduction of up to 2 paid working hours (within 12 weeks or more than 36 weeks after pregnancy)



Miscarriage and stillbirth leave
The leave period for miscarriage or stillbirth depends on the period of pregnancy



Childbirth leave
Up to 90 days (120 days for multiple births) of perinatal leave



Paternal leave system
Up to 20 days are allowed for paternal leave, including 10 days of paid leave for a spouse’s maternity, 6 days of leave supported by the company, and 4 days of annual leave



Congratulatory money for childbirth
KRW 250,000 for childbirth

Communication with Employees

Diagnosis of Organizational Culture

Every year, Hanwha Solutions conducts a companywide organizational culture diagnosis to encourage and share opinions to identify shared values, behavioral patterns, and the working atmosphere. The diagnosis supports Hanwha Solutions to create a wholesome and desirable organizational culture through priorly identified organizational issues and planned improvements. In May 2021, Q CELLS Division carried out an "Effectiveness Diagnosis" to identify employees' voluntary engagement levels and overall enablement of execution, as well as a corporate culture diagnosis to check organizational effectiveness and future directionality. Approximately 700 employees in Korea, Europe, and the U.S. were surveyed by 100 multiple choice and subjective questions on voluntary engagement, enablement of execution, and organizational culture. Each division's Change Agents and HR collaborate to deduce plans for continuous improvement for fields with low satisfaction levels indicated in the survey results.

Getting Closer to the MZ Generation

The MZ generation has recently taken up a large proportion of the organizational members, considerably changing working methods and organizational culture. Accordingly, Hanwha Solutions makes efforts to improve its organizational culture by bridging and connecting the gaps between the MZ and older generations.

Reverse Mentoring As a corporate citizen, the Chemical Division conducts "Reverse Mentoring," led by the center head, to take action against recent social issues between different generations. Unlike the existing top-to-bottom custom, young millennials implement reverse mentoring to management personnel or executives. They coach new knowledge or skills, which boost interaction and bridge gaps between generations.

Getting Closer with the Young Generation In May 2021, the Advanced Materials Division published a newsletter to learn about young people born in the 90s to reduce conflicts and activate communication between generations. Various video programs, such as "How to Communicate with People Born in the 90s," "Getting Along with the Team's Youngest Employee," allowed employees of different generations to get along. Furthermore, the Junior Board and communication channels were opened, stimulating internal communication, and promoting organizational culture.









Labor-Management Communication

Hanwha Solutions ensures and respects employees' basic rights—including the right of organization, collective bargaining, and collective action—and complies with constitutional matters accordingly. It conducts collective bargaining through collective agreements prepared in accordance with relevant laws and regulations and holds quarterly Labor-Management Committee meetings to converge grievances and opinions from employees for a win-win labor-management relationship.






The Q CELLS Division operates its communication channel "Q-Board" instead of the Labor-Management Committee to activate communications with employees. The Q-Board, consisting of 5 members from the headquarters and Korean plants, it holds quarterly meetings to listen to employees' grievances, improve work methods and processes, and generate ideas for cost reduction. Moreover, Q CELLS promotes communication between employees and implements various labor-management programs, such as joint labor-management workshops, watching baseball games together, and labor-management social contribution activities, for sound labor-management relationships.

In the first half of every year, Advanced Materials Division conducts workshops with the Win-Win Labor-Management Committee and the Executive Department. In the second half of every year, it builds win-win labor-management relationships through workshops with the Collective Bargaining Committee on Wages and Collective Agreement. However, in 2020, the strike of COVID-19 resulted in the temporary closure of the workshop to comply with the Korean government's social distancing policies.

Family Love System

 <p>Guaranteed breastfeeding time Guarantees 30 minutes or more twice a day for breastfeeding (up to a year after childbirth)</p>	 <p>Parental leave consultation system Counseling to 1 month before returning from parental leave catch up on work</p>
 <p>Maternity leave Female employees who are pregnant or have children can take a perinatal leave of up to 6 months (separately from maternity leave)</p>	 <p>Childcare before and after school-age Employees with preschool- or school-aged children</p>
 <p>Parental leave Up to one year of leave per child for employees with children aged 8 or below or who are in the second grade or below (simultaneous leave for married couples allowed)</p>	 <p>Family Care Leave For family care due to illness, accidents, or old age, up to 90 days of leave is allowed, and up to 10 days of vacation is granted during this period.</p>
 <p>Reduced working hours during the parenting period Able to reduce 5-25 weekly hours every 3 months or more up to 2 years</p>	 <p>Emergency support for family care expenses Up to KRW 50,000/day (maximum of KRW 500,000) of support for employees' families (close family, spouse, parent, or grandparent) who need emergency help, or are confirmed or suspected of having COVID-19</p>

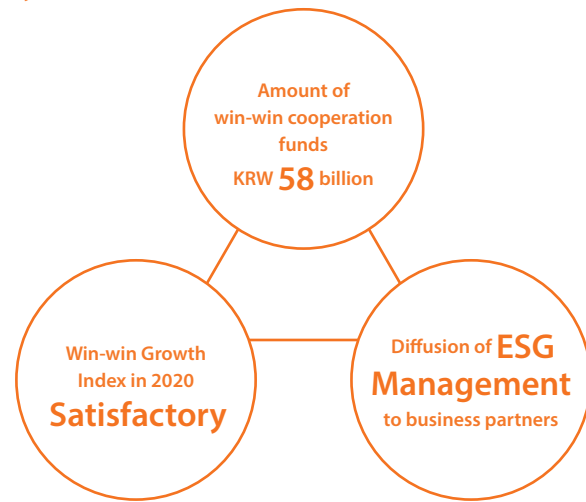
Labor-Management Communication Activities

 <ul style="list-style-type: none"> • Labor-Management Committee: Discusses improvements on the working environment (quarterly) • Occupational Safety and Health Committee: Discusses improvements on occupational safety (quarterly) 	 <ul style="list-style-type: none"> • Labor-management safety check-ups: Labor-management collaborations on-site safety check-ups (annually) • Labor-management safety campaign: Labor-management safety campaigns and training (semi-annually)
 <ul style="list-style-type: none"> • Labor-management partnership meeting: Annual Meeting for Mutual Growth by Labor-Management Partnerships (annually) • Benchmarking of excellent cases of labor-management activities: Benchmarks companies showing excellent performance in labor-management activities (annually) • Joint labor-management workshop: Win-win workshop for harmonious labor-management relations (annually) 	 <ul style="list-style-type: none"> • Preventive activities for COVID-19 (i.e., measurement of body temperature at the workplace entrance) • Joint labor-management social contribution activities (i.e., Sharing coal briquette of love, Going forward together)
 <ul style="list-style-type: none"> • Having a Joyful Workplace: Family-gathering event for employees (i.e., glamping) (quarterly) • Watching baseball games: Watching Hanwha Egales' baseball games altogether (biannually) 	

Win-Win Management

Hanwha Solutions builds partnerships to drive synergy with business partners and develops win-win growth based on collaboration and mutual trust. It plans and supports various programs for its strategic partners to pave the way for shared growth.

Key Performance



System for Shared Growth

Strategies for Shared Growth

Hanwha Solutions plans to secure orderly subcontract transactions and accomplish shared growth based on the value of "Going Further Together." It complies with the "Four Disciplines of Execution: Complying with Subcontracting Rules," enacted by the Fair Trade Commission to maintain long, tight relationships with partners, who are more than merely business colleagues. Moreover, the company signs win-win business agreements with partners to lay the groundwork for win-win development based on mutual trust.

Execution System for Shared Growth

Hanwha Solutions organized the Shared Growth Promotion Committee for each division to comprehensively plan, execute, and inspect the fair trade and shared growth program. Collaborations are made with each department, including the Legal, Purchase, and Financial Departments, to drive smooth communication and systematic management with its business partners. Moreover, each division has a Win-Win Cooperation Team or Management Innovation Team that provides overall support for partner management. The teams plan and introduce new win-win programs, maintain and strengthen existing win-win programs, and support business partners to fulfill sustainable management activities.

Four Principles of Shared Growth

- Commitment through agreements with subcontractors
- Selection and management of business partners
- Establishment and management of the Internal Subcontractor Deliberation Committee
- Proper issuance and storage of documents

Mutual Growth Program

Hanwha Solutions supports win-win growth through various programs, including technical, educational, financial, and ESG management, to promote balanced growth of small and medium-sized enterprise (SME) partners and maximize synergy effects through continuous win-win collaboration activities.

Technical/Educational Support

Win-Win Energy Collaboration Program The Chemical Division operates a Win-Win Energy Collaboration Program that executes industrial innovation campaigns and energy partnership programs to boost the energy efficiency of its main partners. The Win-Win Energy Collaboration Program provides comprehensive solutions, from consulting business partners on production equipment and energy status to supporting equipment investment funds for improved energy operations according to diagnosis results. It also raises the energy efficiency of production facilities, an essential factor for manufacturing, to improve business partners' competitive edge and promote win-win growth.

Financial Support

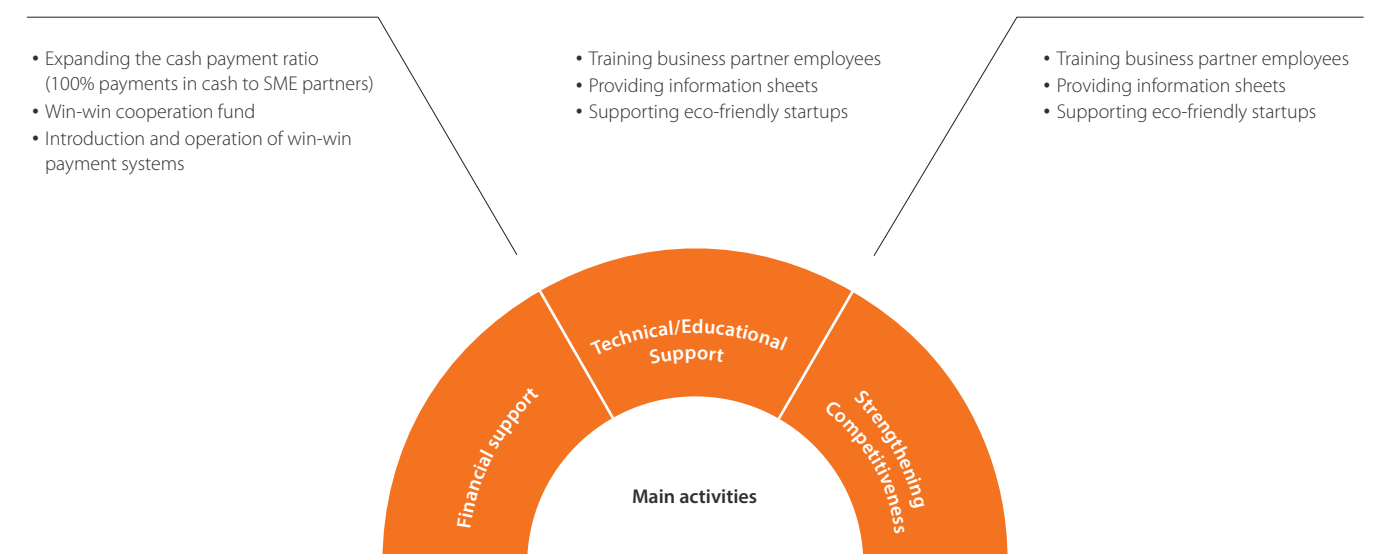
Hanwha Solutions operates its various financial support systems for mutual growth with business partners. In collaboration with Woori Bank (KRW 25 billion), Korea Development Bank (KRW 10 billion), Shinhan Bank (KRW 20 billion), and the Korea Petrochemical Industry Association (KRW 3 billion), it arranged and supported KRW 58 billion of win-win cooperation funds in total. Also, an additional KRW 20 billion is supported upon signing a win-win cooperation fund agreement with Shinhan Bank for business partners suffering from a lack of funds due to COVID-19.

Hanwha Solutions also supports their business partners to have a smooth flow of funds by advancing payments on holidays (Korean New Year's Day and Thanksgiving Day), and payments are settled twice a month. Furthermore, Hanwha Solutions supports business partners giving them funds for enterprise credit evaluation.

How to apply for win-win cooperation funds



Key programs for shared growth



Strengthening Competitiveness

Development of Next-Generation Solar Cells In December 2020, the Q CELLS Division was assigned as the research institution in the “New Assessment for Renewable Energy R&D in the Second Half of 2020,” hosted by the Korea Institute of Energy, Technology, Evaluation, and Planning (KETEP). Therefore, it organized a consortium with academic institutions and SMEs in Korea to implement R&D on the national project, “Perovskite and Crystalline Silicon Solar Cells (tandem cells).” Q CELLS will secure the next-generation solar technologies and create ecosystems for the national solar material industry with prestigious Korean universities and SMEs for the next three years. Hanwha Solutions will advance Korea’s technical skills with its consortium partners to surpass Chinese competitors and secure global competitiveness with world-class solar power expertise.

Agricultural Solar Module Development In April 2021, Q CELLS, Yeongnam University, and SME Moden Solar organized a consortium in the “2021 New Assignment for Technological Development of Independent Industrial Models for Energy and Agriculture,” hosted by the Institute of Planning and Evaluation for Technology in Food, Agriculture, and Forestry. The consortium was selected as an R&D institution for the national project, “Development and Demonstration of the Standard Agricultural Solar Model to Raise Crop Productivity.” Yeongnam University’s research team will lead the national project with professors and researchers specializing in chemical engineering, phytopathology, and horticulture. Q CELLS will develop solar modules specialized for solar modules, and Moden Solar will design the optimal foundation structure according to the degree of soil erosion. Q CELLS, Yeongnam University, and Moden Solar will join forces for the national R&D project and raise agricultural productivity by developing the standard Korean model for agricultural solar power.

Sustainable Supply Chain

Business Partners of Hanwha Solutions

Hanwha Solutions considers its business partners as important companions heading toward the same goal of win-win growth. Based on its value of “Going further together,” Hanwha Solutions seeks sustainable mutual growth and improved competitiveness.

As of 2020, the Chemical Division has 1,780 business partners, with an approximate purchase amount of KRW 1.83 trillion. Business partners collaborate with Hanwha Solutions near its workplaces, including Hanwha’s Head Office in Seoul, production sites in Yeosu and Ulsan, and the Daejeon R&D Center.

As of 2020, Q CELLS has approximately 570 national and international partners and operates win-win collaboration programs for shared growth with 30 of its partners. Its national business partners work near the Global Headquarters in Seoul, JinCheon and Eumseong plants. Q CELLS also develops various HW/SW and systems and solutions and purchases EPC products and construction materials with the help of its business partners. Its overseas businesses contribute to the regional development of production sites abroad and social contribution by complying with local purchasing policies.

As of 2020, the Advanced Materials Division has about 800 partners and is striving to establish and maintain fair and sustainable relationships based on mutual trust and understanding.

Appointment and Assessment of Business Partners

Hanwha Solutions established the “Guidelines for Appointment and Management of Business Partners,” which include business stability, legal compliance, anti-corruption compliance, and environmental safety standards when registering new business partners. In addition, it assesses partners’ working environments based on the following evaluation factors: the credit evaluation results by external specialized agencies, evaluation of financial status, occupational accidents and overdue wages in the last three years, and turnover. The assessment of new business partners includes checklists for each item to determine the management level status. It also conducts on-site due diligence evaluations by visiting the partner’s production sites to confirm its qualification and eligibility as a new business partner before appointment and registration. Furthermore, Hanwha Solutions prioritizes the transaction period and capacity when confirming win-win partnerships and supports win-win growth programs. It supports more companies every year.

Activating Communication with Partners

Hanwha Solutions holds monthly safety and health council meetings for residing partners, managers’ quarterly meetings, and representatives’ annual meetings to check partners’ compliance status on occupational safety and health regulations. Also, relevant information and educational materials are provided to raise partners’ awareness of safety and health. Furthermore, it improves work environments and strengthens the managing partner’s capacity through safety and identifying health risk activities and win-win collaboration programs to have a healthy and safe workplace.

ESG Management for Business Partners

Hanwha Solutions implements an “environmental safety assessment” before registering a new business partner. Only companies that have passed the evaluation are registered as business partners, ensuring a safe and sustainable supply chain. It also executes post evaluations for registered trading partners, and unless a certain level is met, the partner is not allowed to participate in the bidding. The assessment system evaluates each case to strengthen the ESG management capacity of business partners. Furthermore, environmental safety assessment details must comply with the Environment and Safety Department’s safety management procedures for partners. A safety and health management guidebook is shared with partners to support safe and sustainable management.

Reliable Procurement of Raw Materials

Hanwha Solutions purchases ethically procured raw materials to fulfill social responsibility. As a member of the UN Global Compact Network (UNGC), it supports the ten human rights, labour, environment, and anti-corruption principles and links them to corporate management, as it considers the principles as basic values for sustainable growth. It also appoints highly reliable business partners according to company regulations on appointing and evaluating partners to prevent raw material purchasing and procurement risks of supply chains and sustainable growth. Therefore, Hanwha Solutions conducts due diligence and written assessments on raw material suppliers based on performance, quality, and other items. Evaluations are conducted biennially, and feedback and post-management support partners with low grades for improvement.

[Special Case] ESG Management Support for Win-Win Management

Hanwha Solutions has entered into an MOU with Ecredible Co., Ltd., a specialized assessment agency for corporate management, to support ESG management evaluation models and funding for SME partners. Accordingly, Hanwha Solutions applied its self-developed ESG evaluation model to 24 SME partners to check items, including carbon emissions, safety and health, and transparent accounting. It will support ESG training and consulting services for partners according to the results.

Hanwha Solutions will continue to spread ESG management nationwide and establish a corporate culture promoting a win-win growth culture between conglomerates and SMEs.



Sharing Management

Hanwha Solutions pursues a better future for all based on its philosophy—Go Far Together—and leads continuous and sincere social contribution activities to fulfill corporate social responsibilities and mutually develop with communities.

Key Performance

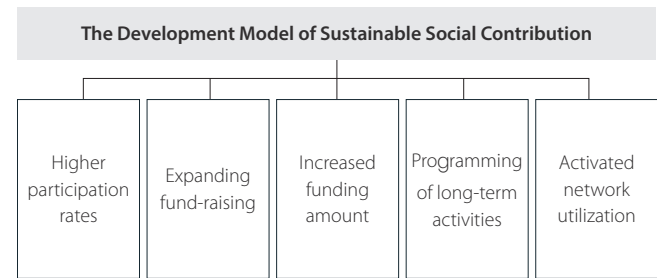


Social Contribution Promotion System

Hanwha Solutions wishes the entire society "Going Further Together" for a bright and healthy future and win-win growth through sharing, consideration, and eco-friendly values. To this end, it plans programs with human resource development, culture and arts, and eco-friendliness as core business areas and continuously fulfills and improves its social responsibilities.

Direction for Social Contribution

With a sincere heart, Hanwha Solutions passionately participates in social contribution activities on a regular basis to achieve better lives and a better, sustainable future. It puts its utmost effort into forming deep trust with the community.



Social Contribution Strategies

Philosophy	Going Further Together			
Mission	Hanwha encourages everyone to go far together for a happy future.			
Core Business Areas	HR development	Culture and Arts	Eco-friendly Environment	Volunteering and Donations
Vision	Help employees achieve their dreams	Enrich people's lives	Create a greener tomorrow	Foster the spirit of sharing
Main activities	<ul style="list-style-type: none"> Hanwha Eco School Global Korean Class 	<ul style="list-style-type: none"> Neulhaerang Choir Hanwha Arts Plus National Artistic Ceramic for Persons with Disabilities 	<ul style="list-style-type: none"> Hanwha Happy Sunshine Hanwha Solar Forest Clean Up Mekong Next-Generation Energy Classroom 	<ul style="list-style-type: none"> Holiday Sponsorship Activities Going Further Together to Different Islands and Regions Bright World Fund

Main Activities of Sharing Management

Talent Development

Hanwha Eco School The Advanced Materials Division operates a specialized social contribution program called "Hanwha Eco School" for elementary school students in Sejong City and Eumseong. In 2019, it successfully changed 145 elementary school students' awareness and attitude of eco-friendliness, though COVID-19 prevented this activity from being held in 2020. The division motivates children to participate in various eco-friendly science experiments and experiential learning programs to cultivate their understanding of science concepts and improve problem-solving skills. It delivers interesting content to encourage students to pay more attention to energy protection and the environment. To present vivid educational experiences and knowledge, professional lecturers teach elementary school students formal education courses, basic science experiments on eco-friendly technologies; they have field trips, and 12 educational courses on basic scientific phenomena for seniors.

Global Korean Class Since 2010, the Chemical Division has planned and operated the "Global Korean Class" program at the Global Child Community Center in Guro-gu for multicultural children who learn Korean as a second language. The Global Korean Class provides a one-on-one lesson with Hanwha Solutions' employees as instructors and students to provide customized education, which raises satisfaction and achievement levels. Subjects include Reading in Korean, Spelling, Elementary Math, and Reading Books.

Culture and Arts

Neulhaerang Choir The Neulhaerang Choir of Advanced Materials Division was established in 2017 as "a bright, sunny, and healthy children's choir." The Sejong Plant and the Sejong Community Child Center provide promising opportunities through the Neulhaerang Choir, in which young people sing their dreams and wishes for 70 elementary school students. The Neulhaerang Choir pulls off stunning performances of the Korean national anthem in baseball games and regional events.

Hanwha Arts Plus Hanwha Solutions promotes social integration through cultural arts classes and takes part in Hanwha Arts Plus—Hanwha Group's social contribution activity to raise environmental awareness. It organizes various programs, such as social design, card news production, and press card making. Employees teach young students stress management and convincing speech strategies. Through this process, the students grow up to be mature citizens. The students' artworks are shared through exhibitions and talent donation meetings for parents and residents.

Sponsorship of the National Artistic Ceramic Contest for Persons with Disabilities The Chemical Division has supported the "National Ceramic Art Contest for Persons with Disabilities" for 16 years to improve the quality of life for people with disabilities by drawing out their talents in cultural and artistic activities. The division wants to prove that people with disabilities can produce cultural artwork. It also bridges gaps between people with disabilities and those without disabilities through communication and cooperation. Hanwha Solutions will continue to implement various activities to show society how talented people with disabilities can be.



Global Korean Class



Neulhaerang Choir

Eco-friendly Activities

The “Happy Sunshine” Campaign The Q CELLS participated in the “Happy Sunshine” campaign—Hanwha Group’s representative eco-friendly social contribution program—to supply and install free solar generation facilities to social welfare facilities nationwide and implement safety checkups, maintenance, and post-management, such as generation rate monitoring. Hanwha Group has been running the campaign since 2011 and has complementarily installed 2,187kW solar generation facilities in 320 facilities nationwide. The scale of supported facilities in the last 10 years is enough to support 720 households, equivalent to 507 tons of reduced carbon dioxide emissions, and the planting of 910,000 20-year-old pine trees. Hanwha Solutions will continuously follow various activities to solve global issues through eco-friendly solar energy.

“Solar Forest” Campaign In collaboration with an innovative social firm Tree Planet, the Q CELLS Division has participated in Hanwha Group’s “Solar Forest” Campaign, which creates eco-friendly solar forests in Korea, China, and Mongolia. Approximately 499,000 trees have been planted on 1.33 million m² site in China, Mongolia, and Korea, whose size is equivalent to 180 soccer

fields. In April 2021, Q CELLS planted 15,000 acacia trees cultivated with solar energy and established the “No. 8 Solar Forest” on a 500 million m² site in Juji-ro, Nogok-myeon, Samcheok-si, Gangwon-do, Republic of Korea. The No. 8 Solar Forest can absorb 162 tons of carbon dioxide and 330 tons of fine dust annually, and participants made donations by virtually cultivating the forest on the Exclusive Solar Forest Campaign app, making it even more meaningful.

Clean Up Mekong Hanwha Group’s “Clean Up Mekong” project was the last bastion to prevent waste from flowing into the Pacific Ocean. In June 2019, Hanwha Solutions donated the solar panels for making solar-powered waste collection boat. “Solar Hero,” a solar boat developed by Hanwha Solutions and donated to the Vinh Long City, collects floating garbage on the Mekong River for 6-7 hours every day, and two Solar Heroes collect approximately 200 tons of waste daily. “Solar Hero” proudly represents zero-carbon emissions operated solely by eco-friendly solar power. So, the more you use it, the more benefits are provided for the environment with no damage.

Next-Generation Energy Classroom Since 2013, the Chemical Division has provided “Next-Generation Energy Classrooms” for promising elementary school students. As of today, 13,500 children in 190 schools and welfare institutions have received lessons. Classes use various textbooks and educational tools to teach children the preciousness of energy and energy-saving tips in “Making Solar Towns,” “King of Energy Invention, and “Energy Board Games.” They also present vivid experiences of promising new renewable energy with no environmental contamination.

Volunteering and Donations

Holiday Sponsorship Activities The Q CELLS’ volunteering group participated in the NGO-organized “Share Love Together” event right before Korea’s New Year’s Day in 2020. Q CELLS shared love and warmth with marginalized neighbors to fulfill its value—Go far together. Its volunteering activity was implemented at a free cafeteria in Seoul Station for 300 homeless people and senior citizens living alone. Rice cake and dumpling soup and warm winter socks were shared for a heart-warming New Year’s Day. The Chemical Division shared bath supplies as gifts for New Year’s Day to 160 low-income Ulsan residents or senior citizens living alone.

Going Further Together to Different Islands and Regions In July 2021, the Yeosu Production Site of Hanwha Solutions implemented the Hope House project called “Go Far Together to Islands and Regions,” trying its best to abide by quarantine guidelines and overcome challenging situations brought by COVID-19. Residents were able to participate in improving the housing environment, which made them extremely satisfied. Various activities have been implemented for island residents since 2004, including but not limited to repairing household appliances, beauty salon services, repairing electronic facilities, gas safety check-ups, and home renovations. The Yeosu Production Site will continue to passionately engage in social contribution activities to help and support residents.

Bright World Fund Hanwha Solutions employees voluntarily deduct a certain amount of their monthly wages, and the company adds 1.5 times of the collected donations, which is an advanced fund-raising method called “matching grant.” This donation is called the “Bright World Fund” and is provided for neighbors in need. Marginalized neighbors in Hanwha Solutions’ production sites use the “Bright World Fund” and non-profit organizations (social welfare institutions) visited by employees volunteering for activities and are used for the environment and cultural development. Hanwha Solutions makes utmost effort to fulfill social liabilities and provides donations transparently.

[Special Case] Promoting the World's Largest Floating Solar Power Project with Residents

Since December 2020, the Q CELLS Division (constructor) and the Korea Water Resources Corporation (client) have been promoting a power generation project with residents to build the world’s largest “Hapcheon Dam Floating Solar Power Plant.” The project will employ dozens of local laborers and involve local construction companies and heavy equipment companies to construct the power plant. Also, it will use the local fishing industry vessels to transport the construction equipment and maintain the power plant for the next 20 years. The construction and maintenance both plan to hire residents and environmental supervisors. The model case draws public attention as it also intends to share profits of the power plant by appointing residents as investors for long-term regional development.



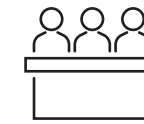
① Going Further Together to Different Islands and Regions ② Holiday Sponsorship Activities ③ The “Happy Sunshine” Campaign ④ Next-Generation Energy Classroom

Governance

Corporate Governance | Risk Management |
Ethics & Compliance Management |
Information Security

Hanwha Solutions has built up a management environment under which it can establish a transparent and sound governance and make reasonable decisions to build confidential relations with the people interested and lay the right and sustainable foundation for its growth.

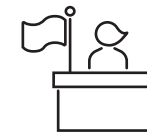
Key Performance in Corporate Governance



ESG Committee established
(2021. 5.)



Foreign outside director appointed
(2020. 3.)



Female outside director appointed
(2020. 3.)

Key Performance in Ethics & Compliance Management



The Compliance Management
System certified (ISO 19600)
(2020. 12.)



The Anti-Corruption Management
System certified (ISO 37001)
(2020. 12.)



In-house inspections for ethics and
compliance undergone in 2020
6 times

Key Performance in Information Security



The number of personal data leaks
for the past three years
0 cases



The number of the executives and staff
educated for information protection
1,815 employees

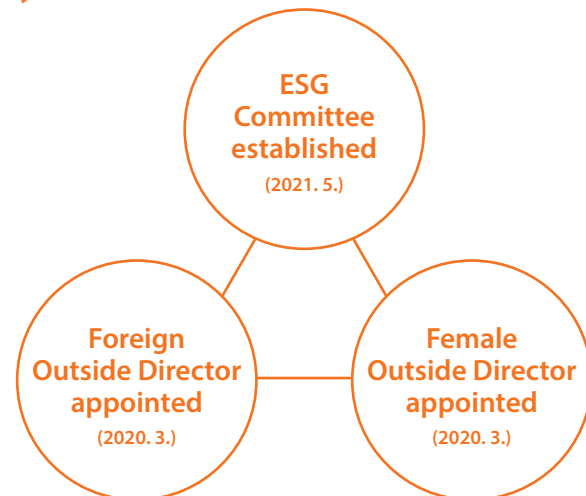


Operation of the Information
Protection Committee for
enterprise-wide protection activities

Corporate Governance

Hanwha Solutions has tried on and on to protect the right of its Shareholders, and it has pursued the healthy growth with its persons interested. Accordingly, constituting its Board of Directors (BOD) equipped with global diversity and specialty, the company has realized its responsible management under the supervision of the BOD and has grown as a corporation that the people interested trust.

Key Performance



Board of Directors

Board Composition

The BOD of Hanwha Solutions, its top decision-making body based on the Commercial Code, it supervises, deliberates and resolves its major managerial and financial matters. For its independent governance, the company constitutes its BOD according to its articles of incorporation and the criteria and procedures of the related laws. Also, to keep it clean and transparent, the BOD prohibits not only an unfair internal trade and self-dealing but also an illegality and corruption and a conflict-of-interest trade to secure fairness even more. As of the end of Oct. 2021, the BOD is composed of five directors and six outside directors, 11 in total, whose ratio of outside directors is 54.5%. It has been constructively led by Koo Yung Lee, CEO of the Q CELLS Division, the Chairman of the BOD.

Board Independency

Hanwha Solutions has filled the BOD with outside directors taking up over its majority to encourage free and objective decision making to give priority to the interest of the company and its shareholders. An outside director has especially been appointed, who had no significant interests in Hanwha Solutions even while it selected the candidates and was able to make a transparent decision for its corporate management in a status that is independent from its management and shareholders, so that it has constructed a management system for making the BOD, keep its policy of independency. Also, in accordance with Paragraph 3, Article 10 of the Regulations for the BOD, a director who has a special concern in a matter shall not exercise a voting right. So the BOD has strengthened its own independence by not adding such a director to the number of the present directors.

Board Specialty and Diversity

Hanwha Solutions has operated the BOD equipped with professionalism and diversity beyond race, nationality, sex, and specialized field. In order for the board members not to have a particular common background or represent a specific interest, the company has appointed those outside directors who have professional knowledge and experience in management, economy, accounting, law, or technologies related so that the BOD could gather opinions from diverse perspectives and form the groundwork for its independent judgment. In particular, in Mar. 2020, Hanwha Solutions appointed an American woman Amanda Bush and a Japanese Shima Satoshi as its outside directors to elevate the diversity and specialty of the BOD and diversify the composition of it.

Members of the BOD

(As of Oct. 2021)

Types	Name	Position	Gender	Specialty	Career Experience	Date of Appt.	End of Term
Inside Director	Koo Yung Lee	Chairman of the Board of Directors/ CEO of the Q CELLS Division	M	In charge of the Q CELLS Division	BA, Department of Political Science & International Studies, Yonsei University CEO, Hanwha Chemical	2019.03.26	2023.03.23
	Yi Hyeon Nam	-	M	In charge of the Chemical Division	BA, Chemical Engineering, Seoul National University Head of Business Development Office, Hanwha General Chemical	Nominated as CEO of the Chemical Division of Hanwha Solutions	
	Du Hyoung Ryoo	CEO of the Advanced Materials Division	M	In charge of the Advanced Materials Division	BA, Business School, Seoul National University CEO, Hanwha Energy	2020.01.02	2022.03.23
	Dong Kwan Kim	CEO of the Strategy Division	M	In charge of the Strategy Division	BA, Politics, Harvard University CCO, Hanwha Q CELLS & Advanced Materials	2020.03.24	2022.03.23
	Eun-Soo Kim	CEO of the Galleria Division	M	In charge of the Galleria Division	BA, Economics, University of Colorado Operations Manager of Management Planning Office, Hanwha Group	2021.03.24	2023.03.23
Outside Director	Man-Gyu Choi	Chairman of the Audit Committee	M	Financial accounting	BA, Department of Agricultural Economics, Konkuk University Outside Director, SKC Kolon Pl Inc.	2018.03.27	2022.03.23
	Amanda Bush	Outside Director	F	M&A in the petrochemicals and energy sector (lawyer)	Univ. of Texas School of Law (J.D) St. Augustine Capital Partners (Current) Jackson Walker LLP (Current)	2020.03.24	2022.03.23
	Satoshi Shima	Outside Director	M	New strategy business	BA, Economics, Nagoya University Visiting Professor, Tama University (Current)	2020.03.24	2022.03.23
	Jeong-Ho Seo	Chairman of the Internal Transaction Committee	M	Law (lawyer)	BA, Business School, Seoul National University Lawyer, WIZ Law Group (Current)	2020.03.24	2022.03.23
	Ji-Hyeong Park	Chairman of the Outside Director Nomination Committee/ESG Committee	M	Economy (Prof)	PhD, Economics, University of Wisconsin-Madison Professor of Economics, Seoul National University (Current)	2020.03.24	2022.03.23
	Han-Joo Lee	Outside Director	M	Global IT	BA, Biology, University of Chicago CEO, Bepin Global (Current)	2021.03.24	2023.03.23

Procedures and Criteria of Appointment

A director of Hanwha Solutions is appointed in the general meeting of shareholders in accordance with the Commercial Code and the articles of association. The company has welcome talented people who have specialty and accountability in a variety of fields, and who are available to contribute to corporate management. An outside director is appointed among the candidates who have been recommended by the Outside Director Nomination Committee. The BOD closely examines a group of candidates considering their independence, specialty, and diversity so that it could manage and supervise from various perspectives. In addition, people who work for several companies or outside directors working for the rivals that belong to the industry of the same kind are excluded from those candidates in order to prevent a company and a person from having a conflict due to their interest. Further, to appoint directors, Hanwha Solutions discloses their major job experience, brief histories, and so on in Korean and English before the general meeting of shareholders so that it could give enough time to allow the shareholders to examine each candidate in detail and find if that person is suitable for the position.

Activities

Hanwha Solutions regularly holds the board meetings to deliberate and resolve major matters necessary for its corporate management. The company makes it a rule to hold a regular board meeting each quarter; or may hold a special meeting, if necessary,

to heighten the efficiency of operation at the meeting. Enough time is given to the directors at least seven days before the board meeting is held so that they can share its agenda and matters in detail for deeper discussion. In addition, the company does the best to answer the directors' questions concerning each agenda and earnestly respond to their request of additional data even before the date of the meeting so that each agenda may be deliberated in deeper detail. The board meetings were held 11 times in 2020. As for the average attendance ratio, 100% of the inside directors attended and 94% of the outside directors attended, while the total 63 reports and agenda were deliberated and resolved. The operation of the BOD and the results of its meetings are transparently opened each quarter with details, attendance ratio, pros and cons, and so on.

Education of Outside Directors

Hanwha Solutions provides its outside directors with various activities and information to give them an environment under which they can efficiently perform their duty. In particular, they have reports of the affairs of its major domestic and overseas workplaces and visits them to be able to raise their understanding about its business activities. In order to do this, it shares with the directors' states and issues of its major businesses to set the foundation on which decisions can be made through active debates.

Lately, due to COVID-19, the filed education plan for outside directors has been delayed. However, the education program was run nine times online to reinforce their job capability. In case the COVID-19 pandemic becomes stable in the near future, the company is supposed to help the directors visit to its domestic and overseas petrochemical and solar plants and research institutes and plan and implement the education course concerned in order to enhance their specialty.

Committees in the BOD

To raise transparency in its management and realize its reasonable governance, Hanwha Solutions has run the total four committees under the BOD: the audit committee; internal transaction committee; outside director nomination committee; and ESG committee. Each committee regulates its organization, authority, and so on for its efficient and systematic operation, and it appoints its chairman and members among the outside directors who have expertise in each field.

Evaluation and Compensation of the BOD

Evaluation of the BOD

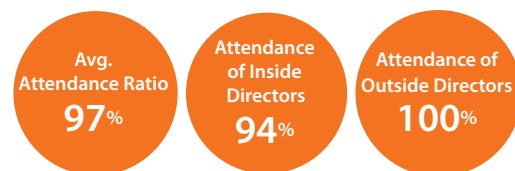
Hanwha Solutions periodically evaluates its Inside directors through CEO. The outside directors are evaluated when their two-year term ends. The department in charge of the BOD and the

personnel department comprehensively assess them internally with regard to their specialty and positiveness according to the categories: whether to properly consult for major decision-making matters as experts in their own fields; the ratio of attendance at the BOD; whether to propose effective opinions about matters of the BOD; and so on. The outside directors are qualitatively evaluated through the comprehensive consideration of their activities, which is comprehensively reflected in the decision of their re-appointment to encourage the BOD to actively do its duty and manage it with accountability.

Compensation of the BOD

The company pays the outside directors nothing extra but the compensation approved in the general meeting of shareholders to let them raise their transparency and fairness and strictly supervise and check the corporate business activities. According to the regulation of executive compensation, outside directors and members of the audit committee are paid with a fixed amount without a difference every month based on their duties and in a reasonable proportion. Furthermore, except for the outside directors and the committee members, the registered directors receive basic compensation and performance-based pay according to the regulation of executive compensation.

Board Attendance



*As of 2020

Board Activities

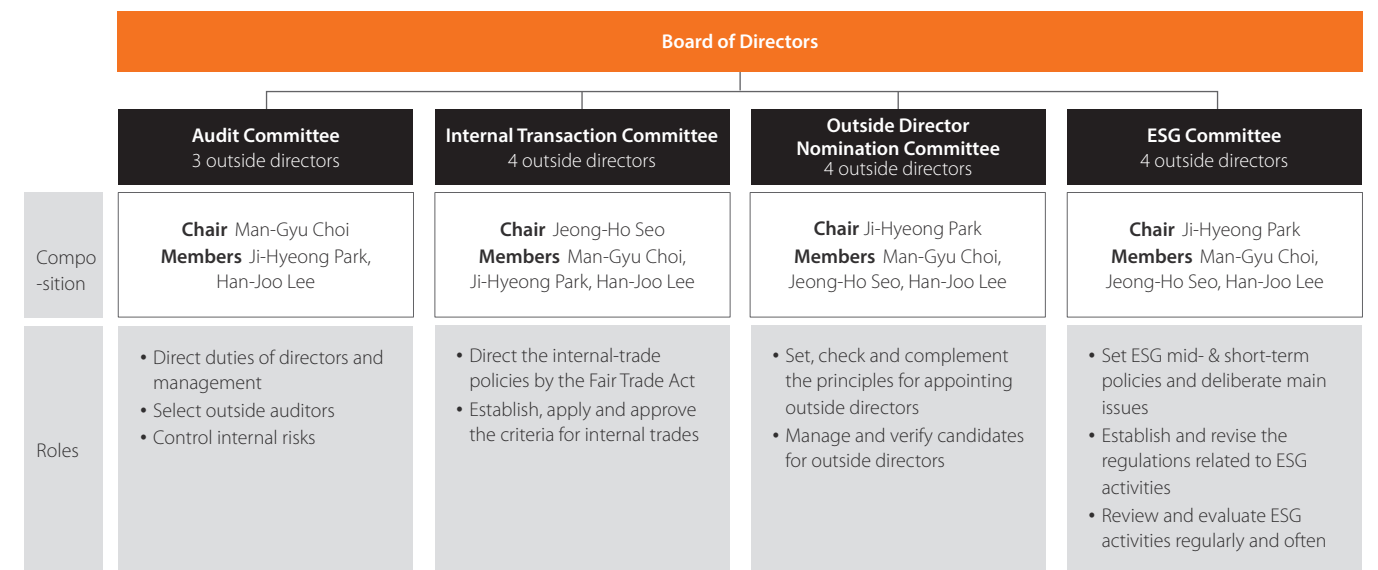


*As of 2020

2020 Committees in the BOD

Composition	Held	Agenda
Audit Committee	7	13 (9 resolutions and 4 reports)
Internal Transaction Committee	4	9 (resolutions)
Outside Director Nomination Committee	1	1 (resolution)
ESG Committee	0 (* established in 2021)	-

Composition and Roles of a Committee in the BOD



* As of the end of Jun. 2021

Shareholders-Friendly Management

Shares and Capital

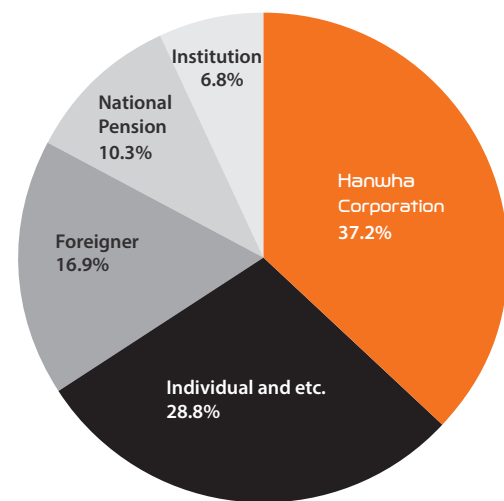
The number of the shares Hanwha Solutions can issue is 300,000,000 with the amount KRW 5,000 obtained per share, according to the articles of association. As Dec. 31, 2020, the total number of the issued shares is 160,988,234.

Voting Rights

Category		Shares issued in total	Non-voting shares	Voting shares
Share Types	Ordinary shares	159,864,497	399,560	159,464,937
	Preference shares	1,123,737	1,123,737	

unit: share

Composition of Shareholders



* As of Dec. 31, 2020, by ordinary shares

Communication with Shareholders

Hanwha Solutions transparently opens its corporate activities through various activities and channels and communicates with its shareholders and investors. Please press the IR tab in the company homepage, and the shareholders can find the information concerned with ease. Investor Relations (IR) are regularly held in the manner of conference call so that anyone can listen to them in real time. In addition, the company holds the Non-Deal Roadshow (NDR) once or more each quarter and participates in the IRs that a security company organizes to notice its business performance and its investors' interests and requirements for inter-communication.

In May 2020, the company published its governance report first, and it transparently disclosed fundamental governance policies, the rights of shareholders, the BOD, the auditing organ, etc., to open a communication channel with its shareholders and the persons interested. It started to open differences of the governance from a model criterion and ESG ratings, and it has continuously tried to position itself as an enterprise in which the various stakeholders such as shareholders, customers, and executives and employees may put confidence more.

Shareholders' Suggestions

Hanwha Solutions has put into effect the 'suggestion system by shareholders' that grants the shareholders who own 3% or more of the total issued shares an authority that they can propose agenda or matters in the general meeting of shareholders. The shareholders who state an opinion in person through such a system may participate in the management of Hanwha Solutions more aggressively, and the company may listen to the views of different shareholders and reflect them in the BOD so that it can form its more innovative and shareholder-friendly managerial environment through communication between both sides.

Policies for Protecting Shareholder's Rights and Interests

Systems for Shareholder's Rights and Interests

- Shareholder implemented return
- Any factor affecting the allocation of shareholder value to be disclosed a month earlier: dividend, treasury stock buying, and so on
- Transparent disclosure of recent five-year dividends in the homepage
- Written ballot and electronic ballot are introduced
- A general meeting of shareholders is announced four weeks before it is convened with actively encouraging them to attend it
- The autonomous program is implemented to distribute the general meeting of shareholders for four consecutive years

Risk Management

As the uncertainty around the global managerial environment grows higher day by day, it is required that enterprises must read the wind of overall change in economy, society, environment, to flexibly and swiftly respond to it. Therefore, Hanwha Solutions has established its company-wide risk management strategy and built and operated a system with which it may not only prevent a risk in advance but also cope with it as soon as it happens through a comprehensive analysis and counterplan.

Risk Management System

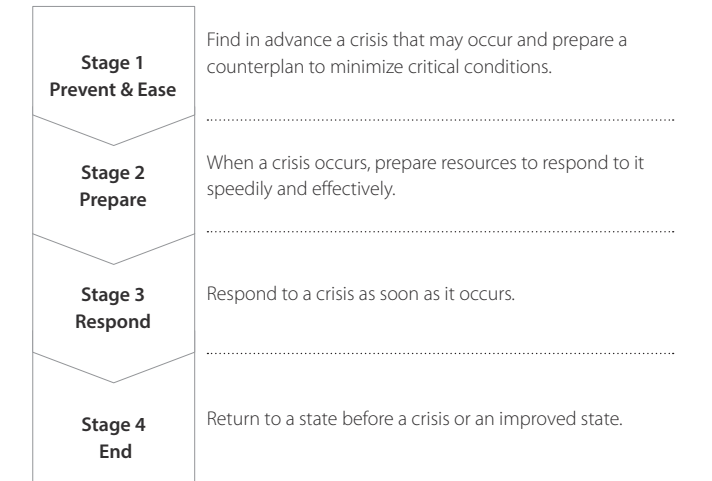
As the probability of an uncertain or hard-to-forecast risk to happen such as the financial crisis and the pandemic due to the novel coronavirus becomes higher, the importance that an enterprise shall control risks effectively has also increased.

Definition of Crisis

A crisis, an accident or incident that unexpectedly occurs, is a serious managerial threat that may give a negative impact to an organization, interested persons, and the industry of the same kind to which a similar critical situation may happen if it is handled in a wrong way when it causes a serious problems in economy, environment, safety, health, law, and security.

To this end, Hanwha Solutions divides into two types all the risks it faces while unfolding its managerial activities to effectively control risks: ordinary risks; and crises that shall be coped with in real time when an urgent condition happens.

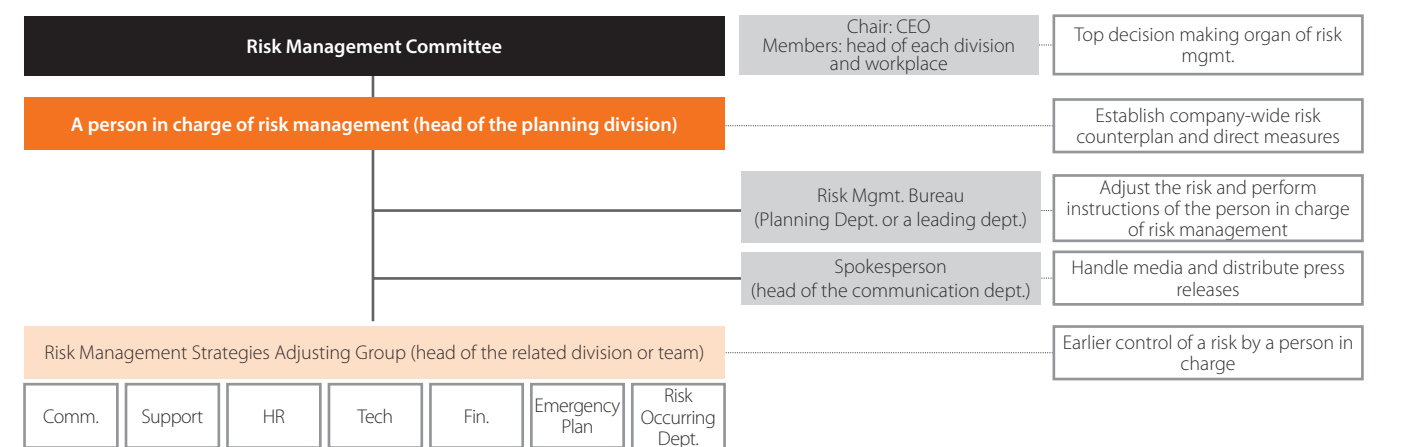
Four-Stage Risk Management



Governance under Risk Management

Governance under Typical-Risk Management To quickly make a decision and respond to it when a risk happens, Hanwha Solutions has run the Risk Management Committee whose chairman becomes its CEO and designates the head of the Planning Division as the person responsible for the risk management to systematically set and drive company-wide counter measures for a risk.

Risk Management Organizational Structure



* The crisis management strategies adjusting group may be differently composed case by case.

The committee is composed of a risk manager (the head of the Planning Division), the head of the risk management bureau (the head of the Planning Department or a leading department concerned), a spokesperson (the head of the Communication department), and management members (the head of each division or workplace). All the matters are reported to CEO through the whole company reporting system. Also, the committee has the risk management strategies adjusting group as a practical organization to effectively cope with a risk.

Governance under Disaster/Crisis Management In case a disaster or emergency occurs in its home offices and workplaces, Hanwha Solutions runs an Emergency Measure Committee, which is composed of the head of the related workplace or division, an Emergency Controller (the head of the environmental safety team, research planning team or environmental safety tech team), a spokesperson (the head of the administration team, research support team or plant manager), and members (head of each department), so that the committee can respond to a risk in the earlier stage and then the company-wide Risk Management Committee can cope with it to minimize the risk of an accident.

Risk Management by Types

Financial Risks

Hanwha Solutions monitors and controls in advance a financial risk that may break out under the managerial conditions such as foreign exchange, interest rate, liquidity, credit, and so forth to try to minimize risk occurrence and create stable and sustainable managerial outcomes.

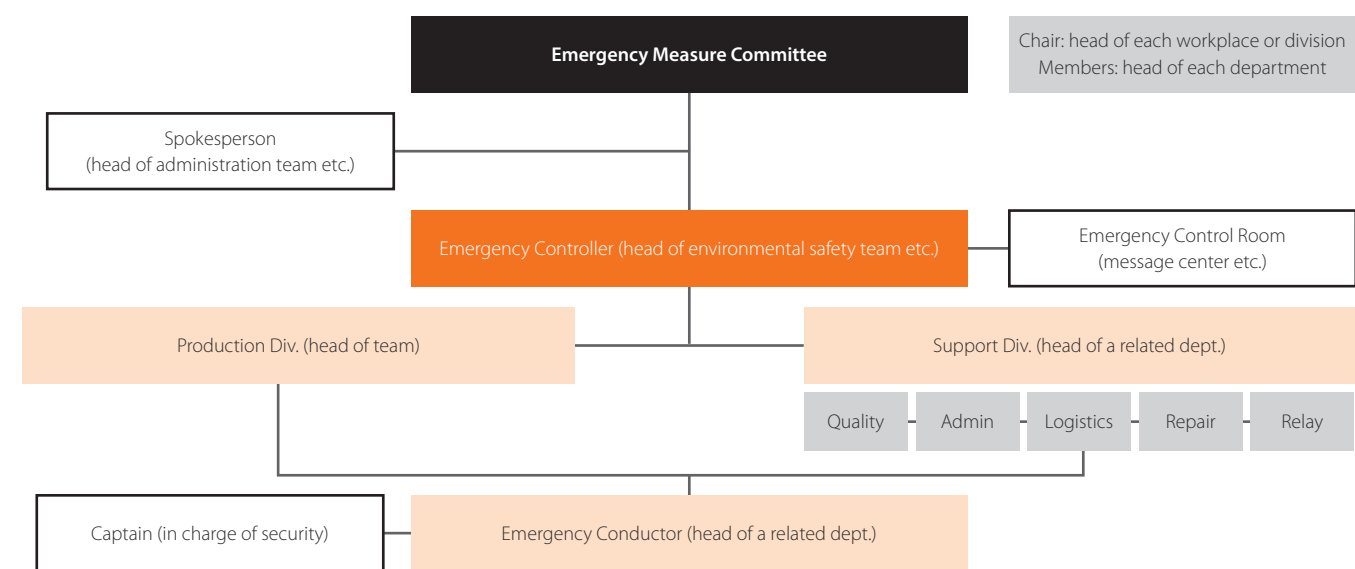
Non-Financial Risks

Besides financial risks that may occur in the course of business operation, Hanwha Solutions classifies security, ethics/compliance, environment, and so on into non-financial risks and often monitors them through the related organs to prevent them in advance.

Crisis/Disaster Risks

Hanwha Solutions has set and run the organs concerned in order to check and control a risk that may occur in any of its workplaces, prevent it beforehand, and take a measure against any risk found immediately. In addition, it established the ESG Committee to examine an ESG risk periodically, assess its activities and outcome, and find an item to be improved. To this end, it has tried to build a workplace environment that is better than the one now.

Disaster/Crisis Control Organizational Structure



Emerging Risk

Hanwha Solutions keeps monitoring emerging risks that may give a serious impact to its overall business environment due to not only political and social issues and revised and reinforced laws and regulations but also changes of climate and environment and responding to them preemptively to try to make its management circumstances stable in a long-term prospective.

Internal Control System

To make and disclose its reliable financial statements, Hanwha Solutions implements its own accounting management system to prevent them from either any error or misconduct that may even happen to bring about a distortion on them.

The accounting system called 'ICARUS' was introduced, which reflects the model criteria revised to respond to certification levels by outside auditors that were reinforced thanks to the revision of the 'Act on External Audit of Stock Companies' in 2018. The company established an internal accounting-dedicated team to enhance efficiency in assessing the design and operation of the system and secure independence in evaluating its management staff. To this end, the criteria to evaluate the outcome of the accounting system were prepared in order that the company can run a responsible system by reflecting the operational status of the system to KPIs

of its members. The CEO and internal-accounting managers check the efficiency of the internal accounting management system each business year. The CEO reports the operational status of the system to the Audit Committee, the BOD, and the general meeting of shareholders in person. In addition, it is certified by independent outside auditors whether the internal system is operated adequately. Further, to employ the consolidated internal accounting management system to be introduced from 2023, Hanwha Solutions has conducted, with an outside accounting expert institution, a project of improving the consolidated system, does its best to secure its accounting transparency and strengthens its credibility by enhancing its internal control system and improving its accounting process.

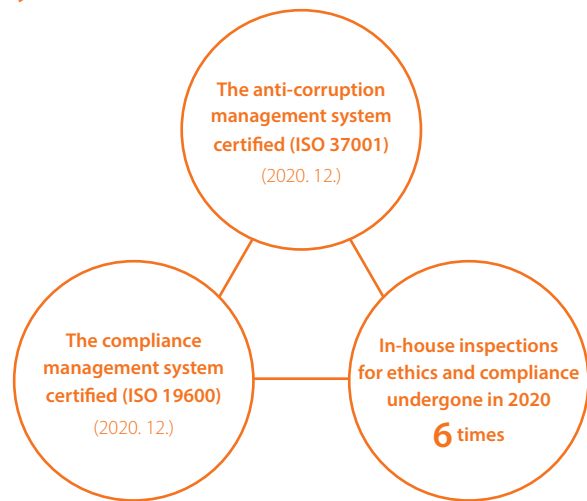
Risk Management by Types

Financial Risks	Non-Financial Risks	Crisis/Disaster Risks
<p>FX/Rates Fluctuation</p> <ul style="list-style-type: none"> Keep monitoring the global financial market and check risks often. Regulate a subject and the procedures for controlling FX/rates fluctuation. 	<p>Security</p> <ul style="list-style-type: none"> Regularly, checkup weak points of security and simulate hacking while exercising simulation trainings for executives and employees. Educate them for information security once or more each year. 	<p>Disasters</p> <ul style="list-style-type: none"> Control an emergency responding training system in each workplace. Run a hazardous chemicals control system. Check the safety state of each workplace four times or more each year.
<p>Liquidity</p> <ul style="list-style-type: none"> Establish a long-term financial P&L plan. Control internal reserves, long-term borrowing and business results in case of a large-scale investment. 	<p>Ethics/Compliance</p> <ul style="list-style-type: none"> Keep monitoring, checking and reforming unfair trades and anti-corruption. Share recognition and value through education of executives and employees 	<p>Safety/Health</p> <ul style="list-style-type: none"> Establish instructions for environmental security and health and install an environmental security and health committee in each workplace. Regularly educate executives and employees for environmental safety and health to enhance their capacity of it.
<p>Credit</p> <ul style="list-style-type: none"> Assess the financial credit rating regularly and set and control the credit limit. Usually manage the debt ratio to keep the financial soundness. 	<p>Environment</p> <ul style="list-style-type: none"> Set a direction of ESG long-term strategies to implement them. Keep global initiative criteria and check results. 	

Ethics & Compliance Management

Hanwha Solutions has enacted and strictly managed a code of ethics and an action guide with which its executives and employees may judge ethical values and that may become a code of desirable conduct, and steadily made efforts to form a transparent and just corporate culture based on honesty and trust all over its business activities.

Key Performance



Ethics Management System

Principles of Ethical Management

Hanwha Solutions declared the practice of ethical management as a basis of corporate activities by announcing the code of ethics in April, 2003. Based on that, it enacted and proclaimed a code of ethics and an action guide that become the criteria of behaviors and value judgment, and compliance and anti-corruption of its directors and employees. The code and the guide have applied to all the global workplaces of Hanwha Solutions without an exception. In particular, they have been strictly controlled so that its overseas executives and employees can understand the local laws and business conventions well in order not to violate ethics and laws. In addition, the company has published the guideline for practicing the ethical management in each area that mainly includes respect for customers and observance of laws and business conventions to offer the standards of behavior for its ethical corporate management to its internal and external stakeholders. Hanwha Solutions respects orderly market competition everywhere in Korea and the world and forbids any type of anti-corruption and misconduct to practice ethics/compliance management at a global level.

Organization for Ethics Management Only

Hanwha Solutions has a compliance supporter and a compliance support team under the BOD, regularly checks compliance issues once or more yearly to report the result to the BOD, and manages whether the company and its executives and employees comply with the principles of ethics/compliance management. Furthermore, as the code of ethics was enacted in 2020, to propagate principals of the code closer to the fields, the company has set the Compliance Department that the CEO controls in person as a post responsible for ethical management so that it can decide company-wide policies for the ethics management and control the overall activities concerned with it. The company runs the Bureau of Ethics Management in each division under the compliance department so that the bureau can lead activities of the management across the company and spread the principles through education and regularly forwarding notice. In addition, it is furnished with a consulting and reporting system connected in a hot line to handle a violation of the code of ethics such as fraud, corruption, or bribery.

Further, these activities of the ethics and compliance management are shared through the Compliance Committee, so they are spread across the Group and used as a benchmark for its subsidiaries.

Major Activities for Ethics Management

Implementation of Ethics Management

Regular and Frequent Checks Hanwha Solutions checks at the half of the year if its every organization complies with the managerial philosophy through the Bureaus of Ethics Management, and gathers and reports the check-ups to the BOD. The checkpoints of the compliance are largely composed of four categories: general case; civil and commercial case; criminal case, fair trade and permission. The person responsible for compliance checking in each department inspects internally according to the checklist of compliance, then submits to the Compliance Department a counterplan with complements, and once any non-compliance happens, regulates the control system to monitor whether it is implemented. For this purpose, the person in charge builds and operates the system to build a non-compliance informing system, and protects an informer based on the criteria of compliance control in order for the whistleblower not to bear any disadvantage.

In-house Check-ups of Compliance and Ethics

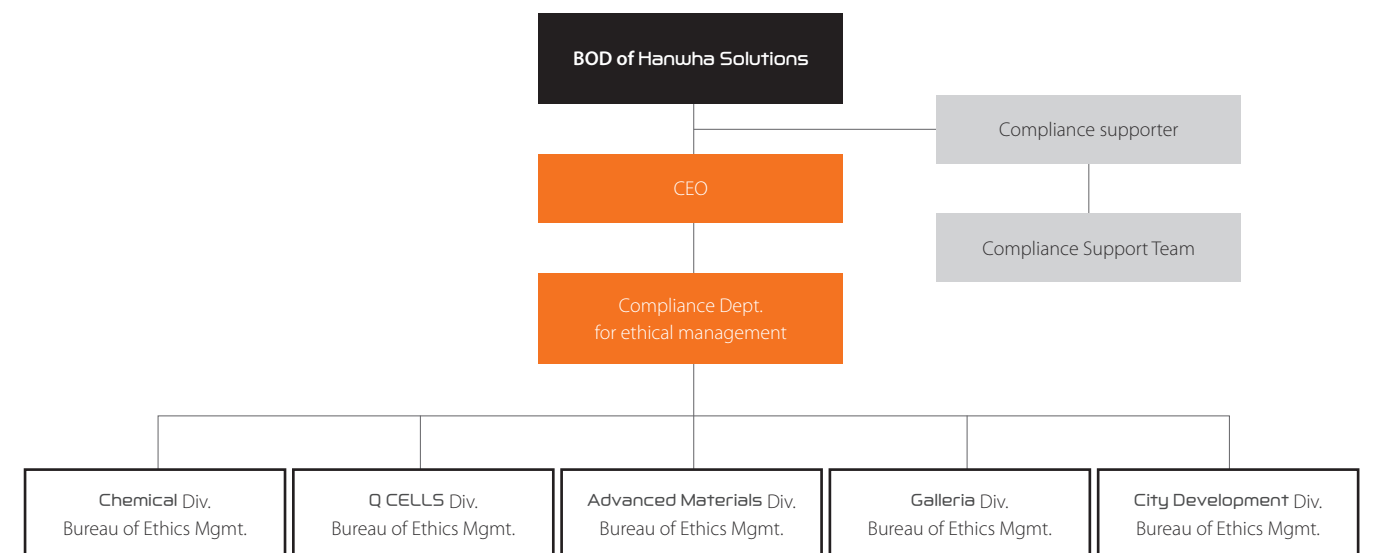
2018	2019	2020
2 times	2 times	6 times

The Code of Ethics for Hanwha Solutions

1. Pursue the satisfaction of our customers, shareholders, and executives and employees; settle commercial regularity on the basis of faith and fairness in the relationship with our partners and competitors; and stick to the way of right management.
2. Keep creating values that are helpful for every customer to win steadfast confidence from them by respecting the opinion of every customer anytime and provide service and convenience in their side.
3. Comply with any law and business convention of an area where we carry on corporate activities while competing in a manner that fairness and transparency shall be ensured.
4. Keep close ties with our partners on the basis of inter-confidence and aim at inter-growth through transparent and fair trades.
5. Adhere to the attitude fit for those corporate citizens who have right ethics and be contributed to the reciprocal growth of individuals and our company.
6. Respect all of our executives and employees as persons who have free will, treat them fairly according to their abilities and achievements, and make efforts to have them exercise their creativity.
7. Grow as a transparent and healthy enterprise so as to protect the interest of our shareholders and be devoted to the advancement of our country and communities.



Ethics Management Hierarchy



Ethics Consulting and Reporting System Hanwha Solutions operates the ‘Hot Line for Ethical Management’ channel through which a consultation or a report may be made for any person interested such as a customer or partner’s employee who may ask a question about the managerial policy or has been inflicted with any breach or corruption of the code of ethics by the staff of the company. A report is transferred directly to the Bureaus of Ethics Management so that facts of it may be checked quickly before a proper measure is taken for it if necessary. In addition, the relevant informer will be protected by the criteria of compliance control and at no disadvantage due to such information. Moreover, any director and employee of the company who might be involved with any unfair trade or corruption such as bribery, entertainment or reception from a partner shall willingly inform the relevant Bureau of Ethics Management of such a fact. The company has strictly controlled violations of ethics and compliance, if any, under the reporting system.

System for the Protection of Human Rights Hanwha Solutions protects the human rights of its directors and employees, which are recognized as an important part of the ethics and compliance management, and makes efforts to extend a culture of respecting human rights. To take a measure to deal with any distress or an in-house unethical behavior such as sexual harassment or infliction that the directors and employees may undergo and protect human rights, the company builds and runs the grievance system on-line and off line. In case a grievance is received, facts of it are checked

before it is dealt with through the Grievance Committee. The company positively tries to settle such a problem by taking a proper measure such as reporting to the CEO depending on its importance. It is available to submit a grievance offline to an ombudsperson of the Grievance Committee, and to report it anonymously online to the chief of the HR Division through the in-house HR hot line. The ombudsperson notifies the submitter how the grievance will be dealt with within five to ten days even though the case might not be completed.

Further, the Q CELLS Division appoints a female committee member dedicated to sexual harassment issues besides the ombudsperson in each workplace. Opening a Kakao-Talk channel through which a grievance is reported and providing global staff members with a foreign language service, the division has managed the system where the directors and employees may consult about or inform of a grievance.

On-line and Off-line Education of Ethics Management

To lift up the level of the willingness that the members of Hanwha Solutions shall actually comply with the ethics and compliance management, the company has continued to educate all of them about that issue. Every year, besides education courses on anti-corruption and fair trade, it opens a variety of on-line courses focused on sexual harassment, in-house infliction, privacy policy, awareness of handicap, and so on, so that a transparent and ethical corporate culture may have deep roots. In case the laws that may give a serious impact to the company such as the Fair Transactions

Open Courses for Ethics Management

Chemical Div.	<ul style="list-style-type: none"> • About privacy policy on-line (Jul., 2020) • For the new and experienced members about the ethics management among the entry-level courses (Jul., 2020) • About anti-corruption on-line (Dec. 22, 2020 to Jan. 8, 2021)
Q CELLS Div.	<ul style="list-style-type: none"> • About the Improper Solicitation and Graft Act and the FCPA (Foreign Corruption Practices Act) on-line (Dec., 2012) • About the Fair Transactions in Subcontracting Act (Dec., 2020)
Advanced Materials Div.	<ul style="list-style-type: none"> • About privacy policy on-line (Jul., 2020)

in Subcontracting Act or the Punishment of Serious Disaster Act are established or revised, for the relevant staff members, the company adds on-line and off-line courses to enhance their capacity of compliance and minimize a risk by non-compliance, if any.

Publication of Compliance Letters

Hanwha Solutions publishes Compliance Letters for all the members every month. Monthly, it informs them of the news about laws and regulations concerned with the business and the compliance management, so that a value of the principles of ethical management comes to their minds and then they try to implement the ethics and compliance management in everyday life. The Letters give the readers the criteria of ethical judgments and behaviors through the company-wide notice during national holidays every year so that a culture of ethical management hits deeply their consciousness.

Ethical Production

No Animal Experiment Hanwha Solutions has accepted that in all the processes of corporate management, there are no experiments and researches that use animals such as safety testing for chemicals etc. This excludes any type of exploitation and cruelty against animals by humans to seek after a sustainable coexistence between humans and animals and between the Earth and its environment and aim at ethical production and consumption.

Autonomous Compliance with Fair Trade Compliance System

Hanwha Solutions has introduced the ‘four greatest practices to observe the laws and regulations for subcontractors’. In particular, it has made the checklist of problems that may occur in a subcontracting trade and monitored them accordingly so that its field workers comply with the checkpoints systematically, while having a contract over a fixed level to go through a mandatory deliberation of subcontracted transactions.

In the first half of 2021, the company gathered and reviewed problems that could frequently occur in a workplace which trades with subcontractors and enacted and distributed the ‘Guideline of the Fair Transactions in Subcontracting Act’ in order that its field workers may autonomously check the points concerned with fair trade.

Activities for Autonomous Compliance

Hanwha Solutions has enacted the practices for implementing fair trade and controlled violations through all-time monitoring in order to reinforce activities for autonomous compliance with it by partners. When selecting a partner and trading with it, the company prescribes that fair opportunities shall be provided to its every partner. In addition, it is severely banned to be recompensed in any manner such as bribery, entertainment, convenience, and so forth by any person interested. In case it is inevitable to receive recompense, it is recommended to report and deal with it according to the guideline so as to check any possible illegal action beforehand. Further, in case all the members of Hanwha Solutions are aware that if they and their colleagues receive any type of recompense such as bribery, entertainment, convenience, and so on but take no appropriate measure, they shall inform the company of the fact, and the company keeps a secret of the informer and protects his or her job security and ensures that the informer will never be differentiated or disadvantaged due to that reporting. Besides, for a contributor of ethical management, an informer against a violator, a person who keeps the company from a risk that may give a harm to the company, the company has established a reward plan in a separate manner to build a culture of monitoring the company-wide autonomous compliance with fair trade.

Deliberation of Internal Trade

Hanwha Solutions has monitored internal trades within its subsidiaries in aspects of adequacy and legality through the Internal Trade Committee under the BOD from 2014 on, so that it could come to be at the first to form an ecosystem of fair trade. The impartiality of an internal trade is deliberated according to the relationship with the counterpart of the trade and its size. The company listens to outside experts for consultation or correction, if necessary, to heighten the transparency of a corporate operation. In addition, the company observes the principles of fair trade to do its best to protect rights and interests of a partner and a client company, and bans any unfair common action and any unfair trade practice to strive to establish a fair-trade culture.

[Special Case] Hanwha Solutions, certified as an international standard for its compliance/anti-corruption

In Dec., 2020, first in the chemical and energy industry, Hanwha Solutions concurrently obtained the certifications of global standards ISO 19600 and ISO 37001 for the compliance and anti-corruption management system. Globally recognized with the advanced ethics and compliance management system and higher ethic earnestly implemented, Hanwha Solutions has shown its intention of compliance management and anti-corruption and caught an opportunity to strengthen a credible relationship still more with the stakeholders. The company will continue to keep the principles of the just and transparent ethics and compliance management to accelerate the expansion of confidence from customers and societies and devote itself for sustainable future.



Information Security

In the age of the Fourth Industrial Revolution, the ethical use of data and the policy of information protection are indispensable for keeping the competitiveness of an enterprise. To this end, Hanwha Solutions complies with domestic and foreign laws and regulations to the ground, and builds and runs the system that helps to protect its major information assets and the personal information of its clients and its executives and staff securely.

Key Performance



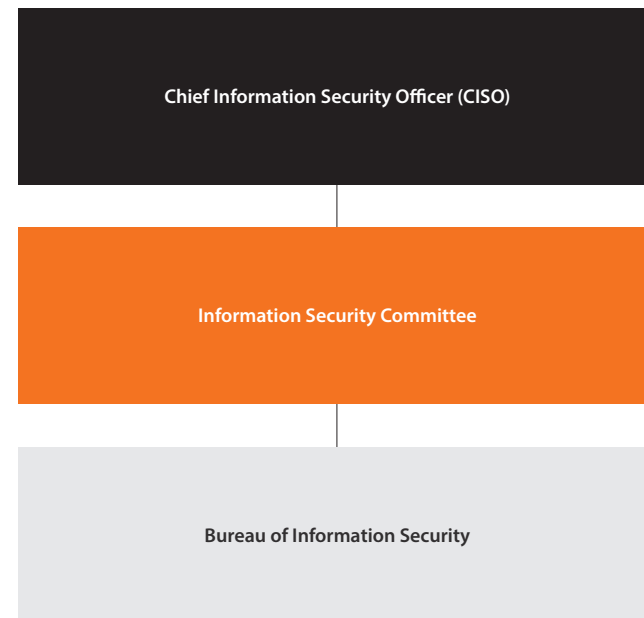
Information Security System

Policy for Information Protection

Hanwha Solutions establishes policies for protecting its internal information and runs the management system according to various domestic and foreign laws concerned with security: the Trade Secret Protection Act; the Industrial Technology Protection Act; the General Data Protection Regulation (GDPR); the Personal Information Protection Act; and so on. It keeps monitoring the latest trend of information protection to revise its internal policies related as well, which is opened at all times in order that the executive and staff may share and read that fact. Further, to run the more systematic information protection system, Hanwha Solutions has driven all of its five Divisions to acquire the Information Security Management System (ISMS) certification from KISA (Korea Internet & Security Agency).

Organization for Information Protection

To manage information security systematically, each Division designates a Chief Information Security Officer (CISO) to manage the information security system on the whole. The CISO head of the information security team establishes the Information Security Committee to deliberate and resolve issues for securing major in-house information. Also, the Bureau of Information Security has been busy with various activities for information security including those for improving the security awareness of the executive and staff, focusing on four key tasks: establishment



and operation of the Information Security Management System (ISMS); that of information protection measures; control of risks and accidents in information protection; countermeasure to restrictions of information protection.

Assessment of Information Protection Level

Hanwha Solutions assesses its information protection level with an objective index, and establishes and implements a plan to improve vulnerable objects if any to lift up the level. Based on the information protection levels in the four control domains—managerial security, physical security, technical security, and privacy protection, a model for measuring the maturity of information protection levels was developed. So, the company has distributed, implemented and control policies for each domain and derived improvement issues in order to enhance the security awareness of the executive and staff and control its own original technologies that might be leaked outside.

Those levels were first evaluated in 2020. After then, the company is supposed to listen and collect opinions of its subsidiaries and refine control targets and evaluation methods that control assessing them once a year.

Privacy Policy

To protect the privacy of its executive and staff, Hanwha Solutions has established the guideline and the internal management plan for that protection, and it has appointed a CPO (Chief Privacy Officer). Also, through the education and vow of all its executive and staff to protect their privacy, it has strictly forbidden them to leak any in-house information outside and violate any security policy. Besides, when it has to collect even a piece of their personal information, it has followed its legal and justifiable procedures and protected their private lives, freedoms and rights.

In particular, to protect the privacy of its global clients, executive and staff, and partners, the Q CELLS Division has applied the Standard Contractual Clauses (SCC) that comply with the GDPR (General Data Protection Regulation) of the EU has minimized risks that may occur at the stages of data transfer and data storing, and formed the environment of information protection by applying the standardized privacy policy to its global homepage.

Maturity Modeling and Evaluation Scores

	1 Level	2 Level	3 Level	4 Level	5 Level
Defini-tions	The control target has not ever been implemented; or done without a particular plan.	The implementation plan of the control target, which specifies procedure, date, budget, and so on, is in part established and documented.	The control target is implemented and being done in the company-wide range according to the documented plan.	The accomplishment by the implemented control object is measured before it is continuously operated and examined for a fixed period.	An outcome of an implemented control target is examined and regularly improved accordingly.
Scores	Below 60	60 or more	70 or more	80 or more	90 or more

Prevention of and Counter Security Accidents

As non-face-to-face and home working increases due to the prolonged COVID-19 pandemic, Hanwha Solutions has propelled its own countermeasures to any possible security accident to secure its core business and client information from cyber threats. Also, it keeps it in mind that it is the starting point of security to be aware of the information protection of its inside members, while positively recommending that it maintains security and observe its directions of security when its members work.

Penetration Testing (Pentest)

To counter cyber threats, which have increased lately, such as ransomware, distributed DoS attacks, and so on, Hanwha Solutions has exercised a cyber-simulation, the same as a real hacking attack, targeting its executive and staff. The pentest is divided into the black-box testing and the white-box testing by and large, which may be exercised based on 10 scenarios that are classified according to intentions of infiltration in a manner of extranet to intranet, intranet to intranet, and so on. Accordingly, the company has evaluated its own information protection level actively and has formulated plans with which it can reinforce its information security.

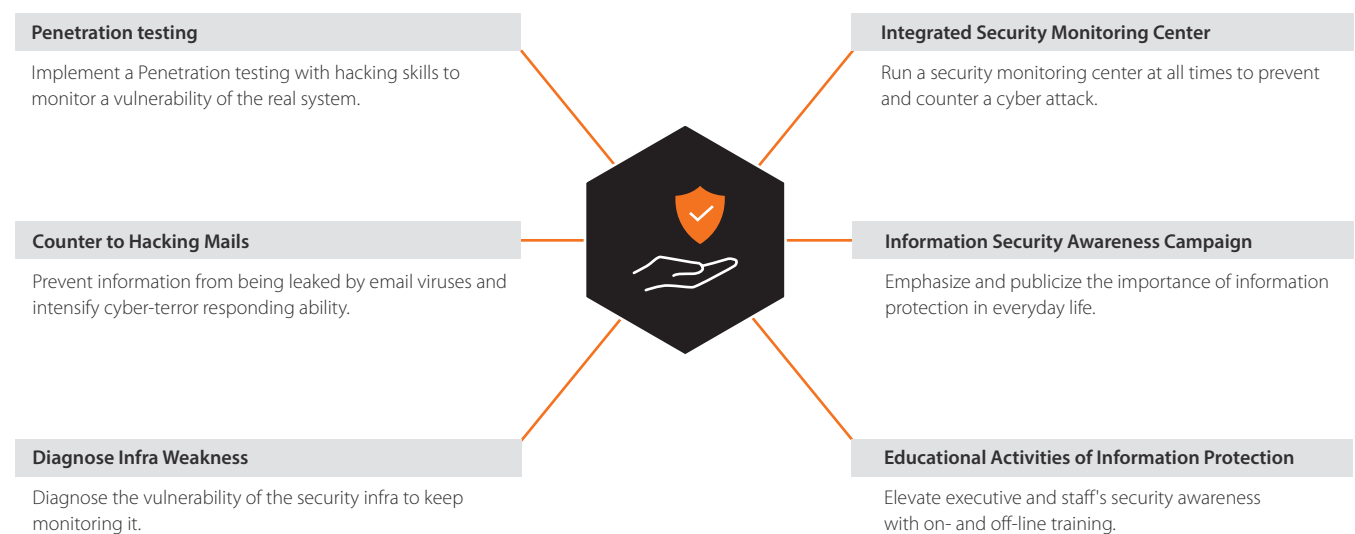
Prevention and Counteraction of Information Security

Black-Box Testing	<ul style="list-style-type: none"> • Focus on an infiltration from an extranet to the intranet • Attack an external service that each subsidiary runs and get the administrator's authority to take over the target system and attack it.
White-Box Testing	<ul style="list-style-type: none"> • Focus on a possibility of intranet infiltration or leakage of key information. • Counter any attack that may infect using a malware an internal service that each subsidiary runs or that intends to take out its core information.

Counter Hacking Mails

Hanwha Solutions has encouraged its executives and staff to be conscious of an information security accident. Besides, it offers counter-exercises to hacking mails twice a year. It makes training scenarios that are composed of mail contents with malware included such as junk mails and phishing mails that were actually received and simulates 'click an email link', 'download and execute an attached file', to check up how they are aware of security. If any member of the executives and staff who participate in the training executes malicious files, a warning phrase appears in a pop-up window in order that he or she can reinforce his or her sensitivity and security awareness level individually. The company tries to prevent a security accident in advance by sharing with them how to deal with those mails. In addition, the company analyzes violation ratio, reporting ratio and violation ratio by type, then compares and verifies them with the companies of the Hanwha Group to derive the requirements necessary to keep raising the security awareness of each member.

Prevention of and Counter to Security Accidents



Diagnosis of Infrastructure Weakness

To diagnose any weak point in the infrastructure, Hanwha Solutions verifies the security status of its IT systems which have reflected the latest trend every first and second halves of a year. The check points for such a diagnosis are largely divided into OS, DB, WEB/WAS, and NW, with which weak points are checked up across the infrastructure and requirements for improvement are derived. Further, to acquire security when a new asset or system is brought in, the company applies secure coding and examines if it is secure; checks up the security status of each office once or more each quarter to control its security infrastructure.

Operation of the Integrated Security Monitoring Center

Hanwha Solutions operates the integrated security monitoring center 24/7 to prevent and counter a cyberattack through Hanwha System/ICT. So, it can detect cyber threats and monitors traffics in real time so as to always provide against occurrences of malware and hacking attacks, and also, when a given level or higher of data is sent outside, the center senses it immediately and disconnects malignant or suspicious traffic to protect information effectively.

Information Security Awareness Campaigns

Hanwha Solutions holds the 'Security Personnel's Day' to share activities concerning information security issues, publicizing the campaigns of its executives and staff for information security and help to enhance security awareness. Also, each department

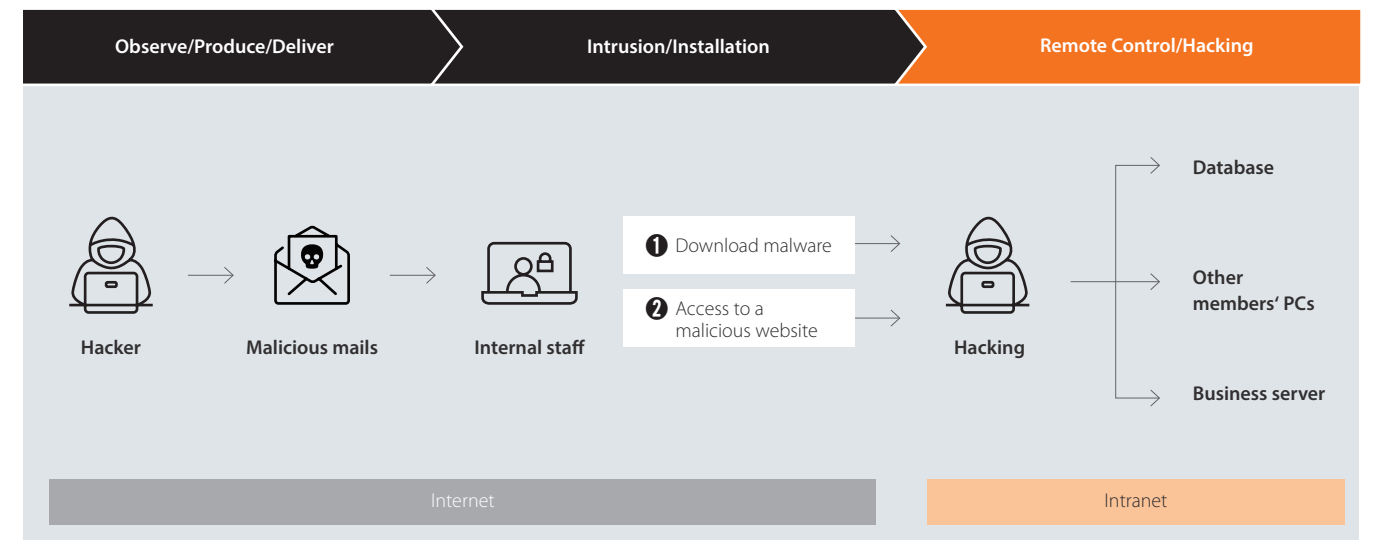
appoints a person in charge of security to control its own information security status, and checks on the 'Clean Office Day' each quarter if the documents and portable storage devices concerned are displayed or managed. It encourages its executives and staff to understand and practice the importance of information protection and security on their own.

Educational Activities of Information Protection

Hanwha Solutions trains its executives and staff on privacy protection and information protection once or more each year to continuously emphasize the importance of such a protection. In particular, its Q CELLS Division, it sends its information security managers to external seminars actively and participates in a variety of industrial security activities as a member of the National Academy of Industrial Security of Korea. Moreover, it campaigns for the importance of information protection, publicizes it through banners, pop-up windows and bulletin boards of its groupware four times or more a year, and communicates directives and cautions regularly through its email system.

In 2020, as the frequency that the executives and staff work from home increases due to the COVID-19 pandemic, the company produced and distributed a guide of 'Six Major Practices of Information Protection' to them so that it can help them to efficiently work from home while complying with the security directions.

Response Drill Process against Hacking Mails



5. ESG Factbook

- 123 ESG Data
- 132 SASB Index
- 134 TCFD Index
- 135 WEF Stakeholder Capitalism Metrics

ESG Data

Environment

Environment

1) Greenhouse Gas Emissions

Classification	Unit	2018	2019	2020
GHG Emissions (Scope 1 + Scope 2)	tCO ₂ -eq	2,849,939	2,668,222	2,400,446
Scope 1		348,576	373,789	404,341
Scope 2		2,501,363	2,294,433	1,996,105
Scope 3		N/A	N/A	5,009,985

* Calculated in Scope 3 Since 2020

** Greenhouse Gas Emissions are calculated with domestic emissions based on the standards for assignment.
(Total GHG Emissions from Chemical, Q CELLS and Advanced Materials Divisions)

2) Energy Consumption

Classification	Unit	2018	2019	2020
Total Energy Consumption (Domestic)	GJ	56,167,011	51,881,507	46,960,625
Electricity		45,259,377	41,257,981	35,778,436
Fuel		5,264,179	5,176,282	6,039,654
Others		5,643,455	5,447,244	5,142,535
Cost for Total Energy Consumption	KRW 100 million	5,132	5,124	4,878
Energy Consumption against Sales Revenue*	GJ / KRW 100 million	1,405	1,534	821
Energy Consumption in worksites	MWh	6,231,462	4,297,706	3,726,920
Renewable Energy Consumption in worksites		1,173	3,376	3,473

* Based on revenues in separate financial statements

3) Air Pollutants Emissions

Classification	Unit	2018	2019	2020
NOx	Tons	201	176	182
SOx		8	2	2
Dust		23	22	20

4) Hazardous Chemical Substances

Classification	Unit	2018	2019	2020
Amount of Hazardous chemical substances	Tons	11,725	4,733	4,911

* Based on Pollutant Release and Transfer Register (PRTR)

5) Water Consumption

Classification	Unit	2018	2019	2020
Total amount of water consumption	Tons	17,915,255	17,354,131	16,556,349
Ratio of water recycling for the year	%	10	9	12
Amount of waste water generated (Domestic)	Tons	7,368,427	6,774,412	6,647,346
Ratio of waste water recycling for the year	%	25	23	30

6) Water Pollutants Emissions

Classification	Unit	2018	2019	2020
Chemical Oxygen Demand (COD)	Tons	381	332	371
Biological Oxygen Demand (BOD)		378	329	290
Suspended Solids (SS)		199	271	222

7) Waste

Classification	Unit	2018	2019	2020
Total waste generated (Domestic)	Tons	98,870	90,947	76,452
Total waste recycled		40,639	47,405	36,846
Landfill (General)		29,912	21,498	16,911
Incineration (General)		4,795	4,903	3,581
Landfill (Designated)		370	272	525
Incineration (Designated)		3,323	2,895	3,403
Others		19,832	13,974	15,186
Cost for Waste Disposal	KRW 100 million	84	68	68

8) Environmental Training and Education

Classification	Unit	2018	2019	2020
Total hours of training and education	Hours	36,417	37,940	43,023
Number of participating employees	Persons	2,809	2,809	3,007

9) Environmental Management System

Classification	Unit	2018	2019	2020
Ratio of ISO 14001 certified worksites	%	100	100	100
Number of ISO 14001 certified worksites	Worksites	10	10	10
Number of worksites required to be certified with ISO 14001		10	10	10

10) Environmental Investments and Costs

Classification	Unit	2018	2019	2020
Environmental Investments (Domestic)	KRW 100 million	111	209	136
Cost spent on environment		114	111	111

11) Environmental Regulations

Classification	Unit	2018	2019	2020
Number of environmental violations of legal obligations	Cases	0	0	0
Penalty and fine for non-compliance with environmental regulations	KRW	0	0	0

* Excluding the cases or penalty and fine on appeal

Safety & Health

1) Occupational Accidents

Classification	Unit	2018	2019	2020
Ratio of death due to occupational accidents	Direct Employees	0	0	0
	Contractors	0	0	0
Number of victims from occupational accidents	Direct Employees	7	5	2
	Contractors	3	3	5
Ratio of occupational accidents (Number of victims / Number of workers) * 100	Direct Employees	0.13	0.09	0.04
	Contractors	0.09	0.07	0.10
LTIR (Loss Time Injury Rate) (Number of lost time injuries for the year * 1,000,000) / (Total hours worked for the year)	Direct Employees	0.72	0.63	0.26
	Contractors	0.72	0.59	1.06
OIFR (Occupational Illness Frequency Rate) (Number of occupational diseases for the year * 1,000,000) / (Total hours worked for the year)	Direct Employees	0.00	0.00	0.00
	Contractors	0.00	0.00	0.00

2) Occupational Safety

Classification	Unit	2018	2019	2020
Hours of Occupational Safety Training	Hours	131,092	133,792	138,975

* Safety & Health Regular Trainings and Chemical Substances Safety Trainings are included in the hours.

3) Safety and Health Management System

Classification	Unit	2018	2019	2020
Ratio of ISO 45001 certified worksites	%	N/A	N/A	100
Number of ISO 45001 certified worksites	Worksites	N/A	N/A	10
Number of worksites required to be certified with ISO 45001		N/A	N/A	10

Social

Employees

1) Employment Status

Classification	Unit	2018	2019	2020	
Total number of employees	Persons	5,089	5,532	5,594	
By Employment Type	Total number of Permanent Employees	5,025	5,353	5,469	
	Ratio of Permanent employees	98.7	96.8	97.8	
	Total number of Contract Employees	64	179	125	
	Ratio of Contract Employees	1.3	3.2	2.2	
By Gender	Male	4,580	4,979	5,029	
	Female	509	553	565	
By Age	Under 30	1,691	1,937	1,785	
	30 - 50	2,654	2,744	2,885	
	Above 50	744	851	924	
By Region (Location of work)	Domestic worksites	5,089	5,532	5,594	
	Overseas	91	101	110	
By Rank	Executives	76	76	78	
	General and Senior Managers	859	937	1,069	
	Assistant Managers	483	495	467	
	Staffs	269	317	292	
	Non-mangers (Executives and Staffs excluded)	3,402	3,707	3,688	
By Job Group	Management (Executives, Outside Board Members, Advisors, etc)	Male	76	76	78
	General personnels	Male	1,191	1,298	1,339
		Female	136	155	179
	Technicals	Male	232	238	246
		Female	71	73	74
	Office personnels	Female	201	204	205
	Professionals	Male	3,038	3,226	3,264
		Female	80	83	84
	Contract Employees	Male	43	141	102
		Female	21	38	23
Diversity of employment (Both permanent and temporary employees)	Persons with disability	77	132	123	
	National Veterans	140	141	141	
	Foreigners	14	18	18	
Female Talents	Number of Female Managers (General and senior managers, executive excluded)	70	88	114	
	Ratio of Female Managers	7.5%	8.7%	9.9%	

Classification	Unit	2018	2019	2020
New Recruitments	Persons	273	427	199
By Employment Type	Permanent (as New Employees)	115	122	73
	Permanent (as Experienced Employees)	106	140	73
	Contract	52	165	53
By Gender	Male	227	358	165
	Female	46	69	34
By Age	Under 30	169	259	123
	30 - 50	102	158	70
	Above 50	2	10	6
Turnover or Retirement (for permanent employees)	Persons	426	446	336
By Gender	Male	361	385	286
	Female	65	61	50
By Reasons for turnover or retirement	Regular Retirement	3	43	43
	Resignation under Instruction (Dismissal, Discipline)	0	1	2
	Involuntary Retirement	83	88	72
	Turnover (Voluntary Retirement)	340	314	219
Ratio of retirement	%	1.7	2.4	2.1
Ratio of voluntary turnover	%	6.7	5.7	3.9

* Ratio of retirement (Involuntary Retirement), Ratio of voluntary turnover (Retirement due to turnover, learning or predorsal)

2) Maternity and Parental Leave

Classification	Unit	2018	2019	2020
Number of Employees on Maternity Leave	Male	2	6	8
	Female	18	35	38
Number of employees expected to return to work after Parental Leave	Male	5	5	8
	Female	21	22	41
Number of employees returning to work after Parental Leave	Male	2	4	8
	Female	17	19	39
Ratio of Return from Parental Leave	Male	40.0	80.0	100.0
	Female	81.0	86.4	95.1

3) Employee Training and Education

Classification	Unit	2018	2019	2020
Total expenses for training	KRW 1 million	4,227	4,992	2,130
Total hours for training	Hours	80,609	74,119	59,550
Total number of participating employees	Persons	12,910	11,291	6,886
Training expenses per Persons	KRW 1,000	841	932	390
Training hours per Persons	Hours	16.0	13.8	10.9

4) Collective Bargaining

Classification	Unit	2018	2019	2020
Number of employees available for joining labor union	Persons	1,356	1,351	1,474
Number of employees joining labor union	Persons	1,356	1,351	1,474
Ratio of employees joining labor union	%	100	100	100

* No labor unions for Hanwha Q CELLS

Win-Win Cooperations

1) Current Status of Partner Companies

Classification	Unit	2018	2019	2020
Total number of New Partner Companies	Companies	7,128	8,141	8,832
Total number of Partner Companies		1,501	1,503	1,305

2) Win-Win Growth

Classification	Unit	2018	2019	2020
Win-Win Growth Index	Grade	Satisfactory	Satisfactory	Satisfactory

3) Support for Partner Companies

Classification	Unit	2018	2019	2020	
Financial Support for Partner Companies (Mutual Growth Fund)	Total amount of Fund	KRW 1 million	38,000	38,000	58,000
	Total amount of Fund Executed		15,584	15,269	13,867
Management Consultation for Partner Companies	Cases	11	4	-	

Social Contribution

1) Corporate Social Responsibility (CSR) Activities

Classification	Unit	2018	2019	2020	
CSR Activities	Number of Participants	Persons	2,394	2,570	218
	Number of Beneficiaries	Persons	13,729	12,983	13,854
Donations	Total amount of Donations	KRW 1 million	5,579	6,311	5,481
	Donations by Company		5,189	5,935	5,109
	Donations by Employees		390	376	372
Employee Volunteering	Total hours for volunteering	Hours	25,277	18,899	757
	Volunteering hours per employee		10.6	7.4	3.5

* Downsized for 2020 due to COVID-19

Governance

Governance

1) Board of Directors

Classification	Unit	Unit	2018	2019	2020
Composition of the Board of Directors	Inside Director	Persons	3	3	5
	Outside Director	Persons	5	5	6
	Ratio of Outside Director	%	62.5%	62.5%	54.5%
	Ratio of Female Director	%	0%	0%	9%
Number of the Board Meetings held	Number of the Board Meetings held	Sessions	13	12	11
Ratio of Attendance	Attendance Rate	%	99%	100%	96%
Number of agenda items or proposals that received objections from outside directors	Cases		0	0	1

* One female outside director newly elected in March 2020

2) Operations of Committees

Classification	Unit	2018	2019	2020	
Audit Committee	Ratio of outside directors	%	100%	100%	100%
	Number of meetings held	Sessions	5	5	7
	Ratio of attendance at meeting	%	100%	100%	100%
Internal Transaction Committee	Ratio of outside directors	%	33%	33%	33%
	Number of meetings held	Sessions	9	5	4
	Ratio of attendance at meeting	%	98%	98%	100%
Outside Director Nomination Committee	Ratio of outside directors	%	100%	100%	100%
	Number of meetings held	Sessions	1	1	1
	Ratio of attendance at meeting	%	100%	100%	100%
ESG Committee	Newly Established in 2021 (2021.5.)				

3) Remuneration for the Board of Directors

Classification	Persons	Unit	Total Compensation	Average Compensation per one person
Registered Director	5	KRW 1 million	2,959	592
Outside Director	3		161	54
Members of the Audit Committee	3		179	60

4) Ratio of Maximum Remuneration to Average Wage of employee

Classification	Unit	2018	2019	2020
Amount of the maximum remuneration	KRW 1 million	1,266	3,595	1,368
Average compensation of all employees		98	100	75
Ratio of maximum remuneration to average wage of employee	Multiples	12.93	35.86	18.34

* Total remuneration excluding retirement benefit

5) Share Ownership

Classification	Unit	2018	2019	2020
Percentage of share ownership by CEO	%	0.01%	0.01%	0.01%
Percentage of share ownership by government agencies	%	7.31%	9.98%	10.59%

6) Information about the Largest Share holder (2020)

Classification	Name of Shareholders	Number of shares held	Percentage of Ownership	Notes
Share ownership over 5%	Hanwha Corporation	59,545,978	37.25%	-
	NPS (National Pension Service)	59,545,978	10.59%	-

7) Shareholder-friendly Management

Classification	Unit	2018	2019	2020
Total Dividend	KRW 1 million	32,903	32,577	-
Dividend Payout Ratio	%	17.6	-13.7	-
Dividend per Share (Ordinary Shares)	KRW	200	200	-
Voting Systems Adopted for the General Shareholders Meeting	Written Ballot System	0	0	0
	Electronic Voting System	0	0	0

* No dividends for 2020

8) In-house inspections for ethics and compliance

Classification	Unit	2018	2019	2020
Number of in-house inspections for ethics and compliance	Cases	2	2	6

* No cases after merger between Q CELLS and Advanced Materials in January 2020

9) Penalty and fine for non-compliance with legal regulations

Classification	Unit	2018	2019	2020
Penalty and Fine	KRW 1 million	32	0	0

10) Violation of Data Protection

Classification	Unit	2018	2019	2020
Number of violations or cybersecurity accidents	Cases	0	0	0

SASB Index

The Sustainability Accounting Standards Board (SASB) was launched to prepare sustainability reporting criteria for each industry. The SASB identifies highly relevant sustainability issues for each industry and recommends that corporations continuously make reports to communicate with the stakeholders. Therefore, Hanwha Solutions manages indicators according to two industrial standards—the Sustainability Industry Classification System (SICS) and for the SASB index and Chemicals, Solar Technology & Project Developers—and transparently shares these with its stakeholders.

SASB - Common Index

Topic	CODE	Accounting Metric	Hanwha Solutions ' Response
Energy Management	RR-ST-130a.1 RT-CH-130a.1	(1) Total energy consumed	46,930,625 GJ
		(2) percentage grid electricity	76%
		(3) percentage renewable	0.1%
		(4) total self-generated energy	3,473 MWh
Water Management	RR-ST-140a.1 RT-CH-140a.1	(1) Total water withdrawn	16,556,349 Tons
		(2) Total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	No worksites with 'High Risk' water stress
Hazardous Waste Management	RR-ST-150a.1 RT-CH-150a.1	Description of water management risks and discussion of strategies and practices to mitigate those risks	(page 72)
		Amount of hazardous waste generated	31,482 Tons
		percentage recycled	39%

SASB - Solar Technology & Project Developers

Topic	CODE	Accounting Metric	Hanwha Solutions ' Response
Ecological Impacts of Project Development	RR-ST-160a.1	Number and duration of project delays related to ecological impacts	Hanwha Solutions is not applicable to this indicator.
		Description of efforts in solar energy system project development to address community and ecological impacts	(Page 46, 102-103)
Management of Energy Infrastructure Integration & Related Regulations	RR-ST-410a.1 RR-ST-410a.2	Description of risks associated with integration of solar energy into existing energy infrastructure and discussion of efforts to manage those risks	Hanwha Solutions is not applicable to this indicator.
		Description of risks and opportunities associated with energy policy and its impact on the integration of solar energy into existing energy infrastructure	(Page 44-47, 54-57)
Product End-of-life Management	RR-ST-410b.1 RR-ST-410b.2 RR-ST-410b.3 RR-ST-410b.4	Percentage of products sold that are recyclable or reusable	No products reaching their life cycle limits.
		Weight of end-of-life material recovered, percentage recycled	No products reaching their life cycle limits.
		Percentage of products by revenue that contain IEC 62474 declarable substances, arsenic compounds, antimony compounds, or beryllium compounds	Hanwha Solutions is not applicable to this indicator.
		Description of approach and strategies to design products for high value recycling	(Page 44, 50-53)
Materials Sourcing	RR-ST-440a.1 RR-ST-440a.2	Description of the management of risks associated with the use of critical materials	(Page 86-88, 111-113)
		Description of the management of environmental risks associated with the polysilicon supply chain	Hanwha Solutions is not applicable to this indicator.

SASB – Chemicals

Topic	CODE	Accounting Metric	Hanwha Solutions ' Response
Greenhouse Gas Emissions	RT-CH-110a.1	(1) Gross global Scope 1 emissions	404,341 tCO ₂ -eq
		(2) percentage covered under emissions-limiting regulations	100%
		Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets	(Page 65-69)
Air Quality	RT-CH-120a.1	(1) Nox	182 tons
		(2) Sox	2 tons
		(3) Volatile organic compounds (VOCs)	N/A
		(4) Hazardous air pollutants (HAPs)	N/A
Water Management	RT-CH-140a.2	Number of incidents of non-compliance associated with water quality permits, standards, and regulations	No standards violated
Community Relations	RT-CH-210a.1	Discussion of engagement processes to manage risks and opportunities associated with community interests	(Page 77, 79, 100-103)
Workforce Health & Safety	RT-CH-320a.1	(1) Total recordable incident rate (TRIR)	0.26% for Direct Employees, 1.06% for Contractors
		(2) fatality rate for (a) direct employees and (b) contract employees	0%
		(3) Near miss frequency rate (NMFR)	N/A
	RT-CH-320a.2	Description of efforts to assess, monitor, and reduce exposure of employees and contract workers to long-term (chronic) health risks.	(Page 82-83)
Product Design for Use-phase Efficiency	RT-CH-410a.1	Revenue from products designed for use-phase resource efficiency.	(Page 46, 50-53)
Safety & Environmental Stewardship of Chemicals	RT-CH-410b.1	(1) Percentage of products that contain Globally Harmonized System of Classification and Labeling of Chemicals (GHS) Category 1 and 2 Health and Environmental Hazardous Substances	Hanwha Solutions is not applicable to this indicator
		(2) percentage of such products that have undergone a hazard assessment	(Page 86-89)
	RT-CH-410b.2	(1) Discussion of strategy to manage chemicals of concern	(Page 74)
		(2) Discussion of strategy to develop alternatives with reduced human and/or environmental impact	(Page 50-57)
Genetically Modified Organisms	RT-CH-410c.1	Percentage of products by revenue that contain genetically modified organisms (GMOs)	Hanwha Solutions is not applicable to this indicator
Management of the Legal & Regulatory Environment	RT-CH-530a.1	Discussion of corporate positions related to government regulations and/or policy proposals that address environmental and social factors affecting the industry	(Page 40-41, 111-113)
Operational Safety, Emergency, Preparedness & Response	RT-CH-540a.1	(1) Process Safety Incidents Count (PSIC)	(Page 125)
		(2) Process Safety Total Incident Rate (PSTIR)	N/A
		(3) Process Safety Incident Severity Rate (PSISR)	N/A
	RT-CH-540a.2	Number of transport incidents	N/A

TCFD Index

Category	TCFD Recommended Disclosures	Reporting Page
Governance	a) Describe the board's oversight of climate-related risks and opportunities.	65, 67
	b) Describe management's role in assessing and managing climate-related risks and opportunities.	
Strategy	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	40-41, 67-68
	b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	
	c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	
Risk Management	a) Describe the organization's processes for identifying and assessing climate-related risks.	69
	b) Describe the organization's processes for managing climate-related risks.	
	c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	
Metrics and Targets	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	65-69
	b) Disclose Scope 1, Scope 2, and if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	
	c) Describe the targets used by the organization to manage climate-related risks and the opportunities and performance against targets.	

WEF Stakeholder Capitalism Metrics

Category	Theme	Metrics	Reporting Page
Principles of Governance	Governing purpose	Setting purpose	8-9, 10-11, 26-27
	Quality of governing body	Governance body composition	106-109
		Progress against strategic milestones	34-45
	Stakeholder Engagement	Material issues impacting stakeholders	33-45
		Relations between remuneration system and impacts on economy, environment, and society.	92, 109-110
	Ethical behavior	Anti-corruption	111-114, 132
		Protected ethics advice and reporting mechanisms	111-114
Risk and opportunity oversight	Integrating risk and opportunity into business process	115-117	
Planet	Climate Change	Greenhouse gas (GHG) emissions (Scope 1 - 3)	65-66, 123
		TCFD implementation	67-69
		Paris-aligned GHG emissions targets and impacts of GHG emissions	40-43
	Nature loss	Land use and ecological sensitivity	72
	Freshwater availability	Water consumption and withdrawal in water-stressed areas	72
	Air pollution	Impact of air pollution	70-71, 123
	Water pollution	Nutrients, Impact of water pollution	70, 72, 124
	Solid waste	Single-use plastics, Impact of solid waste disposal	72-73
Resource availability	Resource circularity	72-73, 124	
People	Dignity and Equality	Diversity and inclusion	127
		Pay equality	131
		Discrimination and harassment incidents and the total amount of monetary losses	132
		Human rights review, grievance impact and modern slavery	113
	Health and Well-Being	Health and safety	125
		Monetized impacts of work-related incidents on organization	80-83, 125
Skills for the future	Training provided	91-92, 129	
Prosperity	Employment and wealth generation	Absolute number and rate of employment	127
		Economic contribution	33
		Financial investment contribution	132
		Infrastructure investments and services supported	100-103, 130
		Significant indirect economic impacts	139-147
	Innovation of better products and services	Total R&D expenses, Social value generated	48-49
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* Local community, human rights, diversity, tolerance, training, safety & health, and labor-management relations

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Consolidated Financial Statement

Consolidated Statements of Financial Position		Unit: KRW 1 million		
	2018	2019	2020	
Assets				
Current Assets	5,012,471	5,322,650	4,958,365	
Cash and cash equivalents	1,024,121	1,084,516	1,199,837	
Financial assets at fair value through profit or loss	-	1,061	2,920	
Financial assets at fair value through other comprehensive income or loss	-	1	-	
Other financial assets	414,808	492,890	192,785	
Trade and other receivables	1,758,578	1,572,846	1,457,526	
Other current assets	315,226	370,438	327,678	
Inventories	1,467,462	1,479,892	1,431,588	
Current tax assets	14,094	23,271	10,521	
Assets held for sale	18,180	297,734	335,510	
Non-current assets	10,219,005	10,358,479	10,178,955	
Financial assets at fair value through profit or loss	82	2,129	1,858	
Financial assets at fair value through other comprehensive income or loss	80,230	46,597	48,541	
Other financial assets	87,323	75,725	62,139	
Trade and other receivables	2,921	4,627	3,837	
Investments in associates and joint venture	2,622,361	2,720,817	2,685,164	
Investment property	190,336	158,043	142,187	
Property, plant and equipment	6,684,052	6,594,033	6,416,485	
Intangible assets	479,383	421,170	413,851	
Right-of-use assets	-	246,990	309,714	
Other non-current assets	18,724	15,965	16,286	
Deferred tax assets	53,592	72,382	78,892	
Total Assets	15,231,475	15,681,129	15,137,320	

	2018	2019	2020
Liabilities			
Current liabilities	5,132,516	5,831,012	5,251,126
Trade and other payables	1,479,738	1,573,035	1,556,392
Borrowings and debentures	2,893,481	3,384,514	2,971,926
Other financial liabilities	162,279	205,562	222,158
Provisions	51,094	60,855	51,059
Other current liabilities	439,889	559,727	302,576
Current tax liabilities	106,035	47,319	147,015
Non-current liabilities	3,871,864	4,044,269	3,918,479
Trade and other payables	330	5	15
Borrowings and debentures	2,995,061	2,984,059	2,716,648
Other financial liabilities	13,907	218,861	379,992
Net defined benefit liabilities	371,701	411,795	446,565
Payroll liabilities	18,270	25,682	27,893
Provisions	64,501	90,675	106,858
Other non-current liabilities	23,551	7,545	6,382
Deferred tax liabilities	384,542	305,648	234,127
Total Liabilities	9,004,379	9,875,282	9,169,604
Equity			
Equity attributable to owners of the Parent Company	6,089,975	5,728,169	5,929,092
Share Capital	821,171	821,171	821,171
Capital surplus	856,962	804,504	798,470
Capital adjustments	(3,433)	(2,918)	(10,328)
Accumulated other comprehensive income (loss)	(81,252)	(70,523)	(110,010)
Retained earnings	4,496,527	4,175,935	4,429,789
Non-controlling interest	137,122	77,678	38,623
Total Equity	6,227,096	5,805,847	5,967,715
Total liabilities and equity	15,231,475	15,681,129	15,137,320

Consolidated Statements of Comprehensive Income

Unit: KRW 1 million

	2018	2019	2020
Revenue	9,046,042	9,457,390	9,195,008
Cost of sales	7,458,562	7,607,276	7,269,115
Gross Profit	1,587,480	1,850,114	1,925,893
Selling and administrative expenses	1,233,134	1,390,963	1,331,710
Operating profit	354,346	459,151	594,183
Non-operating profit (loss)	(66,013)	(291,135)	(142,640)
Other income	468,472	403,499	542,226
Other expenses	(816,689)	(711,602)	(665,209)
Financial income	24,645	27,724	25,466
Financial costs	(160,254)	(224,512)	(205,281)
Share of net profit of associates and joint venture accounted for using the equity method	417,814	213,756	160,158
Profit before income tax	288,333	168,016	451,543
Income tax expense	127,888	77,819	111,969
Net income from continuing operations	-	90,197	339,574
Net income (loss) from discontinued operations	-	(339,062)	(37,852)
Net Income (loss)	160,445	(248,865)	301,722
Other comprehensive income (loss)	(85,137)	(1,955)	(47,599)
Total comprehensive income (loss) for the year	75,308	(250,820)	254,123
Profit (loss) is attributable to:			
Owners of the Parent Company	186,680	(237,623)	309,077
Non-controlling interests	(26,235)	(11,242)	(7,354)
Total comprehensive income (loss) for the year is attributable to:			
Owners of the Parent Company	108,083	(230,199)	267,740
Non-controlling interests	(32,775)	(20,620)	(13,617)
Earnings per share from continuing operations			
Basic or diluted earnings per ordinary share (Unit: KRW)	1,136	622	2,154
Basic or diluted earnings per preferred share (Unit: KRW)	1,186	674	2,210
Earnings per share of controlling subsidiary from discontinued operations			
Basic or diluted earnings per ordinary share (Unit: KRW)	-	(2,081)	(235)
Basic or diluted earnings per preferred share (Unit: KRW)	-	(2,085)	(236)

Consolidated Statements of Changes in Equity

Unit: KRW 1 million

	Issued Capital	Capital Surplus	Capital Adjustments	Accumulated other comprehensive income (loss)	Retained Earnings	Non-Controlling interests	Total
Balance as of January 1, 2019	821,171	856,962	(3,433)	(81,252)	4,496,527	137,122	6,227,096
Adjustments from changes in accounting policies	-	-	-	-	(8,472)	(670)	(9,141)
Balance after adjustments	821,171	856,962	(3,433)	(81,252)	4,488,055	136,452	6,217,955
Changes in equity							
Comprehensive income (loss)							
Profit (Loss) for the year	-	-	-	-	(237,623)	(11,242)	(248,865)
Other comprehensive income (loss)							
Items that will be reclassified from OCI to profit or loss							
Loss on valuation of financial assets at fair value through other comprehensive income	-	-	-	2	-	(3)	(1)
Share in other comprehensive income of associates	-	-	-	3,761	-	66	3,828
Gain on valuation of derivatives qualifying cash flow hedge	-	-	-	(486)	-	-	(486)
Translation of foreign currency financial statements	-	-	-	37,819	-	(2,371)	35,448
Items that will not be reclassified from OCI to profit or loss							
Gain (loss) on valuation of financial assets at fair value through other comprehensive income (equity instruments)	-	-	-	(35,082)	-	(6,752)	(41,833)
Share in other comprehensive income of associates	-	-	-	3,491	-	-	3,491
Reclassification to retained earnings	-	-	-	1,223	(1,223)	-	-
Remeasurements of net defined benefit liability	-	-	-	-	(3,899)	(309)	(4,208)
Share in remeasurements of net defined benefit liability of associates	-	-	-	-	1,816	(10)	1,806
Capital transactions within the group							
Dividends	-	-	-	-	(32,903)	(1,159)	(34,062)
Purchase of treasury stocks	-	-	(37,158)	-	-	-	(37,158)
Retirement of treasury stocks	-	-	37,158	-	(37,158)	-	-
Changes in scope of consolidation							
Acquisition of subsidiary	-	(9,005)	-	-	-	250	(8,755)
Changes in percentage of ownership in non-controlling subsidiary							
Changes in percentage of ownership in subsidiary	-	(45,252)	-	-	-	(37,002)	(82,255)
Others	-	1,799	515	-	(1,131)	(242)	941
Balance as of December 31, 2019	821,171	804,504	(2,918)	(70,523)	4,175,935	77,678	5,805,847

	Issued Capital	Capital Surplus	Capital Adjustments	Accumulated other comprehensive income (loss)	Retained Earnings	Non-Controlling interests	Total
Balance as of January 1, 2020	821,171	804,504	(2,918)	(70,523)	4,175,935	77,678	5,805,847
Changes in equity							
Comprehensive income (loss)							
Profit (Loss) for the year	-	-	-	-	309,077	(7,354)	301,722
Other comprehensive income (loss)							
Items that will be reclassified from OCI to profit or loss							
Loss on valuation of financial assets at fair value through other comprehensive income	-	-	-	(1)	-	(2)	(3)
Share in other comprehensive income of associates	-	-	-	4,715	-	(1)	4,714
Gain on valuation of derivatives qualifying cash flow hedge	-	-	-	(223)	-	-	(223)
Translation of foreign currency financial statements	-	-	-	(4,282)	-	(4,628)	(8,910)
Items that will not be reclassified from OCI to profit or loss							
Gain (loss) on valuation of financial assets at fair value through other comprehensive income (equity instruments)	-	-	-	2,798	-	(1,419)	1,379
Share in other comprehensive income of associates	-	-	-	(42,494)	-	-	(42,494)
Remeasurements of net defined benefit liability	-	-	-	-	(662)	(213)	(875)
Share in remeasurements of net defined benefit liability of associates	-	-	-	-	(1,188)	-	(1,188)
Capital transactions within the group							
Dividends	-	-	-	-	(32,577)	(3,500)	(36,077)
Purchase of treasury stocks	-	-	(28,998)	-	-	-	(28,998)
Sale of treasury stocks	-	13	8	-	-	-	21
Retirement of treasury stocks	-	-	21,580	-	(21,580)	-	-
Changes in scope of consolidation							
Acquisition of subsidiary	-	3,120	-	-	-	1,783	4,904
Changes in percentage of ownership in non-controlling subsidiary							
Changes in percentage of ownership in subsidiary	-	(19,424)	-	-	-	(23,713)	(43,137)
Share-based payments	-	7,714	-	-	-	-	7,714
Others	-	2,543	(1)	-	784	(8)	3,318
Balance as of December 31, 2020	821,171	798,470	(10,328)	(110,010)	4,429,789	38,623	5,967,715

Consolidated Statements of Cash Flows

Unit: KRW 1 million

	2018	2019	2020
Cash flows from operating activities	726,704	1,206,118	1,069,542
Cash provided by (used in) operations	811,318	1,415,699	1,141,661
Income taxes paid	(84,614)	(209,582)	(72,119)
Cash flows from investing activities	(434,645)	(1,110,655)	(42,737)
Interests received	34,683	35,862	35,600
Dividends received	447,207	89,547	176,078
Proceeds from disposal of financial assets at fair value through other comprehensive income or loss	10,147	70	1
Proceeds from disposal of other financial assets	1,496,445	541,605	976,303
Proceeds from disposal of investments in associates	-	-	23,391
Proceeds from disposal of subsidiary	17,769	3,204	2,493
Receipt of government subsidy	66	160	128
Proceeds from disposal of investment property	4,200	38,786	16,007
Proceeds from disposal of property, plant and equipment	56,020	27,385	18,729
Proceeds from disposal of intangible assets	20,166	8,545	16,118
Proceeds from disposal of right-of-use assets	-	2,559	-
Proceeds from disposal of assets classified as held for sale	1,483	18,245	398,835
Acquisition of financial assets at fair value through other comprehensive income	(3,000)	-	-
Acquisition of other financial assets	(1,503,200)	(630,935)	(711,043)
Acquisition of investments in associates	(26,367)	(26,966)	(54,156)
Acquisition of investment property	(329)	(5)	(4)
Acquisition of property, plant and equipment	(720,058)	(1,165,344)	(883,786)
Acquisition of intangible assets	(19,476)	(9,177)	(8,248)
Acquisition of right-of-use assets	-	(535)	-
Acquisition of subsidiary	(360,746)	(22,594)	(45,911)
Decrease in cash from changes in scope of consolidation	-	(5,142)	(3,272)
Acquisition of business	-	(18,208)	-
Withdrawal of other receivables (Investing activities)	110,344	15,734	-
Repayment of other payables (Investing activities)	-	(13,449)	-

	2018	2019	2020
Cash flows from financing activities	(69,585)	(42,617)	(886,838)
Increase in borrowings and debentures	2,098,367	3,264,106	3,506,554
Increase in other financial liabilities	25	2,030	4,054
Increase (decrease) in non-controlling interests	(3,458)	(85,086)	(19,701)
Repayment of borrowings and debentures	(1,923,944)	(2,883,317)	(4,077,517)
Decrease in other financial liabilities	(207)	(4,432)	(2,011)
Interests paid	(182,830)	(228,797)	(176,265)
Dividends paid	(57,538)	(32,903)	(32,577)
Lease payments paid	-	(37,061)	(60,377)
Acquisition of treasury shares	-	(37,158)	(28,998)
Net increase (decrease) in cash and cash equivalents	222,475	52,845	139,967
Cash and cash equivalents at the beginning of the financial year	804,983	1,024,121	1,084,516
Exchange gains (loss) on cash and cash equivalents	(3,336)	7,550	(24,647)
Cash and cash equivalents at the end of the financial year	1,024,121	1,084,516	1,199,837
Cash and cash equivalents at the end of the year in the consolidated statement of financial position	1,024,121	1,084,516	1,199,837

GRI Standards

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Greenhouse Gas Emissions Assurance Statement

No.: PRJN-201133-2020-AST-KOR

Introduction

DNV Business Assurance Korea Ltd. ("DNV") was commissioned by Hanwha Solutions Corporation ("Hanwha Solutions") to verify the Hanwha Solutions' Greenhouse Gas Inventory Report for the calendar year 2020 ("the report") based upon a reasonable level of assurance. Hanwha Solutions is responsible for the preparation of the GHG emissions and Energy consumption data on the basis set out within the guidelines on the operation of GHG emission trading scheme ("ETS") (Notification No. 2021-10 of Ministry of Environment). Our responsibility in performing this work is to the management of Hanwha Solutions only and in accordance with terms of reference agreed with them. DNV expressly disclaims any liability or responsibility for any decisions, whether investment or otherwise, based upon this assurance statement.

Scope of Assurance

The GHG emissions and energy consumption data covered by our examination comprise Direct emissions (Scope 1 emissions) and Energy indirect emissions (Scope 2 emissions) from Hanwha Solutions boundary of the report;

- GHG emissions under verification: GHG emissions from 2020
- Organizational boundary for reporting: Hanwha Solutions Corporation (in Korea)

Verification Approach

The verification has been conducted by DNV on February to March 2021 and performed in accordance with the verification principles and tasks outlined in the guidelines on the operation of GHG ETS (Notification No.2021-10, Korean Ministry of Environment) and the verification guideline for GHG ETS (Notification No. 2018-70, Korean Ministry of Environment). We planned and performed our work to obtain all the information and explanations deemed necessary to provide us with sufficient evidence to provide a reasonable verification opinion concerning the completeness of the emission inventory as well as the reported emission figures in ton CO₂ equivalent. As part of the verification process;

- We have reviewed the GHG emissions and energy consumption report for the calendar year 2020
- We have reviewed and verified the process to generate, aggregate and report the emissions and energy data

Conclusions

As a result of the work described above, in our opinion nothing has come to our attention that would cause us to believe that the GHG emissions and energy consumption set out in Hanwha Solutions' report are not fairly stated. The GHG emissions and energy consumption of Hanwha Solutions for the year 2020 were confirmed as below;

Greenhouse Gas Emissions of Hanwha Solutions Corporation for Year 2020

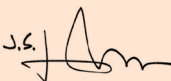
Unit : ton CO₂ equivalent.

Hanwha Solutions	Direct emissions (Scope 1)	Energy indirect emissions (Scope 2)	Total emissions
Domestic (in Korea)	481,500	1,996,107	2,477,598

* Total emissions might be different from the sum of direct and indirect emissions by applying the rule that emissions should be summed after truncating decimal places at the business site level.

June 2021 Seoul, Korea

Jang-Sub Lee Country Manager
DNV Business Assurance Korea Ltd



This Assurance Statement is valid as of the date of the issuance 21 June 2021. Please note that this Assurance statement would be revised if any material discrepancy which may impact on the Greenhouse Gas Emissions of Hanwha Solutions is subsequently brought to our attention. In the event of ambiguity or contradiction in this statement between English version and Korean version, Korean shall be given precedent.

Independent Assurance Statement

Introduction

Hanwha Solutions Corporation ("the Company") commissioned DNV Business Assurance Korea, Ltd. ("DNV"), part of DNV Group, to undertake independent assurance of 'Hanwha Solutions Sustainability Report 2021' (the "Report"). Directors of the Company have sole responsibility for the preparation of the Report. The responsibility of DNV in performing this assurance work is limited to the mutually agreed works in the contract. DNV's assurance engagements are based on the assumption that the data and information provided by the Company to us as part of our review have been provided in good faith.

Scope and Basis of Assurance

Based on non-financial data, sustainability activities and performance data of 2020 generated from the Company, DNV has assessed the adherence to the Reporting Principles for defining report content set forth in the GRI Sustainability Reporting Standards 2020 and assessed the quality of sustainability performance information. DNV has found that the material topics which are identified by the Company's materiality assessment process are linked to relevant topic-specific disclosures of GRI Standards 2020 as follows;

No.	Material Topic	GRI topic-specific Disclosure
1	Enhancement of business portfolio focused on future growth	306-1
2	Eco-friendly investment and business development	Non-GRI*
3	Create economic outcomes and enhance financial stability	201-1
4	Response to climate change	305-5

* Non-GRI: Matched topic-specific disclosures do not exist.

We performed our work using DNV's assurance methodology VeriSustain™ (Ver. 5.0)* 2 which is based on our professional experience, international assurance best practices are applied for the assurance engagement with the limited level of assurance. The assurance was carried out from September to October 2021. The site visit was replaced with video conference due to COVID-19. We undertook the following activities as part of the assurance process:

* The VeriSustain protocol is available upon request at DNV Website (www.dnv.com)

- Challenged the sustainability-related statements and claims made in the Report and assessed the robustness of the underlying data management system, information flow and controls;
- Conducted online interviews with representatives from the various departments;
- Conducted document reviews, data sampling and interrogation of supporting databases and associated reporting system as they relate to selected content and performance data;
- Reviewed the process and the result of materiality assessment.
- Verified data gathering process through video conference with the headquarters and responsible person at major plants.

Limitations

The engagement excludes the sustainability management, performance and reporting practices of the Company's subsidiaries, associated companies, suppliers, contractors and any third-parties mentioned in the Report. We did not interview external stakeholders as part of this Assurance Engagement. Analysis of internal financial documents of Hanwha Solutions, the audited consolidated financial statements disclosed at the website of Korea Financial Supervisory Service (<http://dart.fss.or.kr>) and finance-related announcements posted in the Company's website (www.hanwhasolutions.com) are not included in this assurance engagement. Limited depth of evidence gathering including inquiry and analytical procedures and limited sampling at lower levels in the organization were applied. The baseline data for environmental and social performance are not verified, while the aggregated data at the corporate level are used for the verification. DNV expressly disclaims any liability or co-responsibility for any decision a person or an entity may make based on this Assurance Statement.

Conclusion

On the basis of the work undertaken, nothing comes to our attention to suggest that the reported data and information disclosed in the Report do not give a fair representation of the Company's related sustainability performance nor is prepared in accordance with GRI Standards Core option. Further opinions with regards to the adherence to the Principles are made below;

Stakeholder Inclusiveness Hanwha Solutions defined customers, shareholders and investors, employees, suppliers, local communities and governments as major stakeholder groups. The Company identified their needs via various communication channels and reflected them into the Company's business strategy and decision-making process. The definition of each stakeholders and the approaches to engage with selected stakeholders and relevant organizations are described in the Report, and stakeholder interests are reflected in the materiality assessment process.

Sustainability Context Hanwha Solutions, in the perspective of sustainable development, presents 'Sustainable Solutions for the Green Planet' composed of four sub-projects of 1) 2050 Net Zero, 2) Green Energy, 3) Green Recycling, and 4) Green Hydrogen. The Company also indicates management system and major activities in the viewpoint of ESG. The Company newly established the ESG Committee within the Board of Directors and made efforts to improve governing structure, for instance, by appointing a foreigner and a woman as non-executive directors. Each project is linked to the reporting principles of GRI and quantitative performance data were presented as well.

Materiality Hanwha Solutions has conducted the materiality assessment to prepare the Report. Among 37 issues at initial stage, 20 common issues were sorted out through analysis of stakeholders' interests and business impact. Considering priority, final 4 core issues were selected. We have reviewed the materiality assessment process and noted relevant material topics (core issues) prioritized from the process are addressed in the Report.

Completeness Hanwha Solutions discloses management approaches, future plan and key performance on material topics that reflect stakeholders' interest and expectations. The reporting boundary has been set to include the Company's headquarters and all domestic operations. It is recommended that more systematic management be pursued by expanding management of non-financial data to overseas operations. The assurance team confirmed that the material topics selected through the materiality assessment were completely reflected according to the physical and periodic reporting boundaries.

Comparability, Accuracy, Timeliness, Clarity and Reliability

The assurance team has sampled data and tested accuracy and reliability of the sustainability performance data of the Company.

We interviewed the responsible for the subject data handling and reviewed the data gathering process with the supporting documents and records. Based on the test, the intentional error or misstatement is not noted. Data owners were able to demonstrate to trace the origin of the data and to interpret the processed data in a reliable manner. The data was identifiable and traceable. The Company reports the sustainability performance of the last three years and can be compared over time. Any errors or unclear expressions found during the verification process were corrected prior to the publication of the Report. The Report is published at regular times every year, and the reporting period is specified in the report.

Competence and Independence

DNV applies its own management standards and compliance policies for quality control, in accordance with ISO/IEC 17021:2015 – Conformity Assessment Requirements for bodies providing audit and certification of management systems, and accordingly maintains a comprehensive system of quality control, including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements. We have complied with the DNV Code of Conduct during the assurance engagement and maintain independence where required by relevant ethical requirements. This engagement work was carried out by an independent team of sustainability assurance professionals. DNV was not involved in the preparation of statements or data included in the Report except for this Assurance Statement. DNV maintains complete impartiality toward stakeholders interviewed during the assurance process. DNV provided verification of greenhouse gas emissions of Hanwha Solutions in 2020 which is not a service that could compromise the independence or impartiality of our work.

November 2021 Seoul, Korea

Jang Sup Lee

Country Representative

DNV Business Assurance Korea Ltd.



Awards and Affiliated Organizations

Awards

Divisions	Awards	Associations	Years
Hanwha Solutions	2020 Korea IR Awards – Selected as the 'IR Excellent Enterprise'	KOREA Investor Relations Service	2020
	2021 JoongAng ESG Management Awards – Awarded the 'Excellent Performer' in Energy and Materials sectors	Korea JoongAng Daily	2021
	2020 Yeosu Industrial Complex Safety Management Excellence Scorecard – Awarded the 'Top Prize' (Yeosu plant)	Yeosu City	2021
Chemical Division	2019 Environment Management System – Selected as the 'Top Performer'	Korea Management Register	2019
	Awarded the 'IR52 Jang Yeong-sil Award'. (Eco-DEHCH)	Ministry of Science and ICT	2018
	Awarded the '2018 Top Prize' for 'Educational Contributions'	Korea Foundation for the Advancement of Science & Creativity	2018
Q CELLS Division	2021 PV Module Reliability Scorecard – Selected as the 'Top Performer' for 6 consecutive years	PVEL	2021
	2021 Korea Consumers Awards – Selected as the 'Global Best Company' for 4 consecutive years	Korea Consumer Association	2021
	Selected as the 'Top Brand PV' for 8 consecutive years in Europe, and 6 consecutive years in Australia	EUPD Research	2021
	Germany's Life & Living Awards 2021 – Selected as the 'Germany's most popular provider' in solar technology for 2 consecutive years	Deutsches Institut für Service-Qualität (DISQ), n-tv	2021
	Highest Reputation Award – Selected as the 'No.1 Enterprise' in electricity industry for 2 consecutive years	FOCUS MONEY	2020
	Awarded for 'Disaster Response and Training for Safe Korea'	Chungcheongbuk-do	2018
	Selected as the 'Korea's Best Company' for 'Employment and Labor'	Ministry of Employment and Labor	2018
Advanced Materials Division	Intersolar Award 2018 – Awarded for its innovative solar modules for 2 consecutive years	Intersolar EU	2018
	Awarded for 'Environmental Preservation'	Chungcheongbuk-do	2020
	Awarded the 'Top Prize' For Excellent Green Office	Ministry of Environment	2019

Affiliated Organizations

Korea Listed Companies Association
The Korea Chamber of Commerce & Industry
American Chamber of Commerce in Korea
Korea-U.S. Economic Council
Korea International Trade Association
The Federation of Korean Industries
Korea Economic Research Institute
Fair Competition Federation
Korea Business Council for Sustainable Development
UN Global Compact

Korea Petrochemical Industry Association
Korea Chemical Industry Council
Hydrogen Convergence Alliance
Korea Institute for Advancement Technology
Korea Chlor Alkali Industry Associates
Korea Vinyl Environmental Council
Korea New & Renewable Energy
Korea Photovoltaic Industry Association
Korea Electric Association
Energy Transition Korea

The Korean Society for New and Renewable Energy
Korea Photovoltaic Society
The Korean Solar Energy Society

