

2024 Hanwha Solutions Sustainability Report

Sustainable Solutions For All




About This Report


The 2024 **Hanwha Solutions** Sustainability Report is published with a corporate spirit based on trust and loyalty, transparently disclosing our commitment to ESG management, strategy, and performance to stakeholders.


Using a double materiality assessment, we report ESG management strategies and performance with a focus on material ESG issues. We intend to continue to strengthen ESG management and build trust with stakeholders through the publication of our sustainability reports.


INTERACTIVE User Guide


Hanwha Solutions Sustainability Report is created as an interactive PDF. You can navigate to relevant websites and play videos to gain a better understanding of the topics.

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Report Overview

We publish an annual sustainability report to transparently disclose the company's sustainable practices and achievements in environmental, social, and governance domains, while also serving as a tool for active communication with various stakeholders.

Reporting Period

The report covers the financial and non-financial performance of the company from January 1, 2023, to December 31, 2023, with certain data from the first half of 2024 included to provide up-to-date information. Quantitative data from the past three years (2021-2023) is included to facilitate effective trend analysis.

Reporting Principles

This report has been prepared in compliance with the Global Reporting Initiative (GRI) Standards 2021. To disclose activities relevant to industry-specific issues, we have considered the recommendations of the Sustainability Accounting Standards Board (SASB) and the Task Force on Climate-related Financial Disclosures (TCFD), and we have incorporated indicators from the ten principles of the United Nations Global Compact and the United Nations Sustainable Development Goals (SDGs). The financial information presented in this report is based on the Korean International Financial Reporting Standards (K-IFRS).

Reporting Scope

The financial performance in this report includes consolidated financial information from our head office and business sites worldwide. For non-financial performance, the report focuses on the head office and all domestic business sites of the three business divisions: **Chemical**, **Qcells**, and **Insight**. This report reflects the split-off of the **Advanced Materials Division** in December 2022 and the spin-off of the **Galleria Division** in March 2023, including these divisions in the 2021 and 2022 social and governance data.

Independent Assurance

The financial data in this report has undergone independent auditing by KPMG Samjong Accounting Corporation. Non-financial data has been independently verified by the Korea Management Registrar Inc. to ensure objectivity and reliability.

Inquiries

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CEO Message

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

I extend my deepest gratitude for the unwavering support to **Hanwha Solutions**.

Recent times have posed significant challenges with high interest rates, inflation, and sluggish growth. Simultaneously, concerns about the climate crisis are mounting due to extreme weather events and worsening environmental issues. To confront these comprehensive challenges, we aim to be a Great Challenger, persistently striving for innovation and excellence.

As Great Challengers, we are committed not only to enhancing our company's economic performance but also to addressing global challenges with sustainable energy and materials solutions.

Primarily, we are leading efforts to address climate change through our renewable energy business and expanding into eco-friendly sectors such as the circular economy.

Beyond solar products, we offer comprehensive energy solutions globally by developing sustainable energy projects and directly selling electricity. In North America, we are establishing stable production through 'Solar Hub', an integrated solar value chain complex. Moreover, we are accelerating research on perovskite-silicon tandem cells to significantly enhance solar module efficiency, the next-generation solar technology.

Furthermore, we are pioneering technologies to produce eco-friendly products using renewable carbon resources to promote the circular economy.

Our efforts encompass diverse areas, including research on green hydrogen production, development of cultured meat, investments in climate tech, and smart green industrial complex projects.

Furthermore, we are actively responding to climate change by reducing GHG emissions in line with the 2050 Net Zero Roadmap.

Our progress toward Net Zero is overseen by the ESG Committee, composed entirely of outside directors, with Net Zero performance added to our management's KPIs. We identify climate crisis-related risks and opportunities, analyze their financial impacts, and implement robust response strategies.

Our initiatives include enhancing energy efficiency through advanced facilities, process improvements, and operational optimizations to mitigate greenhouse gas emissions. In our commitment to achieve 100% renewable electricity usage by 2050, we are expanding solar power facilities across our plants and increasing Renewable Energy Certificates purchases and direct Power Purchase Agreements.

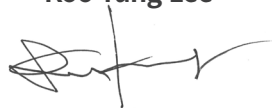
Moreover, we prioritize occupational safety and health management, ESG management in our supply chain, reducing environmental pollutants, maintaining transparent governance, and upholding ethical management practices, recognizing them as critical ESG issues.

As Great Challengers, we remain committed to creating a better world through sustainable growth. We seek your support in our journey of challenges and innovations aiming to "go further together".

Thank you.

May 30, 2024

CEO **Koo Yung Lee**



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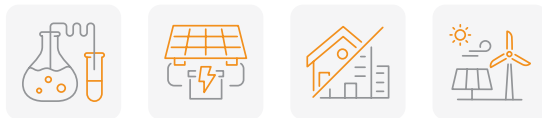
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General Information

Hanwha Solutions is a global energy and material technology company engaged in chemical, solar and wind power, and real estate sectors. Committed to expanding our green portfolio, we invest in new eco-friendly businesses like next-generation solar and circular economy technologies, as well as renewable energy solutions. We will continue pursuing sustainable business growth based on eco-friendly solutions, promising a better future for humanity and the planet.

Major Business Divisions

Hanwha Solutions



Chemical Qcells Insight Q ENERGY

 <p>Company</p> <p>Hanwha Solutions Corporation</p>	 <p>Founded</p> <p>1965</p>
 <p>Head Office</p> <p>Hanwha Building, 86, Cheonggyecheon-ro, Jung-gu, Seoul, Republic of Korea</p>	 <p>CEO</p> <p>Koo Yung Lee, Dong Kwan Kim, Yi Hyeon Nam</p>
 <p>Employees</p> <p>6,004 (12.2023)</p>	 <p>Credit Rating</p> <p>Korea Ratings AA- (Stable) (1.2.2024) Nice Credit Rating AA- (Stable) (1.2.2024)</p>
 <p>Sales</p> <p>KRW 13.2887 trillion (12.2023)</p>	 <p>Total Assets</p> <p>KRW 24.4929 trillion (12.2023)</p>

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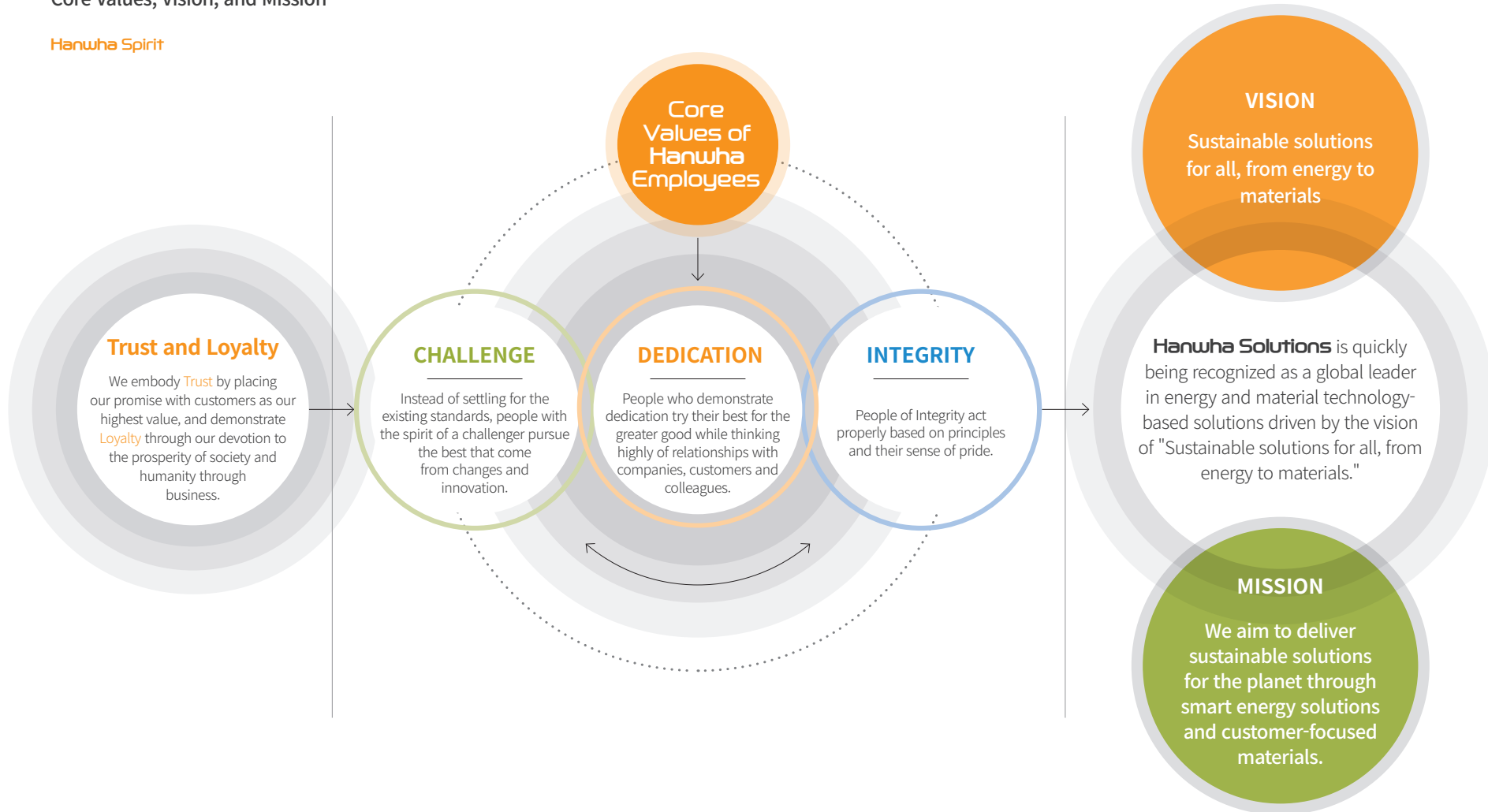
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Core Values, Vision, and Mission

Hanwha Spirit



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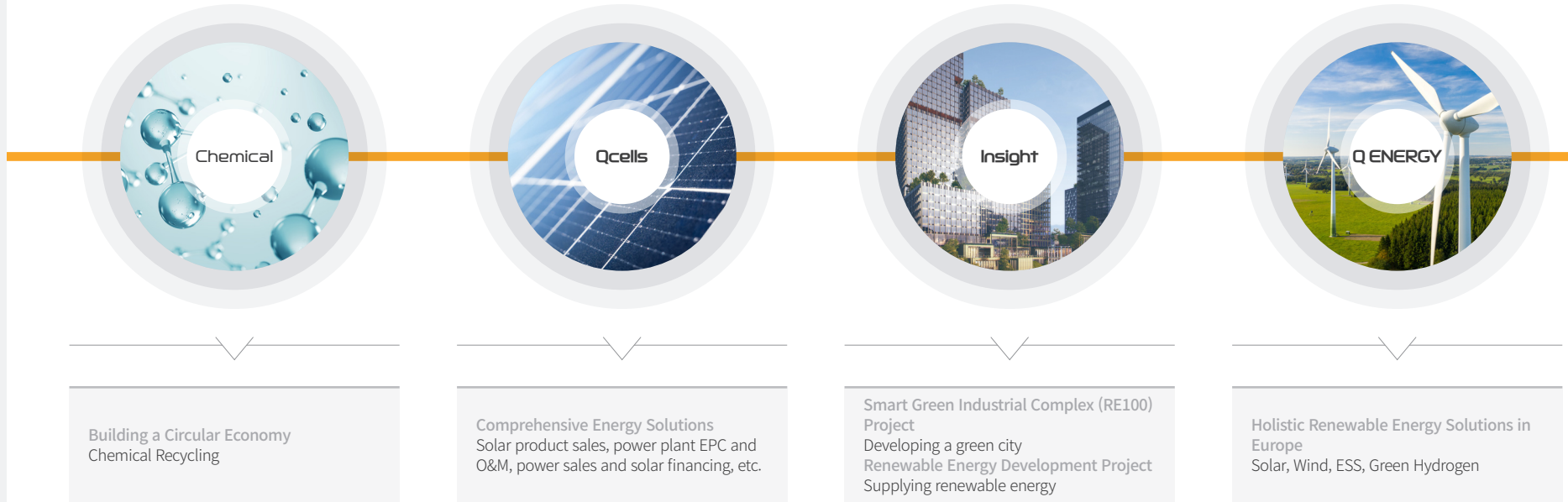
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Our Businesses

Sustainable solutions for all, from energy to materials.

We aim to deliver sustainable solutions for the planet through smart energy solutions and customer-focused materials.



The **Chemical Division** enhances the quality of life by producing polyvinyl chloride (PVC), making **Hanwha** the first Korean company to manufacture various basic petrochemical products such as low-density polyethylene (LDPE), linear low-density polyethylene (LLDPE), chlor-alkali (CA), and toluene diisocyanate (TDI). From basic petrochemical materials to eco-friendly plasticizers like ECO-DEHCH, hydrogenated petroleum resins, and venturing into high-value segments such as Korea's first XDI, we strive to grow into a leading and competitive company.

The **Qcells Division** is committed to shaping a sustainable future under the slogan "Completely Clean Energy." It offers solar products, power plant construction, power sales, and financial services, establishing itself as a comprehensive renewable energy solution provider. The division plays a critical role in addressing the climate crisis while actively promoting and developing our business in major global markets.

The **Insight Division** is Korea's top developer of green and premium projects, creating new value by building a platform based on expertise in renewable energy, premium lifestyle, and urban development, integrated with the financial sector. It is evolving into a developer specializing in comprehensive solutions for sustainable growth, incorporating various fields and trends beyond traditional development approaches.

The **Q ENERGY Division** provides comprehensive solutions for renewable energy power plants in Europe. With over 20 years of experience and expertise, it is growing into a total value chain partner for renewable energy downstream projects. Our business areas include project development in solar power, onshore and offshore wind power, energy storage, green hydrogen, and the construction of renewable power plants.

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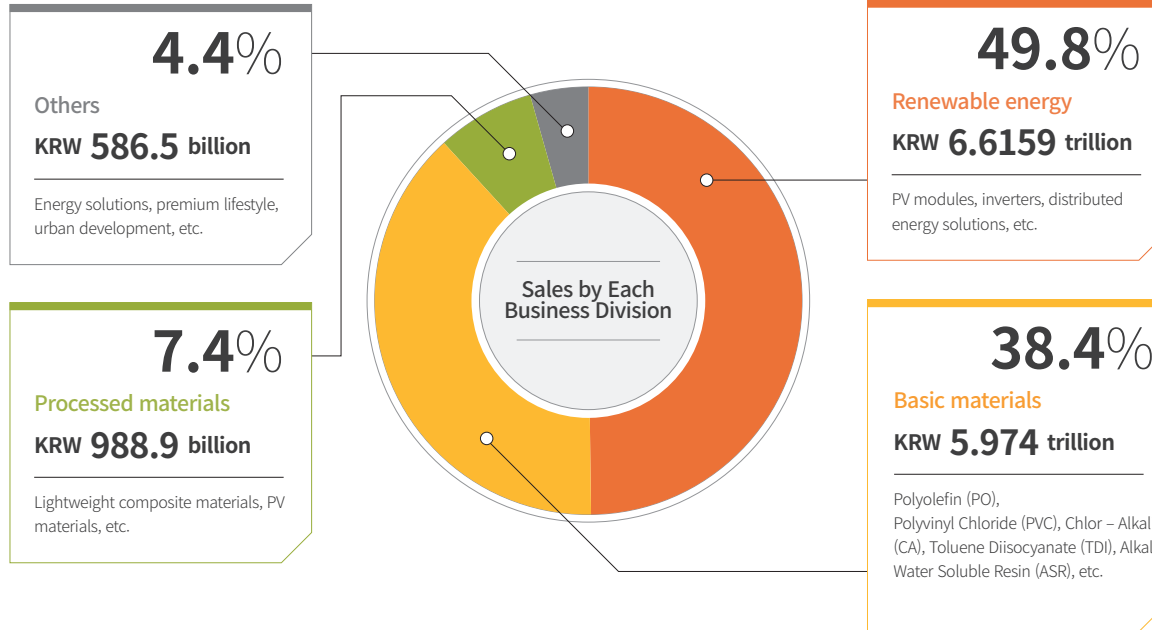
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Financial Key Figures

Sales by Each Business Division



Generation and Distribution of Economic Values

(Unit: KRW million)

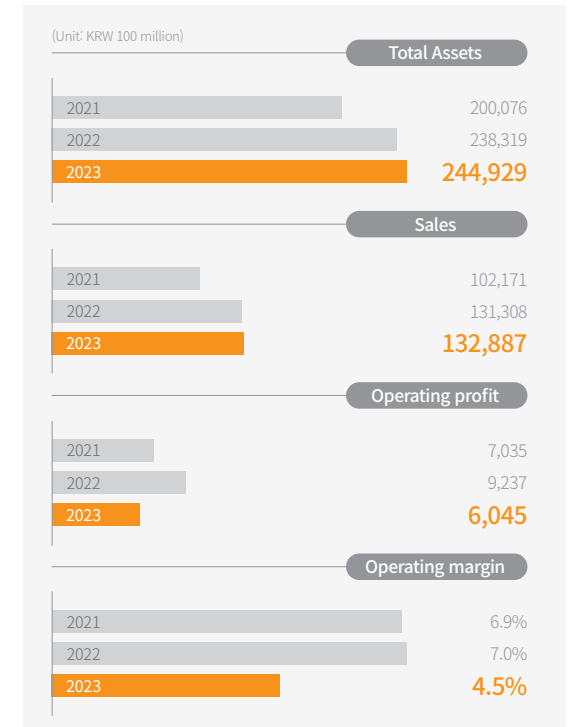
Classification			2022	2023
Economic value generated	Customers	Sales	9,263,556	7,305,296
	Company	Tangible assets acquired	637,203	717,926
	Shareholders and investors	Interest expenses	163,220	270,693
Economic value distributed	Employees	Salaries + Benefits + Retirement benefits	931,194	736,725
	Suppliers	Purchase costs + Outsourcing service costs	6,094,112	4,823,623
	Local communities	Donations	6,343	7,908
	Government	Taxes and Utilities + Corporate tax expenses	508,097	-46,083

*Based on separate financial statements

2021-2023 Management Performances

Hanwha Solutions is engaged in creating shared value through the promotion of sustainable management with various stakeholders.

In 2023, based on our consolidated financial statements, we achieved sales of KRW 13.2887 trillion, contributing to the generation of social and economic value by distributing KRW 13.8161 trillion among our stakeholders.



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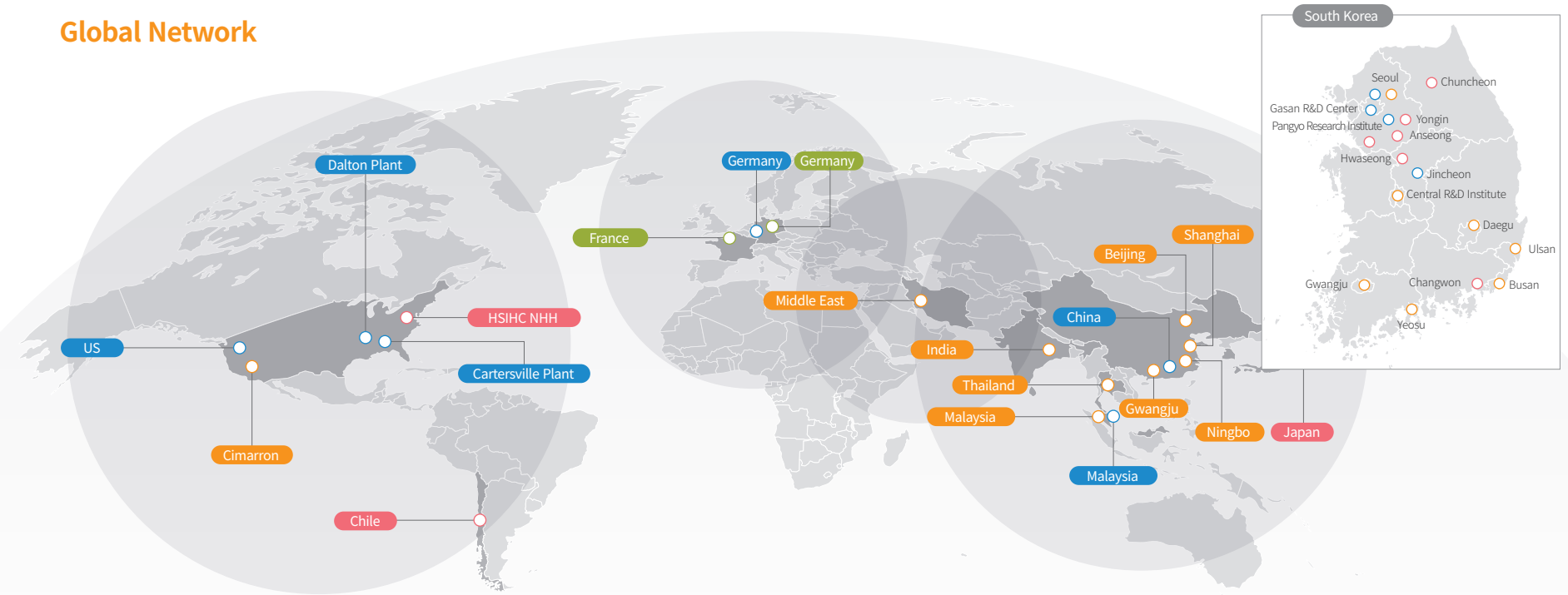
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Global Network



Chemical

Domestic Network (10 locations)
 Seoul Head Office, Central R&D Institute, Yeosu Plant, TDI Plant, Ulsan Plant 1, Ulsan Plant 2, Ulsan Plant 3, Daegu Branch, Busan Branch, Gwangju Branch

Global Network (9 locations)
 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.
 Americas: Hanwha Cimarron
 Middle East: International Polymers Company (IPC)

Qcells

Domestic Network (4 locations)
 Seoul Head Office, Jincheon Plant, Pangyo R&D Center, Gasan R&D Center

Overseas Network (6 locations)
 Asia: Chinese Plant, Malaysia Plant
 Americas: USA Office, Dalton Plant, Cartersville Plant
 Europe: Germany Office

Insight

Domestic Network (8 locations)
 Anseong Techno Valley, West Ochang Techno Valley, 2nd Yongin Techno Valley, H Techno Valley, Ulsan KTX Station Area Complex, Changwon Pungho Jangcheon District, Chuncheon Jade (Jade Palace, Jade Garden), Anseong Techno Logistics

Global Network (9 locations)
 Asia: H Properties, Premium Hirafu Properties, H Summit (Japan)
 Americas: Cabrero, Centauro, San Alberto, Caldera, Chequen (Chile), HSIHC NHH (United States)

Q ENERGY

Global Network (2 locations)
 Europe: Q ENERGY Europe GmbH, Q ENERGY France SA

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ESG Management

ESG Management System

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ESG Policy

We promote ESG management with the vision of providing “Sustainable Solutions for All” and a promise of a better future. We will contribute to creating a better world by listening to our various stakeholders and implementing a sustainable management promotion strategy.

ESG Governance

We operate the ESG Committee under the Board of Directors to promote ESG management. In 2023, the committee deliberated and reported on 15 items, including the results of implementing tasks related to achieving Net Zero and measures to address climate-related risks. The ESG Secretariat supports the committee’s operation by closely collaborating with relevant departments with expertise in areas such as climate change, safety, health, environment, supply chain, and governance.

| ESG Committee Meeting Status |

Date	Agenda
02.16.2023	<ul style="list-style-type: none"> Approval of ESG materiality assessment results H2 2022 ESG performance and plans for 2023 The status of Net Zero implementation and climate risks management plan Approval of the MOU with the Hanuha Foundation of Culture on donations
03.16.2023	<ul style="list-style-type: none"> Approval of the MOU with the Hanuha Foundation of Culture on donations
04.27.2023	<ul style="list-style-type: none"> Approval of donation to the Educational Institute Approval of the Human Rights Management Charter and Human Rights Management Guidelines Approval of the Board of Directors' evaluation and operation plan The status of GHG emissions and Net Zero implementation
05.24.2023	<ul style="list-style-type: none"> Sustainability Report publication
07.27.2023	<ul style="list-style-type: none"> H1 ESG performance and plans for Q3 The status of GHG emissions and Net Zero implementation
12.20.2023	<ul style="list-style-type: none"> Approval of donations to Hanuha Foundation of Culture ESG bonds issued Results of Net Zero implementation and actions for addressing climate risks H2 ESG performance and plans for 2024

| ESG Management Promotion Strategy |



Double Materiality Assessment

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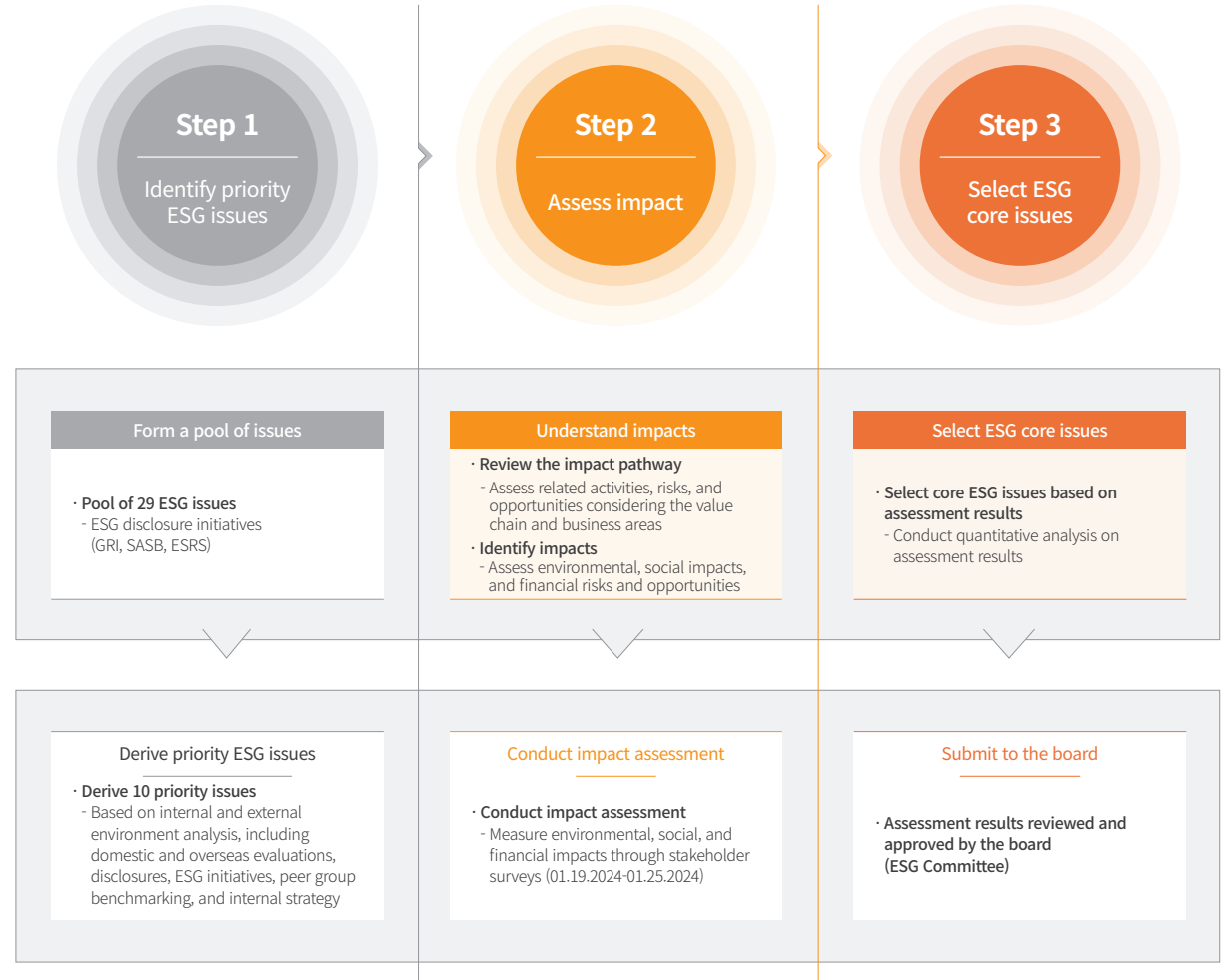
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Double Materiality Assessment

ESG Management Policy

Based on the GRI Standards 2021 topic selection principles, we conducted a double materiality evaluation that considers both the company's impact on the external environment and the external environment's impact on the company's financial value. After forming a pool of ESG issues, we analyzed both the internal and external environments and selected 10 priority issues highly relevant to our company. For each priority issue, we identified impacts relevant to our business activities, considering the value chain and business areas. We also conducted stakeholder surveys to assess environmental and social impact, as well as financial risks and opportunities based on the collected opinions. Based on the assessment results, the ESG Committee reviewed and approved the final selection of seven issues as the company's material ESG issues for 2023. We will continue to transparently disclose our management status on the seven core ESG issues through the Sustainability Report and actively reflect the evaluation results in corporate activities to advance ESG management.

| Double Materiality Assessment Process |



Double Materiality Assessment

Double Materiality Assessment

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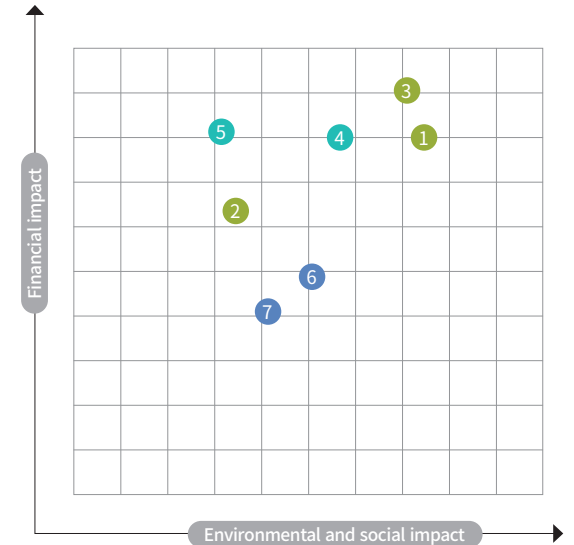
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We conducted a double materiality assessment by considering factors to determine environmental and social impacts-scale, scope, remediability, and likelihood-and financial impacts-scale and likelihood. Through this process, we identified seven core ESG issues.

ESG Issues and Definitions			Environmental and Social Impact	Financial Impact	Overall result	
E	1	Climate change response and Net Zero	Minimizing the company's impact on the climate by establishing response strategies based on climate-related risks and opportunities, expanding the use of renewable energy, and managing greenhouse gas (GHG) emissions throughout the value chain.	██████	██████	██████
	2	Environmental pollutant reduction	Reducing environmental impact by properly processing and reducing waste, air and water pollutants, and hazardous chemicals, while also decreasing water resource usage.	██████	██████	██████
	3	Sustainable products and technologies	Developing technologies that eliminate negative factors by promoting the use of circular resources, enhancing the sustainability of products, and improving the ability of the environment to self-regulate.	██████	██████	██████
S	4	Occupational safety and health management	Creating a work environment that protects the physical and mental health and safety of workers, supported by a comprehensive health and safety management system.	██████	██████	██████
	5	ESG management in the supply chain	Enhancing the ESG competitiveness of suppliers in the supply chain and minimizing sustainability-related risks, including material sourcing.	██████	██████	██████
G	6	Transparent and ethical governance	Establishing a sound governance structure by maintaining a board of directors with independence, expertise, and diversity, and ensuring transparent information disclosure.	██████	██████	██████
	7	Compliance and ethics management	Preventing corruption and bribery, and ensuring compliance with all applicable laws and regulations.	██████	██████	██████



Double Materiality Assessment

Double Materiality Assessment

▲ Positive ▼ Negative Ⓡ Risk Ⓞ Opportunity

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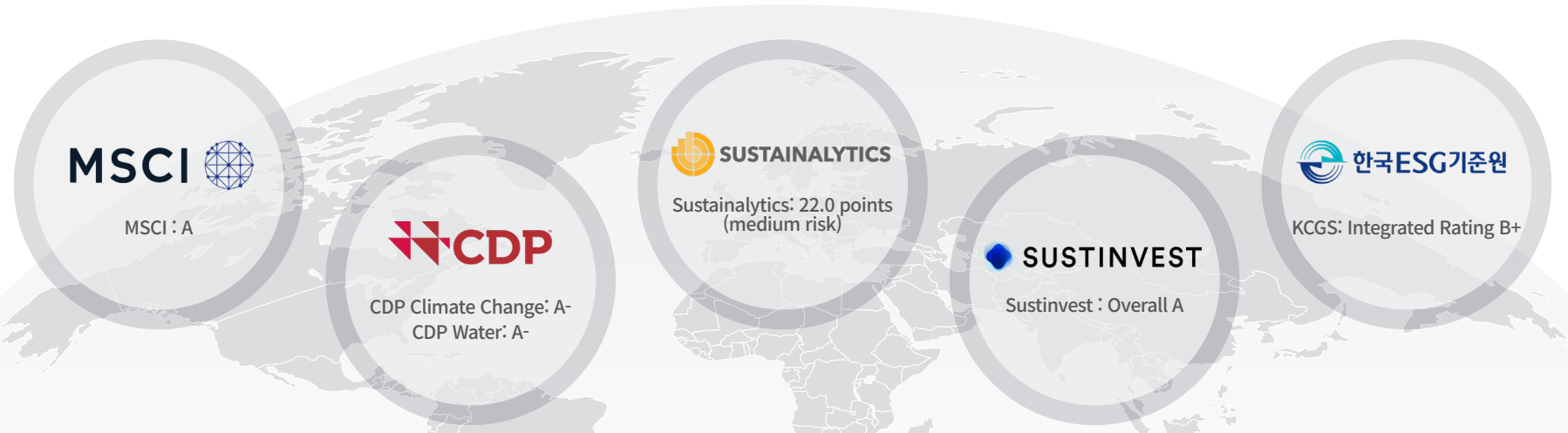
ESG Issues	Impacts, Risks, and Opportunities	Environment and Social ¹⁾ (positive/negative)	Financial ²⁾ (risk/opportunity)	Level of Impact	Management Plan	Page
Climate change response and Net Zero	Acceleration of climate change due to GHG emissions, leading to extreme weather and natural disasters	▼		■■■■■■■■■	<ul style="list-style-type: none"> Declare 2050 Net Zero and K-RE100, and establish implementation plan Analyze the financial impact of climate-related physical/transition risks and opportunities, and establish response strategies Account Scope 3 emissions 	18-35
	Implementation of nationally determined contributions (NDCs) and achievement of the Paris Agreement	▲		■■■■■■■■■		
	Increased expenditure due to the expansion of auctioning and the purchase of emission permits		Ⓡ	■■■■■■■■■		
	Increased cost of electricity purchases due to the use of renewable electricity		Ⓡ	■■■■■■■■■		
	Increased profits from the sale of emission permits due to GHG reduction activities		Ⓞ	■■■■■■■■■		
Environmental pollutant reduction	Reduced exposure to fossil fuel price fluctuations due to the transition to renewable energy		Ⓞ	■■■■■■■■■	<ul style="list-style-type: none"> Install air and water environmental facilities such as new line (TOPCon) wet scrubbers, adsorption towers, and exhaust fans, and expand investments Respond to CDP Water Security 	36-46
	Deterioration of local residents' health due to environmental pollution and discharge of pollutants	▼		■■■■■■■■■		
	Prevention of environmental pollution in the community through effective pollutant management and efficient use of water resources	▲		■■■■■■■■■		
Sustainable products and technologies	Increased costs due to investment in environmental facilities, such as installation of prevention facilities and reinforcement of monitoring systems, driven by stricter pollutant emission standards		Ⓡ	■■■■■■■■■	<ul style="list-style-type: none"> Promote efficient use of solar energy based on cell and module R&D, such as perovskite cells Expand of renewable raw materials and materials such as rPE Develop anion exchange membrane electrolysis cell (AEMEC) technology Develop Smart Green Industrial Complex (RE100) 	47-55
	Expansion of national renewable energy generation through the development of solar products and eco-friendly technologies	▲		■■■■■■■■■		
	Revitalization of the green industry and national circular economy through the development of eco-friendly products	▲		■■■■■■■■■		
	Increased sales and investment from the expansion of the renewable energy and eco-friendly plastics markets		Ⓞ	■■■■■■■■■		
Safety and health management	Increased R&D expenditures for green products and technologies, alongside higher production and regulatory response costs		Ⓡ	■■■■■■■■■	<ul style="list-style-type: none"> Conduct site-centered safety inspection meetings and monthly risk assessment meetings⁵⁾ Conduct risk assessment based on CTO activities and promote the introduction of the RBI system 	56-69
	Creation of a safe working environment and raising safety awareness from promoting a safety culture	▲		■■■■■■■■■		
	Harm to employees and suppliers in the event of safety and health accidents	▼		■■■■■■■■■		
ESG management in the supply chain	Increased investment in facility improvements to prevent accidents and higher overall costs for employee training and competency enhancement		Ⓡ	■■■■■■■■■	<ul style="list-style-type: none"> Conduct supplier ESG risk assessment Hold a meeting with suppliers to manage VOCs 	70-75
	Establishment of a sustainable society through the internalization of ESG practices throughout the value chain and communities	▲		■■■■■■■■■		
	Occurrence of social problems such as human rights violations and environmental damage from raw materials like conflict minerals	▼		■■■■■■■■■		
Transparent and ethical governance	Increased procurement costs and supply chain disruptions due to ESG management and associated risks		Ⓡ	■■■■■■■■■	<ul style="list-style-type: none"> Establish a Compensation Committee Appoint an outside director as the chairman of the board 	76-80
	Fulfillment of stakeholder needs through ethical governance and board management supervision	▲		■■■■■■■■■		
Compliance and ethics management	Enhancement of shareholder value and creation of management performance through increased efficiency and rationality in decision-making		Ⓞ	■■■■■■■■■	<ul style="list-style-type: none"> Operate the internal accounting management system (ICARUS) Identify fair trade risks by division and establish response strategies by division 	81-86
	Decline in stakeholder trust due to penalties for corporate law violations	▼		■■■■■■■■■		
	Establishment of an internal management system to prevent ethical issues and increase monitoring costs		Ⓡ	■■■■■■■■■		
	Increased legal costs in case of failure to prevent corruption		Ⓡ	■■■■■■■■■		

1) Determines whether the impact of the factor on the environment and society is positive or negative (inside-out)
 2) Determines whether the financial factor represents a risk or an opportunity for the company (outside-in)

ESG Highlights

ESG Initiatives and Performance

We transparently disclose Environmental, Social, Governance activities and performance related to each issue.



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Environmental	Climate change response and Net Zero	Sustainable products and technologies	Environmental pollutant reduction
	<ul style="list-style-type: none"> Identified the financial impact of climate change risks and established response strategies to achieve Net Zero by 2050 Invested in GHG reduction based on internal carbon pricing Implemented K-RE100: green premium, renewable energy certificates (RECs), direct Power Purchase Agreements(PPAs) 	<ul style="list-style-type: none"> Developed Waste-To-Chemicals (WTC) technology that manufactures eco-friendly syngas based on waste plastics Developed AEMEC technology and high-performance catalyst Diversified the recycled PE, including cosmetic containers, automotive parts packaging, etc. Launched solar modules with improved efficiency, such as the Q.TRON series using Q.ANTUM NEO technology 	<ul style="list-style-type: none"> Implemented process and facility improvement plans to reduce VC emissions Installed TOPCon Wet scrubbers, adsorption towers, and exhaust fans Examined the reusability of wastewater, CT B/D water, and effluent through water quality analysis
Social	Occupational safety and health management	ESG management in the supply chain	Human Rights and Diversity
	<ul style="list-style-type: none"> Identified weaknesses and established improvement plans through safety atmosphere diagnosis Implemented site-based safety inspection meetings (TBM) and CTO activities Implemented safety management based on risk-based inspection (RBI) system 	<ul style="list-style-type: none"> Improved ESG and SH evaluation systems for suppliers and provided support such as consultancy services Expanded partnerships with highly qualified suppliers through open sourcing 	<ul style="list-style-type: none"> Identified human rights risk factors for employees and suppliers and implemented mitigation measures Operated human rights grievance counseling and reported system to prevent human rights violations
Governance	Transparent and ethical governance	Compliance and ethics management	Proactive risk management and response
	<ul style="list-style-type: none"> Introduced the board assessment system Appointed an outside director as the chairman of the board Implemented shareholder return policy to enhance shareholder value 	<ul style="list-style-type: none"> Strengthened the role of the Internal Transaction Review Committee Operated the compliance officer program and fair trade compliance program 	<ul style="list-style-type: none"> Operated a risk council and a dedicated department under the board Conducted risk assessment for each division following the company's risk management regulations and established response plans for each level of risk

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Climate Change Response and Net Zero (TCFD)

Issue Definition

Activities to minimize the company's impact on the climate including establishing response strategies considering the risks and opportunities posed by climate change, expanding the use of renewable energy, and implementing GHG management activities throughout the value chain.

Issue Approach

Recognizing that climate change poses a significant risk to our business activities, we have declared our commitment to achieving Net Zero by 2050 as part of our response strategy. To reach this goal, we are implementing various efforts, including establishing an organizational system, implementing response strategies, and managing risks across our management activities. We aim to leverage climate change as a strategic opportunity to become a global leader by focusing on developing smart, sustainable energy solutions and customized materials from the customers' perspective.

GOVERNANCE

Governance for Climate Action

Hanwha Solutions establishes and operates a climate change response governance system to understand the impact climate change has on the company's management strategy and to effectively respond to it at the company level.

Board (ESG Committee)

Climate-related Risks and Opportunities Management and Oversight

We operate the ESG Committee within the Board of Directors as a decision-making body responsible for overseeing climate-related risks and opportunities. The committee's roles and responsibilities in reviewing climate-related risks and opportunities are outlined in the Board regulations and ESG Committee regulations.

The board oversees overall management, including climate strategies and investments, and conducts the final review and approval of major issues, such as key business risks, including climate-related risks and climate-related investments.

The ESG Committee was established and operated to deliberate on the company's major ESG policies and issues, review the establishment of mid- to long-term policies for ESG activities, monitor and deliberate the implementation of ESG activities, review the establishment and revision of regulations related to ESG activities, and conduct regular and occasional assessments of these activities. Comprised entirely of outside directors, the committee is responsible for reviewing significant financial and strategic impacts related to climate change and implementing climate-related public policy engagement activities and performance as stipulated in the ESG Committee regulations.

The ESG Committee regularly monitors the company's Net Zero implementation status through quarterly reports on performance and plans, and reviews climate-related risks through biannual reports on related matters.

2023 Climate-related Activities by ESG Committee

Date	Type	Item
02.16	Reporting	① GHG emission status (quarterly)
04.27		② Net Zero implementation status and plans (quarterly)
07.27		③ 2023 Climate risk identification and response plan (02.2023)
12.20		④ 2023 Climate risk response results (12.2023)



Composition of the Board of Directors and ESG Committee

Board-level Climate Governance Training

We enhance our expertise in addressing climate change by providing training to outside directors on ESG issues and trends. In 2023, we conducted training sessions for outside directors focusing on company-level response measures in light of the intensifying ESG information disclosure regulations.

The Role of Management

We are enhancing the roles and responsibilities of our management to effectively address the climate change response needs of various stakeholders and headed in the right direction.

Each year, the CEOs of the **Chemical** and **Qcells Divisions** receive and review a report on the status of Net Zero. This report

includes information on GHG emission performance, reduction plans, and the detailed implementation plan for the mid to long-term Net Zero strategy.

Once every month in 2023, the **Chemical Division** calculated the Net Zero implementation costs for each plant and production team, in line with its Net Zero goal. These costs were incorporated into the internal accounting process, and the profit and loss, including these transition costs, were reported to the CEO.

Executive Compensation

The **Chemical** and **Qcells Divisions** incorporate climate change and sustainability performance into executive compensation, linking climate response activities with management performance.

The **Chemical Division** includes these metrics, such as achievements related to the company's Net Zero goals, in the KPIs of key executives like the Chief Safety Officer (CSO), the Head of SHE Office and the Heads of Plants, while the **Qcells Division** integrates them into the The Head of ESH Office (CSO)'s KPIs.

Climate Action Organization

Our ESG Secretariat comprises ESG personnel from each division and supports the ESG Committee in smoothly carrying out climate change response and climate-related risk management activities.

The **Chemical Division's** Climate Change Response Team and **Qcells'** Environment, Safety, and Health Office are responsible for establishing, planning, and supporting the implementation of climate change response strategies.

STRATEGY

Climate-related Risks and Opportunities Identification and Assessment Process

We thoroughly assess climate-related risks and opportunities across all aspects of each division, including business structure and characteristics. For identified risk factors, we evaluate their likelihood of occurrence and impact according to the company's risk management system standards to calculate the final risk rating. Furthermore, we analyze the quantitative and qualitative financial impact of identified climate-related risks and opportunities, incorporating them into our management strategies.

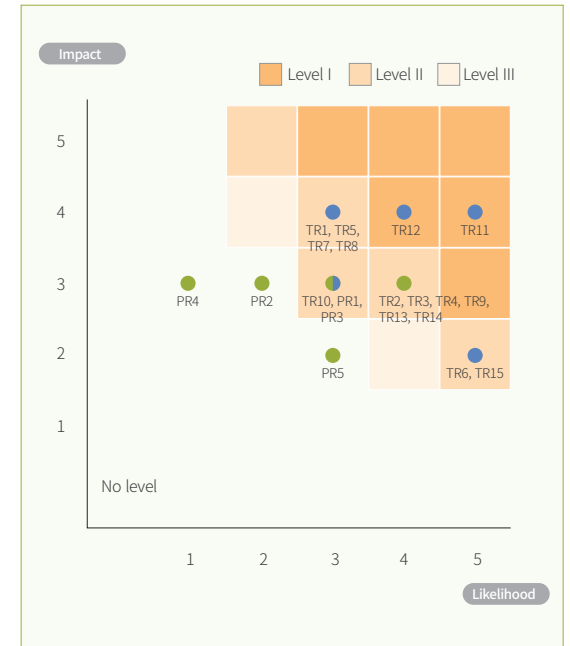


Climate-related Risk Assessment Results

	Category		2023 Risk Factors	Risk Level
Transition risk	Regulation/Policy/Law	Chemical	(TR1) Strengthening regulations related to GHG emissions	Level II
	Policy, Reputation	Qcells	(TR2) Achieving Net Zero target in stages	Level II
	Market	Qcells	(TR3) Increasing Net Zero and K-RE100 implementation costs	Level II
	Regulation/Policy/Law	Chemical	(TR4) Introduction of mandates and regulations for existing products and services	Level II
	Regulation/Policy/Law, Reputation	Chemical, Qcells	(TR5, TR6) Strengthening of regulations such as mandatory ESG disclosures	Level II
	Legal	Chemical	(TR7) Climate litigation	Level II
	Technology	Chemical	(TR8) The emergence of low-carbon alternatives to existing products and services, the transition to low-carbon technologies, and the failure to invest in new technologies	Level II
	Market	Chemical	(TR9) Changing customer behavior	Level II
	Market, Regulation	Chemical	(TR10) Biomass and hydrogen market uncertainty	Level II
	Market, Reputation	Chemical	(TR11) Increasing need for production of new and renewable energy-based products	Level I
	Market	Chemical	(TR12) Rising costs of fossil fuels and fossil-based raw materials	Level I
	Reputation	Chemical	(TR13) Preconceived notions about the chemical sector	Level II
	Reputation	Chemical, Qcells	(TR14, TR15) Increasing demand from customers, investors, and stakeholders for climate-related disclosures and ESG assessment results	Level II

	Category		2023 Risk Factors	Risk Level
Physical risk	Acute	Chemical	(PR1) Production disruption due to abnormal and unpredictable weather events (cold waves, heavy rains, heavy snowfalls, typhoons, earthquakes, heat waves, etc.)	Level II
	Acute	Qcells	(PR2) Serious damage to human life and property caused by natural disasters	No level
	Acute	Chemical	(PR3) Supply disruption and price fluctuations due to abnormal climate in the area of supply	Level II
	Acute	Qcells	(PR4) Suppliers unable to deliver raw materials due to natural disasters	No level
	Chronic	Chemical	(PR5) Climate/environmental changes due to the increase in the global average temperature	No level

Climate-related Risk Assessment Results



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Result of Climate-related Risks and Opportunities Identification and Assessment

Hanwha Solutions categorized identified climate-related risks based on their anticipated occurrence timelines (period - short, medium and long-term) and impact across the value chain (impact scope), and assessed their potential financial impacts. Based on this analysis, we developed response strategies to effectively mitigate these risks.

Transition Risk Factors

U Upstream (Suppliers) O Operation (Company) D Downstream (Customers, Shareholders, Investors, Communities)

Classification	2023 Risk Factors			Period			Risk Level	Potential Financial Impact	Response Strategies and 2023 Action Results	
	Definition and Details	Impact Scope	Short-term	Mid-term	Long-term					
Transition risk	Regulation/Policy/Law	Chemical	<p>(TR1) Strengthening regulations related to GHG emissions</p> <ul style="list-style-type: none"> - Expanding GHG reduction rates per the Framework Act on Carbon Neutrality and Green Growth for Coping with Climate Crisis and its Enforcement Decree, and enforcing mandatory reductions (short-term) - Updating emission allocation methods by increasing paid allocation, exceeding free allocation range, and reinforcing BM criteria (short-term) - Incurring regulatory response costs through the introduction of a carbon border tax and expanding export restrictions on carbon-intensive products (medium-term) - Introduction of carbon tax (mid to long-term) 	U O D	V	V	V	II	<ul style="list-style-type: none"> - Financial impact in 2023 <ul style="list-style-type: none"> - Energy Saving Equipment¹⁾: KRW 1,882 million (Chemical Division) - Acquisition of energy-saving facilities²⁾: KRW 70,677 million (Chemical Division) - Current assets related to emission permits at the end of the year: KRW 1,732 million (Company-wide) <p> Short/medium/long-term details</p>	<ul style="list-style-type: none"> - Implementing Net Zero <ul style="list-style-type: none"> - Reported quarterly the status of GHG emissions and Net Zero implementation to the ESG Committee - Enhanced emissions management through incorporation of Net Zero costs into Net Zero targets for each production team - Implemented carbon reduction activities through the procurement of RECs and direct PPAs for solar energy - Responding to emission permits <ul style="list-style-type: none"> - Monitored regulations related to emission permits - Conducted training for site managers to develop on-site GHG reduction items - Managing product carbon footprint <ul style="list-style-type: none"> - Completed LCA for 202 products and identified carbon-intensive products - Managing value chain emissions <ul style="list-style-type: none"> - Held Net Zero Council with major partners to build a sustainable supply chain (3 times in 2023)
	Policy, Reputation	Qcells	<p>(TR2) Achieving Net Zero target in stages</p> <ul style="list-style-type: none"> - Growing need for transitioning to eco-friendly raw materials and emission reduction technologies - Reducing or offsetting residual emissions required through internal and external reduction projects 	U O D		V	V	II	<ul style="list-style-type: none"> - Increase in investment to reduce GHG emissions and to achieve the 2030 interim target for Net Zero - Financial impact in 2023 <ul style="list-style-type: none"> - Energy saving equipment¹⁾: KRW 495 million (Qcells Division) - Acquired energy-saving facilities²⁾: KRW 2,745 million (Qcells Division) - Decline in corporate value if the 2050 Net Zero goal is not achieved 	<ul style="list-style-type: none"> - Implementing annual plans to achieve Net Zero and K-RE100 goals - Promote GHG emission reduction activities <ul style="list-style-type: none"> - Reviewed and adopted state-of-the-art technologies for each field, including fuel, electricity and process gas - Expanded solar power facilities within the company, converted to high-efficiency lighting (LED), and established cooling system optimization facilities
	Market	Qcells	<p>(TR3) Increasing Net Zero and K-RE100 implementation costs</p> <ul style="list-style-type: none"> - Increasing Net Zero and K-RE100 implementation costs due to rising renewable energy procurement costs 	U O D		V	V	II	<ul style="list-style-type: none"> - Increase in power purchase costs due to renewable energy purchases - Financial impact in 2023 <ul style="list-style-type: none"> - Renewable energy procurement cost⁴⁾ (K-RE100 implementation cost): KRW 274 million (Qcells Division) - Increase in cost of emission permits purchases within the emission trading system - Potential decline in corporate value due to failure to achieve the 2050 K-RE100 target 	<ul style="list-style-type: none"> - Monitoring renewable energy market prices and related renewable energy market <ul style="list-style-type: none"> - Attended seminars on related schemes such as PPA - Compared and reviewed purchasing costs for renewable energy in the market/industry sector

1) Amount related to energy saving capitalization in assets under construction (financial position statement as of the end of 2023).

2) Amount related to energy saving capitalization in buildings, structures, and machinery (financial position statement as of the end of 2023).

3) Amount related to energy saving capitalization in constructed assets, machinery, tools, and equipment (financial position statement as of the end of 2023).

4) Green premium expenses (Income Statement as of the end of December 2023).

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Classification	2023 Risk Factors			Period			Risk Level	Potential Financial Impact	Response Strategies and 2023 Action Results
	Definition and Details	Impact Scope		Short-term	Mid-term	Long-term			
Transition risk	Regulation/Policy/Law	Chemical	(TR4) Introduction of mandates and regulations for existing products and services - Mandatory increase in the use rate of recycled (physical/chemical) and bio-based materials/products - Mandatory increase in the ratio of bio-based raw materials and products	U O D	V	V	II	<ul style="list-style-type: none"> Increase in the costs of regulatory compliance and introducing new raw materials Decline in sales of fossil-based products 	<ul style="list-style-type: none"> Monitoring relevant regulations - Continuously monitored regulations related to circular economy and plastics Obtaining sustainable certifications - Acquired and renewed ISCC+ (28 grades for 10 product lines) - Acquired GRS certification
	Regulation/Policy/Law, Reputation	Chemical, Qcells	(TR5, TR6) Strengthening of regulations such as mandatory ESG disclosures - Mandatory ESG disclosures, including climate change, for listed companies with assets of KRW 2 trillion or more- Strengthening ESG disclosure standards, such as ISSB IFRS S2, EU CSRD, US SEC climate disclosure, and establishment of KSSB - Strengthening ESG regulations, such as mandatory sustainability due diligence duty for companies exporting to the EU export - Increasing demand for the production of eco-friendly/low-carbon products, and LCA results	U O D		V	II	<ul style="list-style-type: none"> Increase in regulatory compliance costs Decline in corporate value and increased penalties for non-disclosure, omission of information, false statements, etc. 	<ul style="list-style-type: none"> Monitoring global ESG disclosure regulations and climate disclosure standards - Attended seminars on climate disclosure standards - Monitored domestic and global disclosure standards Engaging in a pilot project of the national environmental information disclosure system
	Legal	Chemical	(TR7) Climate litigation - Increasing exposure to litigation risks related to social responsibility and ESG disclosure - Growing possibility of climate lawsuits against companies emitting excessive GHG and engaging in greenwashing	U O D		V	II	<ul style="list-style-type: none"> Decline in corporate value and increased litigation costs in the event of a lawsuit 	<ul style="list-style-type: none"> Third-party verification to ensure accuracy and reliability - Completed verification of CDP Climate Change response and Scope 1, 2, 3 GHG emissions
	Technology	Chemical	(TR8) The emergence of low-carbon alternatives to existing products and services, transitioning to low-carbon technologies, and the failure to invest in new technologies - Leading market dominance and technology monopoly - Costs incurred for transitioning to eco-friendly and low-carbon processes and business operations - Risk of failure of immature technology and business R&D investment	U O D		V	II	<ul style="list-style-type: none"> Increase in costs due to technology monopolization by leading companies and failed investments 	<ul style="list-style-type: none"> Monitoring climate technology - Attended related expos, forums, etc. Developing low-carbon technologies and products
	Market	Chemical	(TR9) Changing customer behavior - Increasing demand for the use of circular resources and eco-friendly/low-carbon raw materials - Growing demand for data on product carbon footprint and the management of footprint	U O D	V	V	II	<ul style="list-style-type: none"> Decline in sales of fossil-based products Increase in costs to meet customer needs 	<ul style="list-style-type: none"> Obtaining environmental certifications - Acquired and renewed ISCC+ Determining the product carbon footprint - Promoted the latest environmental report - Shared the results of the LCA for all products from the Chemical Division upon customer request - Promoted third-party verification of the LCA for specific products Expanding the circular economy business - Promoted commercialization of bio PVC in the Base Chemical Business
	Market, Regulation	Chemical	(TR10) Biomass and hydrogen market uncertainty - Supply shortages and price increases due to fluctuations in low-carbon and carbon-free raw materials and energy markets (biomass, hydrogen) - Changes to government policies and regulations related to biomass and hydrogen	U O D	V	V	II	<ul style="list-style-type: none"> Increase in costs due to rising biomass-based raw materials and hydrogen price 	<ul style="list-style-type: none"> Monitoring relevant matters - Monitored regulations related to biomass and hydrogen - Monitored energy supply and demand

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Classification	2023 Risk Factors			Period			Risk Level	Potential Financial Impact	Response Strategies and 2023 Action Results	
	Definition and Details	Impact Scope		Short-term	Mid-term	Long-term				
Transition risk	Market, Reputation	Chemical	(TR11) Increasing need for production of new and renewable energy-based products - Requests for plans to shift towards renewable energy use from stakeholders (ESG evaluators, initiatives, customers, investors) - Increasing energy expenses resulting from the introduction of renewable energy	U O D	V	V	V	I	<ul style="list-style-type: none"> Financial impact in 2023 Renewable energy procurement costs¹⁾: KRW 876 million (Chemical Division) 	<ul style="list-style-type: none"> Renewable energy procurement <ul style="list-style-type: none"> Procured REC for Ulsan 3 Plant (approximately 6.9 GWh in 2023) Completed PPA for Ulsan 2 and 3 Plants for 15MW (partial power supply begins in Dec) Purchased green premium in the first half of the year (approximately 53.7 GWh for the Chemical Division in 2023)
	Market	Chemical	(TR12) Rising costs of fossil fuels and fossil-based raw materials - Rising raw material costs due to diminished supply of fossil-based materials - Decreasing fossil fuel development and supply and increasing energy expenses	U O D	V			I	<ul style="list-style-type: none"> Increase in operating costs due to expected rise in short-term fuel (LNG) prices due to geopolitical tensions 	<ul style="list-style-type: none"> Converting fuel, power, and raw material <ul style="list-style-type: none"> [Fuel] Co-combustion by-product hydrogen in VC cracker [Power] Procured solar power at Ulsan 3 Plant (REC, PPA) [Raw Material] Produced products using bio-based raw materials in the Base Chemical Business (PVC)
		Chemical	(TR13) Preconceived notions about the chemical sector - Spreading of negative perceptions of fossil-based products	U O D	V	V		II	<ul style="list-style-type: none"> Decline in sales of fossil-based products and the accompanying costs incurred during the transition to renewable alternatives 	<ul style="list-style-type: none"> Producing sustainable products <ul style="list-style-type: none"> Produced sustainable products by incorporating biomass raw materials (PVC products of the Base Chemical Business) Promote environmental certification <ul style="list-style-type: none"> Acquired and renewed ISCC+
	Reputation	Chemical, Qcells	(TR14, TR15) Increasing demand from customers, investors, and stakeholders for climate-related disclosures and ESG assessment results - Decrease in competitiveness compared to companies that disclose information. - Decline in public trust due to insufficient climate-related social responsibility, including failure to achieve Net Zero goals - Formation of negative public opinion - Heightening investor and stakeholder demand for climate-related disclosure	U O D	V	V	V	II	<ul style="list-style-type: none"> Decline in brand value resulting in diminished valuation Decrease in customer/investor engagement and operating profit stemming from unfavorable public perception Challenges in securing additional investment if investor/stakeholder demands are not met 	<ul style="list-style-type: none"> Disclosure of climate information <ul style="list-style-type: none"> Participated in CDP 2023 and published TCFD Report in the sustainability report Disclosed climate information to clients and investors ESG ratings <ul style="list-style-type: none"> 2023 KCGS: A for Environment 2023 CDP Climate Change: A- Qcells Division: Advance ESG performance management system

1) The sum of green premium, REC purchase, and direct PPA procurement costs is calculated (based on the Statement of Financial Position as of December 2023 and the Income Statement for FY2023).

STRATEGY

Result of Climate-related Risks and Opportunities Identification and Assessment

Physical Risks Factors

U Upstream (Suppliers) O Operation (Company) D Downstream (Customers, Shareholders, Investors, Communities)

Classification	2023 Risk Factors			Period			Risk Level	Potential Financial Impact	Response Strategies and 2023 Action Results	
	Definition and Details	Impact Scope		Short-term	Mid-term	Long-term				
Physical risk	Acute	Chemical	(PR1) Production disruption due to abnormal and unpredictable weather events (cold waves, heavy rains, heavy snowfalls, typhoons, earthquakes, heat waves, etc.) - Damage to production and infrastructure facilities due to abnormal weather in the business area - Increasing energy consumption and GHG emissions due to abnormal climate - Rising worker safety risks and reduced productivity due to abnormal weather - Increasing demand for water supplies at business sites due to drought	U O D	V	V	V	II	<ul style="list-style-type: none"> Increase in costs such as transportation and maintenance expenses Decline in profits due to production cuts Increase in energy costs Details	<ul style="list-style-type: none"> Developing physical risk mitigation measures <ul style="list-style-type: none"> Assessed water reuse opportunities at business sites for potential water shortages Incorporation of natural disaster-related concerns into emergency management guidelines for Yeosu and Ulsan Plants
		Qcells	(PR2) Serious damage to human life and property caused by natural disasters	U O D	V			No level	<ul style="list-style-type: none"> Increase in damage restoration costs Increase in costs associated with safety responses Details	<ul style="list-style-type: none"> Conducting special safety inspections <ul style="list-style-type: none"> For storm and flood damage (yearly) For winter season (yearly) Establishing a crisis management response manual
		Chemical	(PR3) Supply disruption and price fluctuations due to abnormal climate in the area of supply	U O D	V	V	V	II	<ul style="list-style-type: none"> Increase in transportation and maintenance costs 	<ul style="list-style-type: none"> Developing a climate-related risk management model <ul style="list-style-type: none"> Identified physical risks for each abnormal weather indicator and region
		Qcells	(PR4) Suppliers unable to deliver raw materials due to natural disasters	U O D	V	V		No level	<ul style="list-style-type: none"> Increase in raw material procurement and transportation costs 	<ul style="list-style-type: none"> Monitoring inventory and raw material supply status at each plant Regularly monitor raw material supply status from suppliers and establish immediate disaster response Implement multi-sourcing through dual vendor operations for specific items
	Chronic	Chemical	(PR5) Climate/environmental changes due to the increase in the global average temperature - Increasing energy costs due to change of control range due to rising average temperature - Increasing physical risks and production disruptions due to rising sea levels - Emergence of new infectious diseases and ecosystem destruction due to climate change and extreme weather events	U O D			V	No level	<ul style="list-style-type: none"> Increase in energy costs Increase in costs associated with safety responses Details	<ul style="list-style-type: none"> Developing a climate-related risk management model <ul style="list-style-type: none"> Identified physical risks for each abnormal weather indicator and region Contribution to creating a low-carbon society <ul style="list-style-type: none"> Established and implemented Net Zero roadmap

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Result of Climate-related Risks and Opportunities Identification and Assessment

We classified climate-related opportunities into short-term, medium-term, and long-term categories and analyzed their financial impact. Using this analysis, we established strategies to respond to these opportunities and integrated them into our business operations.

Climate-related Opportunities

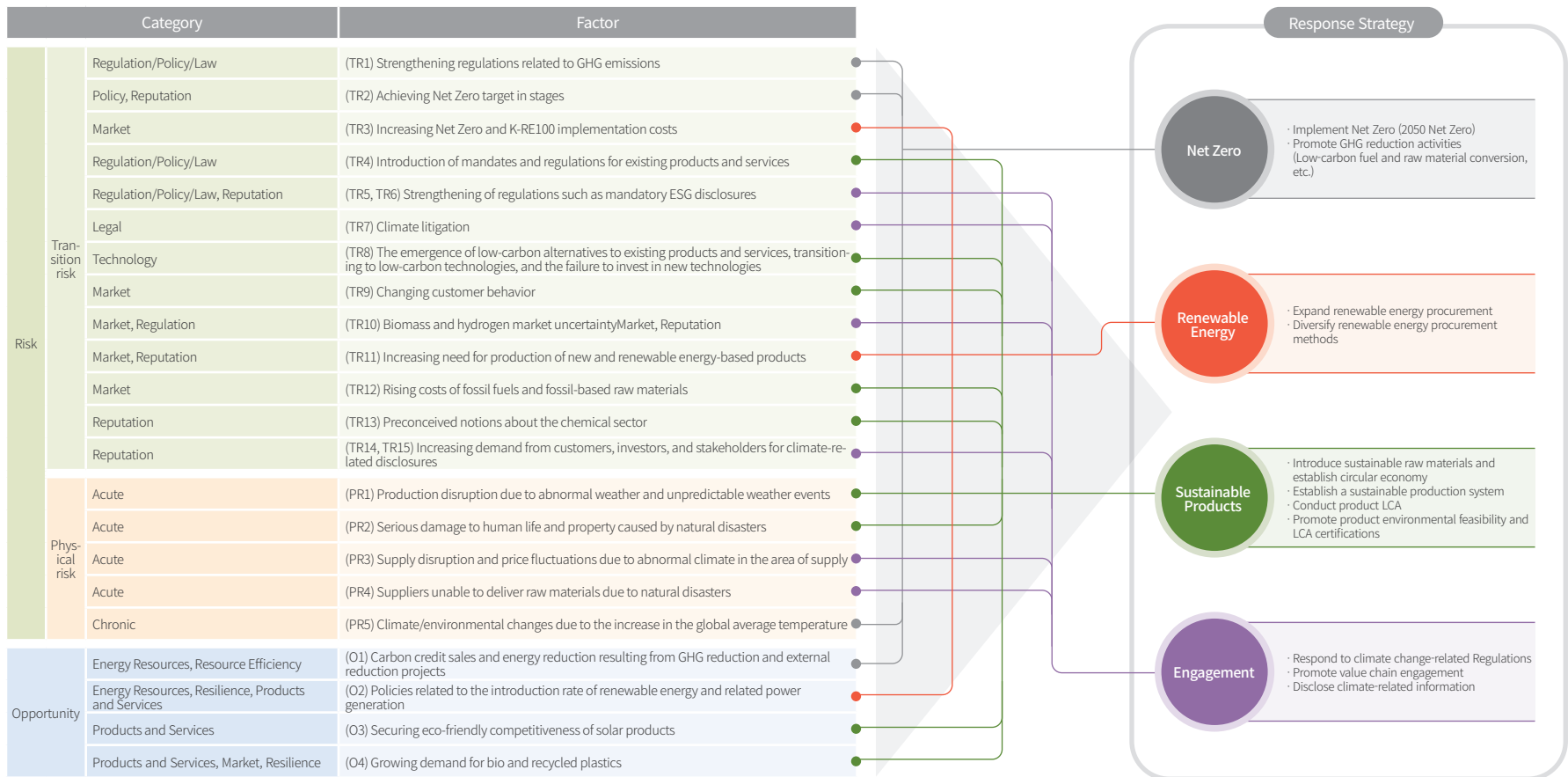
U Upstream (Suppliers) O Operation (Company) D Downstream (Customers, Shareholders, Investors, Communities)

Classification	2023 Opportunity factors			Period			Potential Financial Impact	Response Strategies and 2023 Action Results
	Definition and Details	Impact Scope	Short-term	Mid-term	Long-term			
Opportunity	Energy Resources, Resource Efficiency	Chemical	(O1) Carbon credit sales and energy reduction resulting from GHG reduction and external reduction projects - Selling surplus carbon credits when GHG emissions from our business sites are reduced and remain within the allocated quota - Selling emissions secured from GHG emissions offset projects - Reducing energy consumption through improved process efficiency	U O D	V	V	<ul style="list-style-type: none"> Increase in profit from selling surplus carbon credits Decline in operating costs by avoiding excess emission purchases Increase in profit from selling carbon credits secured through off-site reduction projects Decrease in operating costs through energy savings 	<ul style="list-style-type: none"> Implementing Net Zero and discover internal reduction projects Completed 13 projects, including energy efficiency improvements and fuel conversions at business sites within the Chemical Division Reduced GHG emissions by 3,300 tons through the introduction of renewable energy in the Chemical Division
	Energy Resource, Resilience, Products and Services	Chemical, Qcells	(O2) Policies related to the introduction rate of renewable energy and related power generation - Expanding opportunities for using green energy as the proportion of renewable energy generation within the country increases - Expanding the hydrogen industry ecosystem - Enhancing corporate reputation through increased utilization of renewable energy - Expanding through solar project development and EPC and O&M business	U O D	V	V	<ul style="list-style-type: none"> Decline in vulnerability to fluctuations in fossil fuel and electricity prices Increase in profits from surplus carbon credit sales derived from renewable energy utilization Increase in profits from products manufactured using renewable energy sources Increase in revenue from entering new markets Increase in investment and capital availability facilitated by an improved corporate reputation 	<ul style="list-style-type: none"> Expanding renewable energy/low-carbon energy procurement Entered a long-term REC purchase agreement in 2022 and began procurement in 2023 Signed a direct PPA and commenced procurement Explored the implementation of carbon-free steam and developed the conversion of by-product hydrogen into fuel Developing a hydrogen total solution at the Group level Developed hydrogen production using water electrolysis
	Products and Services	Qcells	(O3) Securing eco-friendly competitiveness of solar products, expanding eco-friendly electricity use consulting business, and increasing interest in solar solutions through the use of underutilized land - Increasing need for low-carbon solar product certification - Capturing demand for low-carbon products - Increasing need for RE100 consulting business - Revitalizing new markets such as agri-photovoltaic, soundproof walls PV, BIPV, etc	U O D	V	V	<ul style="list-style-type: none"> Increase in profit from low-carbon product sales Increase in profit from new business and service introductions Enhancement in capital availability due to increased investment 	<ul style="list-style-type: none"> Identification and management of product carbon footprints Achieving eco-friendly product certifications Launching the RE100 solution business in Korea
	Products and Services, Market, Resilience	Chemical	(O4) Growing demand for bio- and recycled plastics - Capturing demands on circular economy and low-carbon - Pioneering and preempting new markets for bio- and recycled plastics	U O D	V	V	V	<ul style="list-style-type: none"> Increase in sales of bio and recycled plastics due to rising demand Decrease in exposure to the risk of using biomass and recycled raw materials

STRATEGY

Response Strategy for Climate-related Risks and Opportunities

Hanwha Solutions has established strategies to effectively respond to the identified risks and opportunities posed by climate change.



STRATEGY

GHG Emissions Management

Net Zero by 2050

In 2021, **Hanwha Solutions** established the 2050 Net Zero Goals to limit the global temperature increase to below 1.5°C and overcome the climate crisis. Building on this commitment, we are developing a detailed strategy each year to reduce climate-related risks and capitalize on related opportunities.

We aim to reduce Scope 1 and 2 GHG emissions by 35% by 2030 and by 60% by 2040, compared to the base year of 2018, and achieve Net Zero by 2050.

To reduce Scope 1 and 2 emissions and achieve Net Zero goals, we have implemented strategies to improve energy efficiency, switch to electricity generated from renewable energy sources, convert to by-product hydrogen-based fuel, and integrate carbon capture and utilization (CCU). We have established and are actively carrying out related activities. To achieve our renewable energy goals, we aim to increase renewable energy use to 100% by 2050.

Since establishing the Net Zero Roadmap, we are promoting Net Zero by regularly updating reduction needs, costs, and methods.

| 2050 Net Zero Implementation Strategy |

Type	Details
Scope 1, 2 (Business sites)	· Improving energy efficiency
	· Transition to renewable energy
	· Transition to hydrogen-based fuel
	· Carbon capture and utilization (CCU)
Scope 3 (Value chain)	· Utilizing Sustainable raw materials (Circular economy)

GHG Reduction Activities

Improving Energy Efficiency

In 2023, the **Chemical Division** carried out 11 activities to improve process and energy efficiency, such as installing a wastewater waste heat recovery system, installing heat dissipation materials inside the boiler in the CA production unit, and replacing electrolyzers. These efforts are projected to decrease GHG emissions by 42,000 tons per year and approximately 7,000 tons were reduced in 2023. At the same time, the division conducted interviews with site managers to discover emission reduction projects within plants.

The **Qcells Division** has completed the construction of cooling system optimization facilities in 2023, which is expected to reduce energy consumption by 2.3GWh per year from this facility. By the beginning of operations in 2023, energy consumption had already dropped by about 2GWh compared to previous levels. From 2022 to 2023, the company promoted an LED lighting replacement project in the factory, reducing electricity use by about 2GWh in 2023.

Transition to By-Product Hydrogen-Based Fuel

The **Chemical Division** is actively reducing its reliance on fossil fuels by utilizing by-product hydrogen generated within the CA Process of the Base Chemical Business as internal fuel. In 2022, the division installed a hydrogen co-combustion piping system, resulting in a reduction of approximately 7,000 tons of GHG in 2023 compared to total fossil fuel combustion. This initiative is anticipated to further decrease GHG emissions by approximately 9.3 thousand tons per year. The division is also planning to enhance the hydrogen co-combustion system to optimize the co-combustion ratio in the near future.

Utilizing Sustainable Raw Materials

In 2023, the **Chemical Division** utilized a small amount of biomass-based ethylene, which slightly reduced Scope 1 and Scope 3 Category 1 emissions. Moving forward, the division will continue to contribute to the reduction of GHG emissions and the establishment of a circular economy through the use of sustainable raw materials.

Carbon Capture and Utilization (CCU)

The **Chemical Division** is establishing a collaborative system with domestic national research institutes, universities, and leading companies to advance CCU research and development (R&D). Through these initiatives, the division aims to reduce GHG emissions by capturing carbon dioxide emitted from facilities and incineration processes that cannot be converted into fuel. It plans to repurpose this captured carbon dioxide as raw materials using conversion technology.

K-EV100

In 2021, we joined the K-EV100 initiative led by the Ministry of Environment and pledged to substitute all company vehicles with eco-friendly options, including electric and hydrogen vehicles, by 2030. In 2023, we increased the number of eco-friendly vehicles to seven and intend to progressively advance the transition to sustainable vehicles while expanding our electric vehicle charging infrastructure.

Mangrove System

The **Chemical Division** employs the Mangrove System, developed with AI machine learning technology, enabling the automation of monitoring and management of Scope 1 and 2 emissions.

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Transition to Renewable Energy

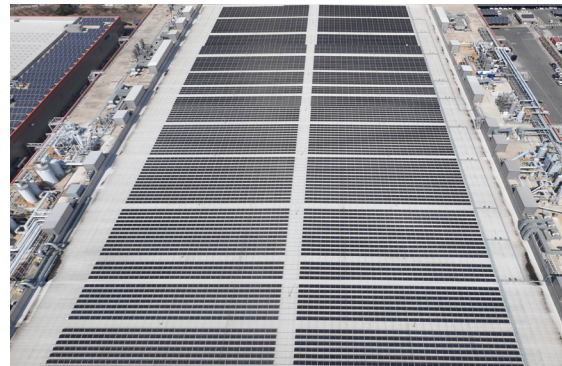
Expanding Renewable Energy Procurement

In 2023, we secured a total of 92.2 GWh of renewable energy, marking a 29% increase from 71.2 GWh in 2022. Within this, the **Chemical Division** secured 62.0 GWh of renewable energy in 2023, reflecting a 32% increase from 47.1 GWh in 2022, while **Qcells** secured 30.2 GWh of renewable energy in 2023, marking a 25% increase from 24.1 GWh in 2022.

On-site renewable energy self-generation

The **Qcells Division** actively uses idle space within plants to secure renewable energy. Since the installation of the first solar power generation facility on a building rooftop (0.56 MW) in 2016, it has continuously expanded such generation facilities. Additional facilities were installed in the parking lot (1 MW) in 2018 and on the building rooftop (2.37 MW) in 2023. As of 2023, a total of 3.9 MW of solar power facilities are in operation. In 2024, the company plans to install an additional 2 MW of solar power facilities on the building rooftop, increasing the total scale of renewable energy generation to 5.9 MW. As of 2023, the division achieved 3.2 GWh of renewable energy consumption through introduction of solar power facilities.

| Qcells On-site Renewable Solar Power Facilities |



Renewable Energy Certificate (REC) Purchase and Direct PPA

In 2022, the **Chemical Division** signed a long-term purchase agreement with a renewable energy provider for RECs with a production capacity of 5.3 MW. Through this contract, approximately 6.9 GWh of renewable energy power was procured in 2023. The division also signed a direct Power Purchase Agreement (PPA) with a capacity of 15 MW, receiving part of the renewable energy since December 2023.

Green Premium

We procure renewable energy through the Green Premium operated by the Korea Electric Power Corporation (KEPCO). Through the 2023 Green Premium, our **Chemical Division** secured approximately 53.7 GWh of renewable energy production power, and the **Qcells Division** secured 27 GWh of renewable energy.

STRATEGY

Development of Sustainable Products

Introducing Sustainable Raw Materials and Building a Circular Economy

The **Chemical Division** is driving a transition to a business model aligned with the circular economy for sustainable growth, focusing on low-carbon products. It is promoting the commercialization of bio-PVC, utilizing bio-based raw materials, and expanding the production of recycled polyethylene (rPE) products sourced from renewable raw materials to foster a circular economy. Its commitment extends to enhancing product R&D efforts and resource allocation in this direction.



Sustainable product and technology development activities

Life Cycle Assessment (LCA)

Product Carbon Emission Management Based on LCA

LCA is a methodology that quantifies, analyzes, and evaluates the environmental impact of a product throughout its lifecycle, spanning from raw material extraction to disposal. The **Chemical Division** has developed a proprietary LCA tool capable of assessing impacts from raw material collection to manufacturing (cradle-to-gate) across seven environmental impact categories, including carbon footprint, consistent with environmental reporting standards. Using carbon footprint data derived from LCA, the division gains a better understanding of direct and indirect GHG emissions throughout the production process, as well as identify critical emission sources and implement strategies for reducing emission. By assessing carbon footprint of each product, we adhere to global environmental regulations on product-level data and meet consumer expectations.

Product-level Environmental Impact Management through LCA

In 2023, the **Chemical Division** completed LCA assessments for 202 products by grade using its proprietary LCA tool. The division is actively pursuing third-party verification to further enhance the reliability of LCA results, particularly for rPE products. The **Qcells Division** conducted LCA assessments for its flagship Q.PEAK DUO G11S series. Leveraging these findings, the division has been advancing product development and production sustainability. Specifically, it identifies energy and resource-intensive stages of the product lifecycle and implements measures to mitigate environmental impacts at these stages.

Product Environment and LCA-related Certifications

We are pursuing environmental and LCA certifications to evaluate the environmental impact of our products comprehensively. With a continued focus on certifications, we aim to increase the availability of eco-friendly and LCA-certified products while providing customers with detailed environmental information of our products.

Product Environment and LCA-related Certifications Status |

Classification	Organization	Products	Year Acquired	Period	Note
Electronic Product Environmental Assessment Tool (EPEAT)	Global Electronics Council	Q.PEAK DUO XL-G11S series	Feb 2024	-	-
Energy System Product Safety Certification	Underwriters Laboratories Inc., (UL)	Inverters (electricity conversion system), energy storage systems (ESS)	2024	-	Certified products to be released in the second half of 2024
Environmental Product Declaration (EPD)	Ministry of Environment in Korea	39 products (plasticizers, ethylene-vinyl Acetate (EVA), etc.)	2021 (6 products), 2022 (33 products)	Three years	Promoting the acquisition for 5 products as of 2024

Establishing a Sustainable Production System

Climate Change Emergency Response System

We are establishing an in-house emergency response system to address potential hazards stemming from unexpected climate changes. During extreme weather events, we prioritize safety management to safeguard our production facilities. Furthermore, we continually monitor the supply status of raw and subsidiary materials, proactively securing necessary materials when potential supply and demand disruptions arise, thereby enhancing the sustainability of our production system.

STRATEGY

Engagement

Responding to Climate Regulations

Monitoring of Climate Regulatory Trends

We monitor the expected timeline, content, and impact of regulations to promptly respond to global laws and regulations applicable to our operations. This monitoring is conducted regularly in accordance with our company's risk management policies.

In addition to examining the potential implications of South Korea's Framework Act on Carbon Neutrality and Green Growth for Coping with Climate Crisis and the Operation Plan of the Greenhouse Gas Emission Trading System, we analyze various energy-related policies and laws, such as the Basic Plan of Long-term Electricity Supply and Demand, Special Act on the Dispersed Energy Promotion, Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy. These efforts aim to secure renewable energy and advance our Net Zero goals. To remain competitive in international markets, we closely monitor legislative developments related to carbon tariff, such as the EU's Carbon Border Adjustment Mechanism (CBAM) and the US Clean Competition Act (CCA), ensuring compliance with their requirements. Furthermore, we are enhancing our regulatory readiness by preparing for mandatory ESG disclosures for listed companies with domestic assets exceeding KRW 2 trillion, which will come into effect beyond 2026, and by reviewing the Global Plastic Treaty draft released in September 2023.

Participation in Consultative Bodies Related to Climate Action

In addition to our internal efforts to effectively respond to climate-related regulations, we actively participate in various industry, public-private, and private-led consultative bodies. Through conferences and seminars hosted by these bodies, we explore practical approaches to achieving Net Zero and deepen our understanding of industry-wide climate change response trends. We also use these platforms to engage in indirect activities and advocate for the improvement of climate-related regulations, ensuring they take into account the characteristics of the petrochemical industry.

In 2023, we participated in the Korea TCFD Alliance conference hosted by the Korea Sustainability Investing Forum (KoSIF) to address climate-related disclosures. We also took part in training sessions for RE100 private partnership members and a renewable energy utilization strategy conference organized by the Climate Change Center. As a board member of the Carbon Free Alliance under the Ministry of Trade, Industry, and Energy, we contributed to discussions on promoting the carbon-free energy (CFE) program. In addition, we shared insights on climate-related regulations as part of the climate change response group of the Korea Petrochemical Association. Furthermore, we engaged in workshops and forums hosted by the Korea Adaptation Center for Climate Change (KACCC) and the Korea Energy Agency to strengthen industry response capabilities to the climate crisis.

Value Chain Engagement

Net Zero Council

In 2022, the **Chemical Division** established a Net Zero Council in partnership with key suppliers to foster a sustainable supply chain. In 2023, the council convened three times, facilitating discussions on the petrochemical industry's approach to Net Zero and strategies to reduce emission. Through active collaboration with suppliers within the Net Zero Council, the division is spearheading initiatives to decrease GHG emissions across our entire value chain.

Climate-related Information Disclosure

Participation in Environmental Information Disclosure

We outline climate-related risks and opportunities, along with the company's response strategies and activities, in the TCFD section of the Sustainability Report. We also disclose our climate-related information to global stakeholders through environmental information disclosure system operated by the Ministry of Environment as well as by submitting response to Carbon Disclosure Project (CDP) Climate Change annually.

STRATEGY

Scenario Analysis: Resilience of the Net Zero Roadmap and Transition Risks

Overview of the Scenario Analysis

The **Chemical Division** conducted a comprehensive analysis of the impact of each GHG reduction measure to enhance the resilience of our roadmap toward Net Zero. The division quantitatively assessed GHG emission liabilities resulting from Net Zero implementation and the transition to renewable energy. While the division utilized various data sources to estimate the financial implications, significant uncertainty persists due to the need for assumptions about future developments.

Scenario	IEA NZE 2050 Scenario* NGFS Scenario (carbon credit price) IMF Scenario (carbon credit price) National Carbon Neutrality Scenario <small>*A scenario that demonstrates the path to achieving Net Zero CO₂ emissions in the global energy sector by 2050, aligned with the IEA's global Net Zero emissions objectives and the Paris Agreement's goal of limiting the global average temperature increase to 1.5°C.</small>
Reason for Selection	<ul style="list-style-type: none"> Our Scope 2 emissions account for 85% of the total GHG emissions from Hanwha Solutions' domestic business sites, with 90% of total emissions originating from the Chemical Division. Sourcing renewable energy in the Chemical Division is the key implementation measure for reducing Scope 2 emissions. The analysis of climate-related transition risks is conducted using the IEA NZE 2050 scenario, a 1.5°C scenario that relies on solar power and hydrogen as the main energy sources.
Details	<ul style="list-style-type: none"> The analysis reflects government's carbon neutrality plan, including the emission trading system, the Basic Plan of Long-term Electricity Supply and Demand, and the Carbon Neutrality Framework Act Technology: The adoption rates of renewable energy (such as solar and wind), CCUS technology, and improvements in energy efficiency are taken into account in the IEA's Net Zero Emissions scenario, alongside the introduction of renewable energy in Korea and the level of CCUS technology development Energy Mix: Considers the energy mix in the 10th Basic Plan of Long-term Electricity Supply and Demand, IEA NZE Scenario, etc. Business as usual (BAU) emissions: Projected future emissions under a scenario where no specific mitigation measures are taken, reflecting ongoing economic activities including emissions from existing and planned future operations. Emission Permits: (2025) consider pre-allocation and additional allocation, (2030) 90% of BAU emissions, (2050) 73% of BAU emissions Ratio of Paid Allocation : 0% in 2025, 0% in 2030, 100% in 2050 Price of Carbon Credit: AI forecasts in the short-term, IEA data (2022) in the mid to long-term Electricity Emission Factor : the 10th Basic Plan of Long-term Electricity Supply and Demand
Period/ Scope	<ul style="list-style-type: none"> Period: 2023-2050 Scope: Chemical Division (domestic sites)

Resilience Assessment Result

Under the IEA NZE 2050 scenario, the **Chemical Division** analyzed the emission reduction rate of each decarbonization method and reviewed the resilience of the company's Net Zero strategy. The division specifically examined the respective adoption rate and the level of development of CCUS technology for renewable energy (solar, wind), CCUS, and energy efficiency under the scenario. According to the scenario analysis, renewable energy accounts for the primary contributor to emissions reductions, with significant increases expected in fuel conversion and CCU by 2050 compared to the early 2020s.

Based on these findings, **Hanwha Solutions'** detailed Net Zero implementation strategy has also been set to allocate the largest proportion of the budget to renewable energy. We also set GHG emission reductions from fuel conversion, such as hydrogen, to account for the second-largest share starting from 2026. CCU has been factored in, considering the company's actual Scope 1 emission ratio and domestic demonstration status. Through these actions, we believe we are building resilience to mitigate and adapt to climate-related risks.

(TR1) Strengthening regulations related to GHG emissions
- Estimated response costs for emission permits

Estimates for emission permits response costs (KRW million, Chemical Division)	Short-term (2025)	Mid-term (2030)	Long-term (2050)
BAU emissions	cost 3,187	cost 11,682	cost 247,548
Emissions aligned with Net Zero goals	profit 8,856	profit 26,269	0

(TR11) Increasing need for production of new and renewable energy-based products
- Estimated additional costs of introducing renewable energy

Estimates for additional costs arising from introducing renewable energy (KRW million, Chemical Division)	Short-term (2025)	Mid-term (2030)	Long-term (2050)
Minimum cost (Assuming green premium)	420	12,587	Note
Maximum (Assuming REC purchase)	1,804	54,124	Note

The projection for amount of electricity assumed under BAU scenario. By 2050, renewable energy supply is expected to stabilize and the cost of power generation is anticipated to decline. Yet, these factors were not taken into account due to high uncertainty.

STRATEGY

Scenario Analysis: Physical risks

We enhance climate-related risk management and response by identifying and assessing physical risks at both the company and supply chain levels, aiming to mitigate and adapt to acute and chronic risks.

Assumptions and Approaches

We selected 8 climate change hazards to analyze climate-related physical risks and conducted scenario analysis using S&P Global Climamomics, applying up-to-date scenarios from the Shared Socioeconomic Pathways (SSP) scenarios (SSP1-2.6, SSP2-4.5, SSP3-7.0, SSP5-8.5) of IPCC.

Physical Risk Analysis of Key Domestic Business Sites

Modeled Average Annual Loss: 0% (White), Less than 1% (Light Red), 1-2% (Red), More than 2% (Dark Red)

Hanwha Solutions	Coastal Flood				Fluvial Flood				Pluvial Flood				Temperature Extremes				Tropical Cyclone				Wildfire				Water Stress				Drought			
	2020s	2030s	2040s	2050s	2020s	2030s	2040s	2050s	2020s	2030s	2040s	2050s	2020s	2030s	2040s	2050s	2020s	2030s	2040s	2050s	2020s	2030s	2040s	2050s	2020s	2030s	2040s	2050s	2020s	2030s	2040s	2050s
SSP1-2.6 Scenario	0%	0%	0%	0%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	0%	0%	0%	0%	1-2%	1-2%	1-2%	1-2%
SSP2-4.5 Scenario	0%	0%	0%	0%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	0%	0%	0%	0%	1-2%	1-2%	1-2%	1-2%
SSP3-7.0 Scenario	0%	0%	0%	0%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	0%	0%	0%	0%	1-2%	1-2%	1-2%	1-2%
SSP5-8.5 Scenario	0%	0%	0%	0%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	1-2%	0%	0%	0%	0%	1-2%	1-2%	1-2%	1-2%

Response Strategies and Result of Actions

Hanwha Solutions manages risks stemming from extreme weather events, natural disasters (PR1, PR2), and supply chain vulnerabilities to raw material sourcing due to climate anomalies (PR3, PR4) as acute physical risks.

We also manage chronic physical risks such as those associated with rising global average temperatures (PR5).

Through analysis, we have confirmed that risks intensify with repeated occurrences of extreme weather events across all climate hazards. Risks and the Modeled Average Annual Loss (MAAL) associated with temperature extremes are consistently identified as the highest among all climate hazards throughout the analysis periods. As such temperature increase acts as a key factor intensifying climate change in the long-term, we aim to mitigate the risks through establishing and implementing the 2050 Net Zero Initiative.

In addition, we implement response strategies to minimize losses associated with climate-related physical risks. To safeguard human life and property against natural disasters, the **Qcells Division** has established response procedures and conducts special safety inspections to prepare for storm and flood damage and winter seasons.

Also, the **Chemical Division** has incorporated natural disasters into its emergency management protocols and developed a climate-related risk model to mitigate supply disruptions attributed to climate change. The **Qcells Division** monitors raw material supply status and implements multi-sourcing and timely purchasing to prevent disruptions.

In addition to the scenario analysis, recognizing water shortage as a significant risk, the division examined the feasibility of water reuse at its facilities to mitigate such risks and adapt to aggravating water scarcity.

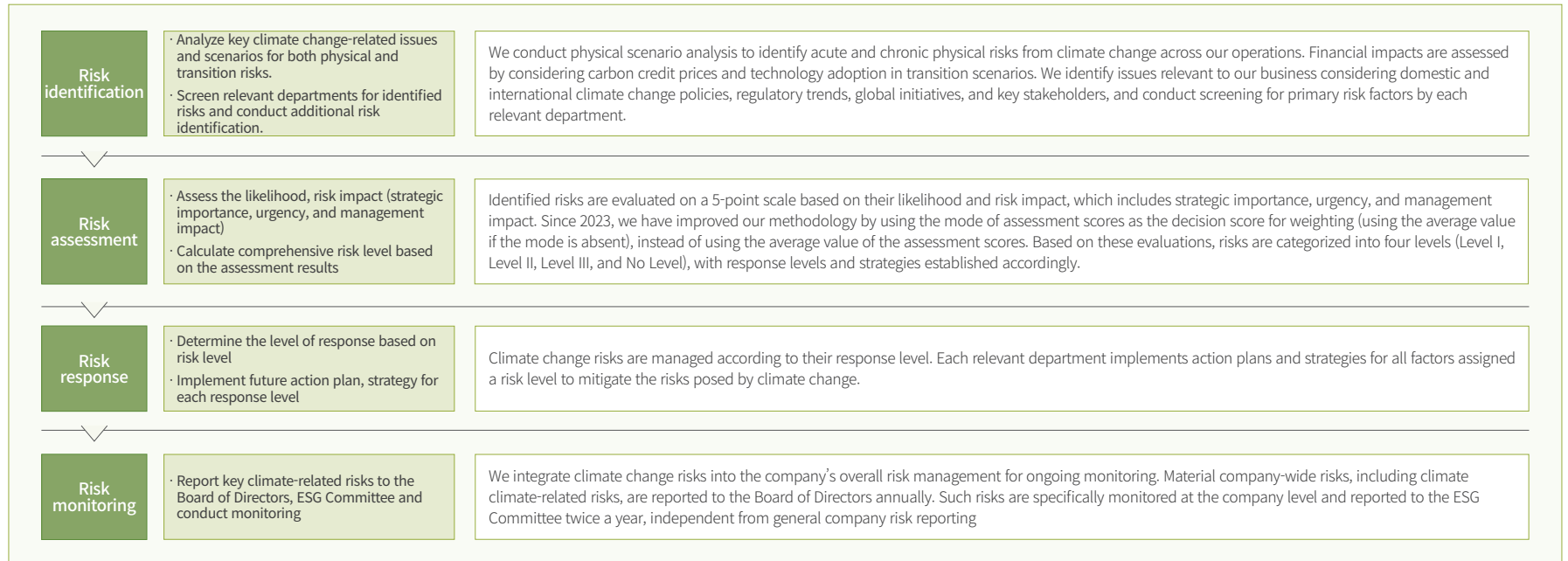
RISK MANAGEMENT

Risk Management

Hanwha Solutions integrates climate-related risk management process into the company's overall risk management, systematically evaluating sector-specific climate-related risks and opportunities. To identify potential impacts on our operations, we create a comprehensive list of climate-related risk and opportunity factors based on TCFD recommendations, industry-based guidance on Implementing IFRS S2, and input from our stakeholders. Factors are then categorized into physical risks (acute and chronic), transition risks (policies, reputations, markets, technologies), and opportunities (energy resources, products and services, markets) in line with TCFD recommendations. These factors are further categorized based on their impact periods: short-term (until 2025, aligned with the third phase of the Korean emission trading system), mid-term (until 2030, our interim target year for Net Zero), and long-term (until 2050, our Net Zero target year).

These identified risk and opportunity factors inform the development of our management strategy. We assess climate risks based on their likelihood and impact, prioritize them, develop and implement response strategies, and conduct a regular progress monitoring of the strategies to ensure ongoing effectiveness. Climate risk matters are reported biannually to the ESG Committee within the Board of Directors.

Climate-related Risk Identification and Assessment Process



METRICS & TARGETS

Climate-related Metrics

Scope 1, 2 Emissions

As a company subject to the national emission trading system, **Hanwha Solutions** accounts and manages Scope 1 and 2 emissions in compliance with relevant guidelines.

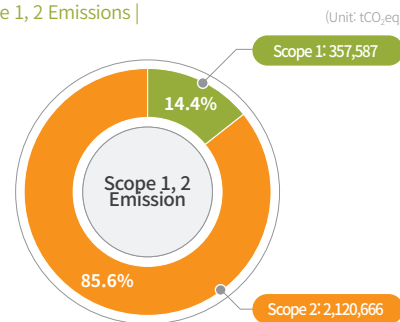
Scope 3 Emissions

For Scope 3 emissions, we have identified Category 1 (Purchased Goods and Services) and Category 15 (Investments) as key categories among all 15 categories. To calculate emissions for each category, emission factors derived from primary data supplied by vendors or secondary data from sources like national LCI databases or Ecoinvent were utilized. To improve the accuracy of emission calculations, we applied the most appropriate methodologies and emission factors, considering business relevance, share compared to total GHG emissions, and available data for each category.

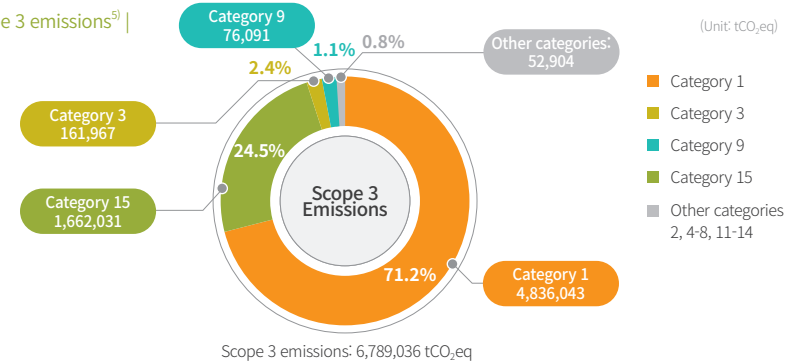
Internal Carbon Pricing

In 2023, as part of achieving the Net Zero target, the **Chemical Division** calculated the Net Zero cost by multiplying the internal carbon price by the difference between the target emission aligned with Net Zero target and actual emission of each production team. These costs were reflected in their profit and loss statements, and the internal carbon price for 2023 was set considering REC purchases.

| Scope 1, 2 Emissions |



| Scope 3 emissions⁵⁾ |



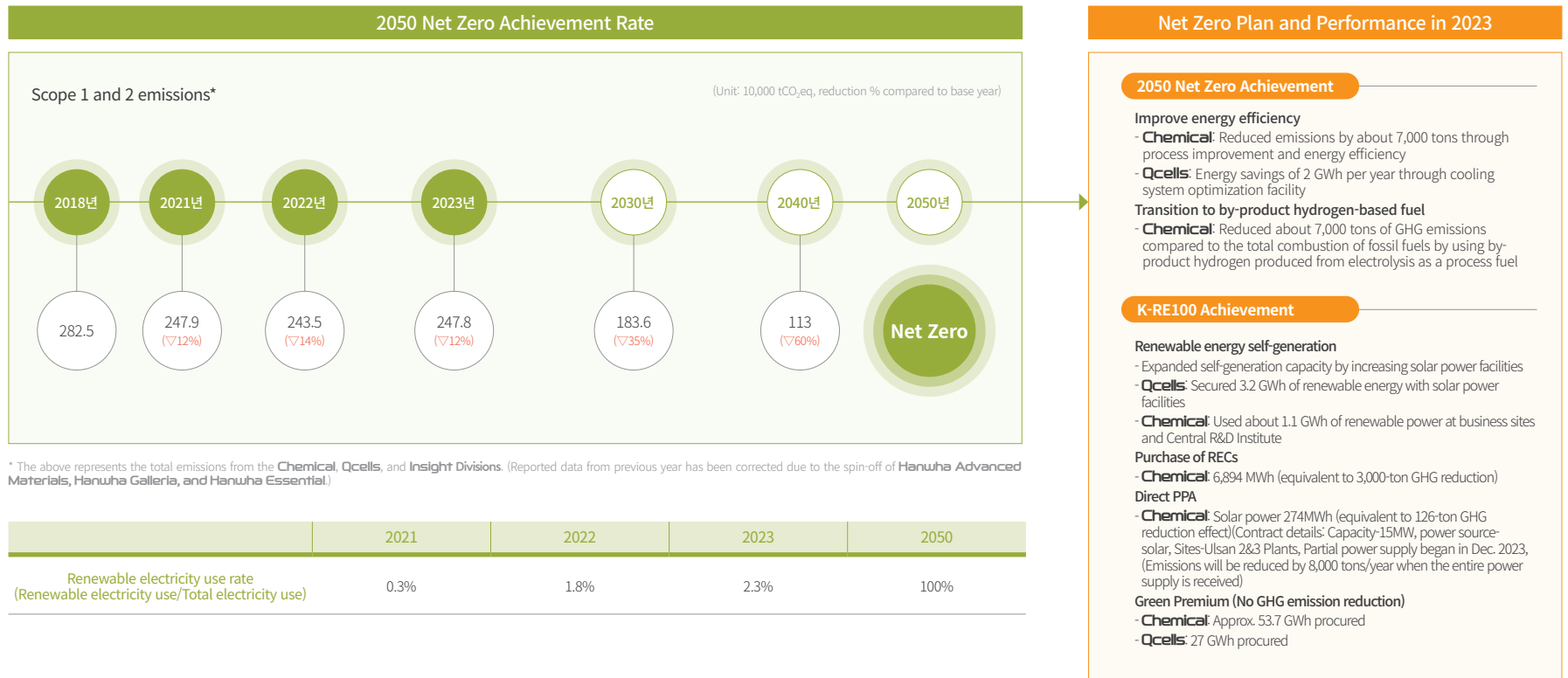
Scope 3 Categories	Emissions ⁵⁾ tCO ₂ eq	Calculation Method	Inputs (Activity Data)
1. Purchased goods and services	4,836,043	Supplier-specific and average-data methods	Volume of purchased key raw materials
2. Capital goods	67	Supplier-specific and average-data methods	Quantity of purchased durable goods (electronic devices, etc.)
3. Fuel and energy-related activities	161,967	Average-data method	Usage of purchased electricity and fuel
4. Upstream transportation and distribution	23,164	Distance-based and fuel-based methods	Volume of purchased key raw materials, distance transported, statistics on fuel efficiency by type of vehicle
5. Waste generated in operations	16,091	Waste-type-specific-method ¹⁾	Amount of discharged waste, disposal method, waste type ³⁾
6. Business travel	3,676	Distance-based, fuel-based, and average-data methods	Distance traveled, mode of transport ³⁾ , statistics on fuel efficiency by type of vehicle
7. Employee commuting	7,140	Distance-based, fuel-based, and average-data methods	Mode of commuting, number of people commuting, commuting distance, number of working days in 2023, statistics on fuel efficiency by type of vehicle
8. Upstream leased assets	0	N/A (Emissions from the use of leased electronic devices contribute to Scope 1 and 2 emissions, while upstream emissions of such assets are assessed every three years and included in Scope 3 Category 2 emissions)	
9. Downstream transportation and distribution	76,091	Distance-based and fuel-based methods	Weight of the product sold, mode of transportation, distance transported, statistics on fuel efficiency by type of vehicle
10. Processing of sold products	Not calculated	Not calculated (In case of the Chemical Division , Category 10 emissions are challenging to estimate accurately due to B2B sales of intermediate goods following GHG Protocol and WBCSD guidelines. Products sold by the Qcells Division are exempt from Category 10 calculations as they are considered finished products.)	
11. Use of sold products	0	N/A (Direct emissions from sold products in the Chemical Division (e.g. PE, EVA, PVC, etc.) and Qcells Division (Solar module) at the end-use stage are negligible)	
12. End-of-life treatment of sold products	2,685	Waste-type specific method	Amount of packaging material input used in packaging of sold products ⁴⁾ , materials used in packaging
13. Downstream leased assets	81	Asset-specific method	Amount of electricity use of downstream leased assets
14. Franchises	0	N/A (no franchises)	
15. Investments	1,662,031	Investment-specific and average-data methods	Scope 1&2 emissions of investees, share of equity, investee company's total revenue, and investee's business sector

1) In the previous year, a distance-based methodology was applied when the emission factor for a specific waste-treatment type could not be identified. This year, the waste-type-specific method was applied only.
 2) A higher emission factor is applied when matching the emission factor for each waste-treatment type is difficult.
 3) A emission factor for a car was used when estimating means of transport is difficult because the emission factor for a car is highest among those for other transport.
 4) Emissions from packaging materials are calculated considering the characteristics of intermediate goods producers, following the GHG Protocol.
 5) Scope 3 for the **Chemicals** and **Qcells Divisions** has been verified by the third party.

METRICS & TARGETS

Climate-related Targets

We have committed to achieving Net Zero and K-RE100 by 2050 to combat climate change, aligning with the Paris Agreement and national carbon neutrality goals. Our strategy focuses on integrating renewable energy to achieve these goals. To enable systematic management of our Net Zero target, we regularly report achievement and status of the targets to the CEO and ESG Committee for company-wide monitoring. In 2023, we achieved a reduction of 20.7 thousand tons of GHG emissions through initiatives such as improved energy efficiency, by-product hydrogen utilization, and use of renewable energy, achieving a 12% reduction compared to the base year. However, total emissions increased by about 40,000 tons from 2022 to 2023 due to factors such as growth in production. We remain committed to ongoing mitigation efforts to achieve Net Zero.



	2021	2022	2023	2050
Renewable electricity use rate (Renewable electricity use/Total electricity use)	0.3%	1.8%	2.3%	100%

Climate Change Response and Net Zero (TCFD)

Sustainable Products and Technologies

Safety and Health Management

ESG management in the supply chain

Transparent and ethical governance

Compliance and Ethics Management

Reducing Environmental Impact

Issue Definition

Activities to minimize environmental impact by properly treating and reducing air and water pollutants, hazardous chemicals, and waste, while reducing the use of water resources.

Issue Approach

We operate an effective environmental management system to minimize negative environmental impacts. Through this system, we strictly comply with our environmental management responsibilities and further fulfill our corporate social responsibility.



Reducing Environmental Impact

INTRODUCTION

OVERVIEW

▶ PART 1. CORE ISSUE PERFORMANCE

Climate Change Response and Net Zero (TCFD)

▶ Reducing Environmental Impact

Sustainable Products and Technologies

Safety and Health Management

ESG management in the supply chain

Transparent and ethical governance

Compliance and Ethics Management

PART 2. GENERAL ISSUE PERFORMANCE

ESG FACTBOOK

APPENDIX

GOVERNANCE

We are strengthening our decision-making system by establishing a governance system that promotes environmental management. The ESG Committee oversees various activities related to the company's environmental management, including monitoring reduction goals and detailed implementation plans for waste, water, and wastewater as outlined in regulations.

Our board of directors approves safety, health, and environmental performance and plans every year, including major environmental performance and key business matters. At the board of directors meeting held on February 16, 2023, an environment, safety, and health plan was approved, and management is being carried out.

The CEO of the **Chemical Division** is responsible for overall environmental management. The division manages performance of pollutant emissions, goals, and other environmental statuses through the Safety and Health Management Committee, which consists of the CEO, CSO, executives, and business site managers.

Linking Performance with Compensation

We link environmental performance with compensation to assign responsibility for environmental management to key decision-makers.

In the **Chemical Division**, executives and site managers' KPIs include achieving pollutant targets and compliance with environmental laws and regulations.

The **Qcells Division** includes environmental safety improvements in the KPIs of organization heads and the head of the ESH Department, following inspections.

Environmental Management Organizations

The **Chemical Division** prioritizes comprehensive environmental management, overseeing activities like planning and management, environmental evaluations at global sites, law monitoring, and

regulation updates through its Safety, Health, and Environment (SHE) Office under the Production & Safety Generalization Department. Each site has an SHE Office and an action department for environmental management tasks.

In the **Qcells Division**, the Environment, Safety, and Health (ESH) Office takes the lead, setting environmental policies, inspecting facilities, conducting assessments, and enhancing performance. ESH teams are established at all sites, with ESH officers appointed in relevant departments to ensure minimal environmental impact through a structured cooperation system.

For the **Insight Division**, environmental activities such as impact assessments, improvements, compliance with laws, and daily inspections are managed by the Safety and Health Office under the business Division head.

STRATEGY

Expanding Sustainable Product and Technologies

Environmental Management Policy

We have established Environmental Management Guidelines and are promoting various activities based on them.

Environmental Management Guidelines

- We actively engage in environmental management to attain Net Zero and foster eco-friendly workplaces.
- We promote the development of eco-friendly products and services, striving for a sustainable resource cycle.
- We adhere to all environmental laws and regulations, striving to reduce GHG emissions, enhance energy efficiency, and minimize environmental pollutant emissions.
- We conduct activities to restore natural ecosystems and conserve biodiversity for local environmental protection.

Environmental Management System

Hanwha Solutions implements environmental management activities under the Plan, Do, Check, and Action (PDCA) cycle. Since declaring our commitment through the environmental policy, we have set goals and plans for specific activities, continuously improving environmental performance by evaluating those goals.

We have established the ESH Portal system to effectively manage environmental management. By integrating environmental safety and health work processes, we achieve more efficient environmental management and maintain a comprehensive compliance system, which computerizes information such as workplace hazards, training systems, regulations, and maintenance of safety organizations.

Environmental Tasks Based on ESH Portal

- ① Governmental affairs related to the environment, including air, water quality, and waste, real-time emission management
- ② Monitoring of chemical substance-related regulations and policies
- ③ MSDS for chemical substance handling information, inventory, purchase, and import

PART 1. CORE ISSUE PERFORMANCE

Climate Change Response and Net Zero (TCFD)

Reducing Environmental Impact

Sustainable Products and Technologies

Safety and Health Management

ESG management in the supply chain

Transparent and ethical governance

Compliance and Ethics Management

PART 2. GENERAL ISSUE PERFORMANCE

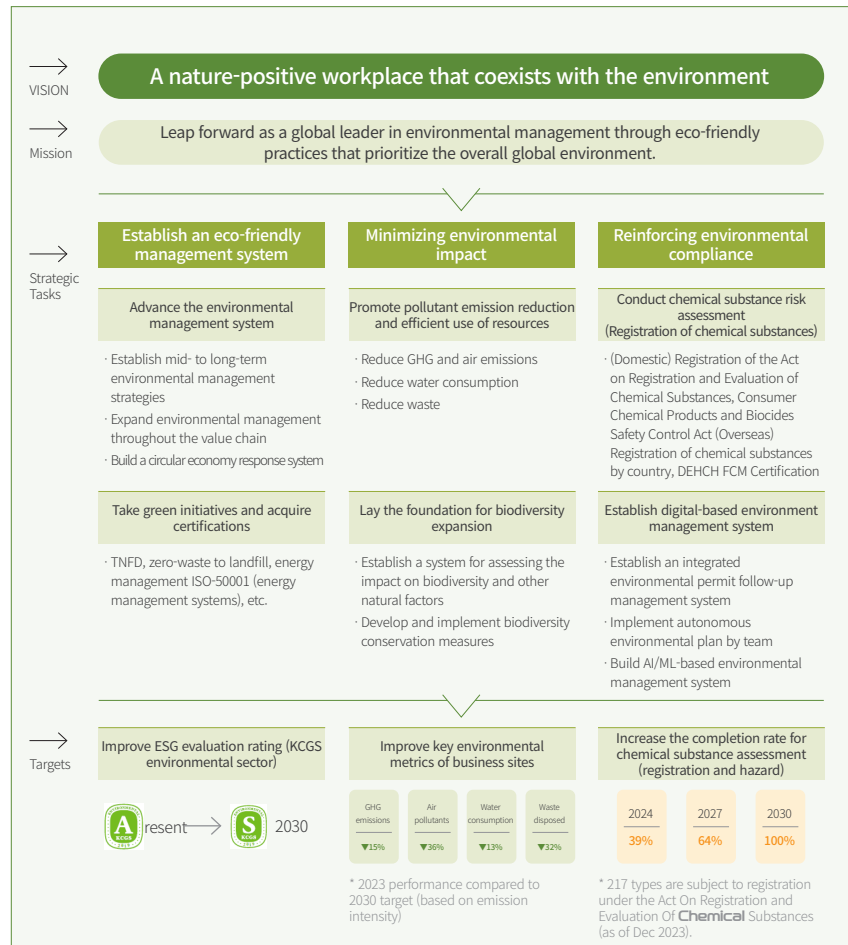
STRATEGY

Environmental Management Implementation Strategy

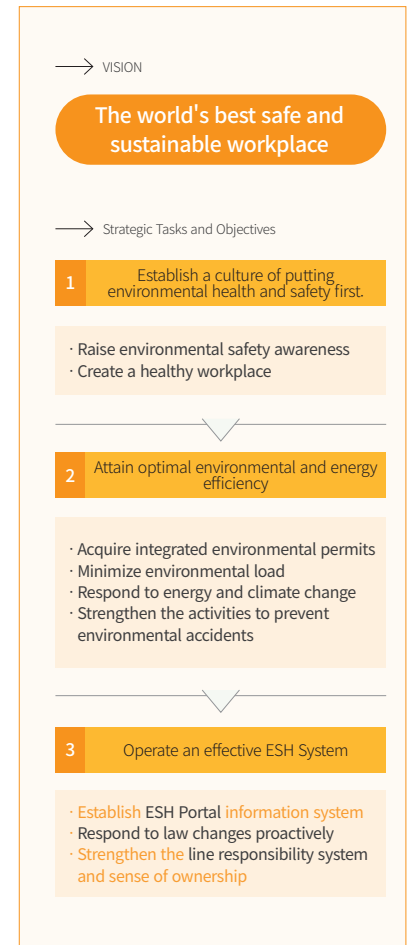
The **Chemical Division** has established three strategic response directions to minimize environmental risks and reduce environmental impact. The division has implemented an eco-friendly management system to enhance executive capabilities in environmental management and established detailed strategies and goals to minimize environmental impact. Moreover, the division is actively promoting enhancement activities to ensure environmental compliance.

In the **Qcells Division**, activities include conducting inspections and improvements following a mid to long-term ESH strategy, identifying potential risks in environmental management, and reinforcing the line responsibility system.

| Chemical Division's Environmental Management Strategy |



| Qcells Division's Environmental Management Strategy |



STRATEGY

Air Pollutant Management System

The **Chemical Division** aims to enhance its autonomous environmental management system by obtaining integrated environmental permits for all business sites. It has established the ESH Portal to computerize and manage air pollutant data. In 2024, the division plans to optimize its management system further by integrating permit follow-up management items into the system and consolidating data.

Moreover, the division has revised environmental regulations to establish air pollutant emission allowance standards within 30% of the legal standard and implemented emission reduction targets for each major facility in the 3rd National Plan for Air Quality Improvement. In 2024, the division intends to assess optimal technologies for preventing air emissions from major emission facilities through consultations with specialized firms.

The **Qcells Division** maintains internal air emission standards stricter than legal requirements and conducts inspections, improvement activities, and investments in air emission reduction facilities. By precisely analyzing raw materials used in the process, the division develops strategies such as substituting substances that cause nitrogen oxide (NOx) and enhancing treatment facility efficiency.

Air Pollutant Reduction Activities

The **Chemical Division** conducts regular air emission facility measurements to ensure close monitoring of their operations. In 2023, a company-wide environmental inspection was completed, and 100% improvement measures were implemented for identified non-conformities. Efforts to reduce atmospheric salt substances include installing a PE3-activated carbon adsorption tower at the Yeosu Plant and shutting down the plasticizer PA/MA line at the Ulsan Plant.

In 2024, the division plans to engage in professional consulting to optimize air emissions. Responding to government standards tightening, the division aims to establish a roadmap for pollutant reduction and apply gradual reduction technologies, particularly focusing on facilities emitting significant NOx amounts, such as VC cracking furnaces and CA hydrogen boilers.

The **Qcells Division** manages pollutants generated from processes through air pollution preventive facilities. Telemetry Systems (TMS) have been installed in major facilities for continuous measurement and management of emission concentrations, with one additional TMS installed in 2023. This system enables prompt response through alerts if pollutant concentrations exceed internal standards. In 2023, it achieved over a 12% reduction compared to the average emissions from 2021-2022.

The **Insight Division** mandates cover on construction equipment during the soil and aggregate transport and wheel washer installations at construction sites to minimize fugitive dust generation.

CASE

In 2023, our Yeosu Plant entered a voluntary agreement with the Yeongsan River Basin Environment Agency of the Ministry of Environment to reduce air pollutants. Under this agreement, the plant established emission reduction targets and implementation plans aimed at improving air quality in the southern region. By 2024, it aims to reduce emissions to 95% of the total NOx emission allowance, setting a goal of 80,319 kg. To achieve this target, it plans to install additional pollutant reduction facilities in hydrogen boilers and develop our TMS-based alarm system that follows internal reinforcement standards.



CASE

In 2023, the **Qcells Division** was awarded a certificate of commendation by the Korea Environmental Industry & Technology Institute for its involvement in environmental public activities, notably fine dust reduction initiatives.

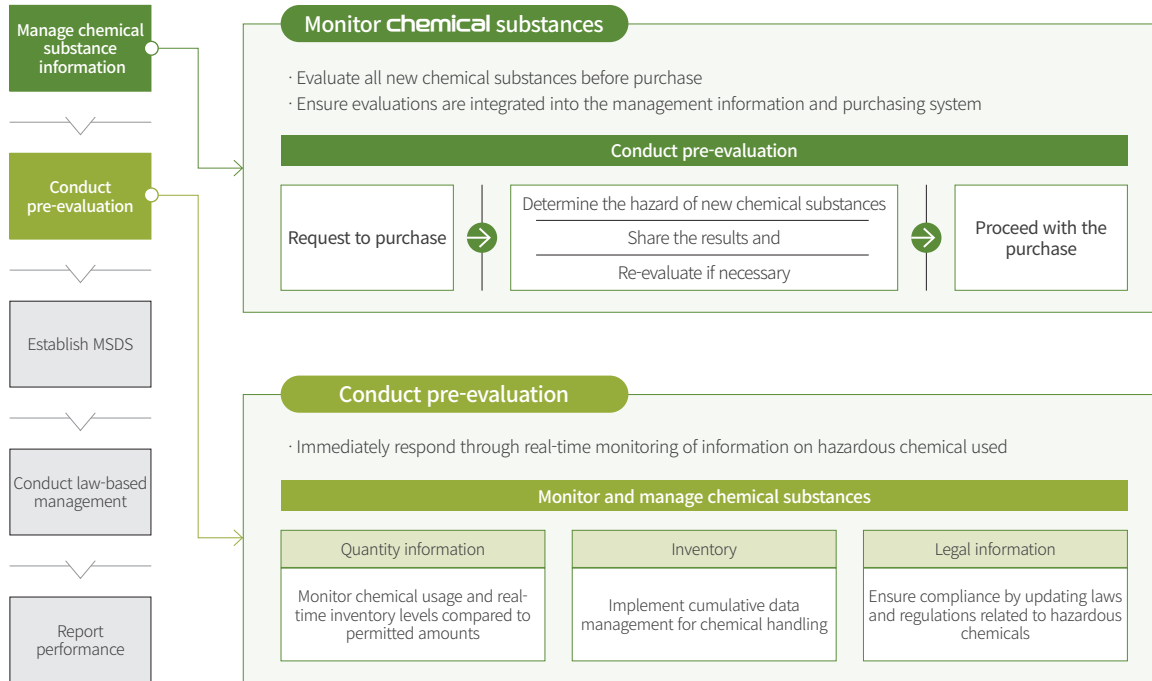


STRATEGY

Hazardous Chemical Management System

We operate a regulatory response system based on the life cycle of chemical substances. To ensure compliance with global chemical laws and to maintain the safety of handling facilities, regular inspections are conducted on the transportation and storage processes of chemical substances while proactively adhering to domestic chemical regulations such as the Act on Registration and Evaluation of Chemical Substances, Consumer Chemical Products and Biocides Safety Control Act, as well as the EU REACH. We have also established an advanced integrated chemical substance management system based on MSDS to create a comprehensive database of information on all chemical substances handled at each business site, enabling effective management of hazardous chemicals-related performances and facility status.

| Hazardous Chemical Substance Management System |



Hazardous Chemical Management Activities

In February 2023, the **Chemical Division** received the initial notification of conformity for its Chemical Accident Prevention and Management Plan. The division manages the quality of hazardous chemicals through self-inspections, with a particular focus on reducing the emission of vinyl chloride (VC). Since 2021, the division has been enhancing the vent scrubber system at the Yeosu Plant and installing additional strippers for each process at the Ulsan Plants. Furthermore, the division is implementing plans to improve processes and facilities to further reduce VC emissions.

| VC Emissions Reduction Plan |

Year	Yeosu Plant	Ulsan Plant
2024	<ul style="list-style-type: none"> Duplicate TR-1/2 Purge gas incineration pipe Strengthen the management of facilities such as stripper Improve the environment of VC process 	<ul style="list-style-type: none"> Install additional stripping for SPVC process Increase the capacity of the stripping column or installing more VC2 DCS Revamping for process reliability Replace aged electrical equipment for VC1/2 Improve hydrochloric acid tank system for VC1
2025	<ul style="list-style-type: none"> Install low-concentration VC adsorption equipment Seal non-point pollutant sources 	<ul style="list-style-type: none"> Monitor the latest VC reduction technology trends and confirm the applicability

The **Qcells Division** continually conducts lab tests to review and enhance processes and facilities for reducing hazardous chemicals. The Jincheon Plant meticulously examines the hazardous chemicals utilized in the etching process and develops formulations to decrease the amount of chemical input per product. In September 2023, the division completed investments aimed at improving and optimizing the facility, resulting in a reduction of 294 tons of hazardous chemicals in the process compared to the previous year, equivalent to 882 tons annually.

Climate Change Response and Net Zero (TCFD)

Sustainable Products and Technologies

Safety and Health Management

ESG management in the supply chain

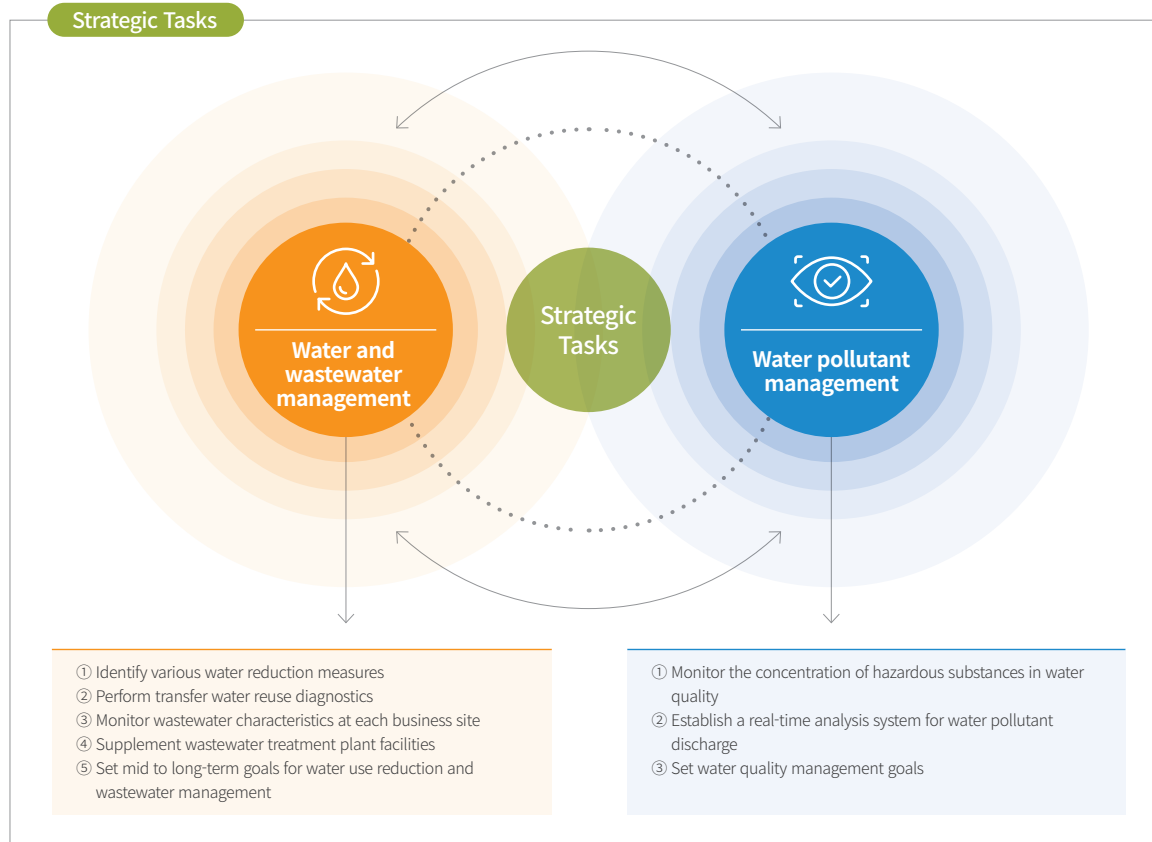
Transparent and ethical governance

Compliance and Ethics Management

STRATEGY

Water Quality Management System

We analyze and develop methods to reduce water pollutants in both water and wastewater to enhance our water resource and quality management system, and operate a task force dedicated to water reduction and recycling initiatives.



Water and Wastewater Reduction Activities

The **Chemical Division** actively reduces water consumption and wastewater generation by installing preventive facilities like scrubbers for discharge facilities and implementing practices such as ceasing water use after work hours and halting blower operations. In 2023, the division participated in CDP Water and shared relevant information with stakeholders. The division's plan for 2024 includes upgrading its management system by enhancing the consistency of water resource information and exploring ways to align detailed financial performance with water management initiatives.

| Wastewater and Water Management Reduction Status and Plan |

Division	Activities	Year
Chemical	Installation of ECH wastewater waste heat recovery system in Yeosu	2023
Chemical	Improvement of TDI Process rain and wastewater pipeline system in Yeosu	2023
Chemical	Economic feasibility inspection for PE1/2 and W&C wastewater in Yeosu, and PE wastewater, and PVC effluent processes in Ulsan	2023
Chemical	Expansion of production team to monitor environmental facilities at TDI plant in Yeosu	2023
Qcells	Maintenance of wastewater treatment facilities with the expansion of TOPCon (treatment facility capacity up & facility improvement, etc.)	2023
Chemical	Improvement of boil-out wastewater treatment method (non-exposure to atmosphere) and change of stormwater furnace type	Scheduled in 2024
Chemical	Improvement of SPVC Wastewater VAM Purification Facility in Ulsan	Scheduled in 2024

STRATEGY

Water and Wastewater Reduction Activities

Water Pollutant Reduction Activities

The **Chemical Division** aims to achieve 30-50% of the water pollutant discharge standard. To achieve this goal, the Ulsan Plant implemented a wastewater quality monitoring system and a low-phosphate program for cooling tower blowdown water, resulting in a nearly 75% reduction in total phosphorus concentration in river effluent. Furthermore, quarterly analysis and management of wastewater characteristics are conducted, along with improvements to the wastewater separation system to minimize wastewater generation and the risk of untreated wastewater leaks.

The **Qcells Division** has established internal management standards targeting an average of 50% for each pollutant compared to legal discharge standards. The division has implemented a wastewater monitoring system to analyze pollutant concentrations daily, installed CCTV cameras at the final discharge outlet to prevent the release of harmful substances, and operate a water quality analyzer to monitor pH, T-P, T-N, and SS for each process daily. Moreover, additional TOC analyzers have been installed since 2022 to monitor seven types of water pollutants, and maintenance of wastewater treatment facilities was conducted in 2023.

The **Insight Division** implemented temporary siltation ponds and drainage channels to mitigate water pollution from sediment runoff and established an oil spill response plan, equipping necessary products such as oil adsorbents for mitigation purposes.

Ulsan 2 Plant Water Pollutant Management Activities |

- 01 Establish water quality monitoring system for wastewater
- 02 Replace the reaction tank of the physicochemical treatment facility for stable wastewater treatment
- 03 Install adsorption equipment for wastewater sump tank vent gas and sludge pond odor removal equipment

Water Reuse Diagnosis

In 2023, we collaborated with a specialized company to conduct a water reuse feasibility analysis. This involved examining the possibility of reuse through water quality analysis of wastewater, CT B/D water, and discharged water for each process at all business sites, followed by a detailed review of three sites identified to have high economic feasibility. The diagnosis revealed that approximately 480,000 tons/year of water from these three sites (2.61 million tons/year for all sites) can be reused. Based on these findings, we established goals and mid to long-term roadmap for water resources management. Moving forward, we plan to gradually expand the scope of water reuse, taking into account economic feasibility and site considerations.

CDP Water Security

Financial Impact of Water Shortage and Stress at Chemical Division's Ulsan Plant

We used the WRI Aqueduct Tool to identify high-risk areas with high water stress in 2030 and 2040. The results revealed that the **Chemical Division's** Ulsan 1 and 2 Plants are located in the medium-high water stress zone. Focusing on these two sites, we analyze the strategic and quantitative financial impacts of water-related risks and opportunities, and establish response strategies, responding to CDP Water Security. After reviewing the physical risks based on the SSP5-8.5 scenario, water stress was identified as a major risk. In the event of a shutdown due to water supply interruption from increased water stress, financial loss is expected to reach at least KRW 4.1 billion.

Impact of water shortage and increased water stress on directly-operated sites in Ulsan

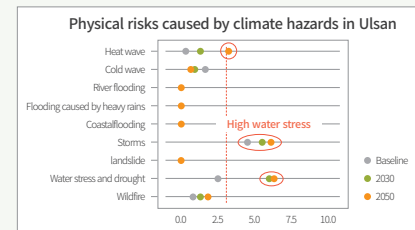
- If water supply is interrupted due to increased water stress, it could lead to property damage from disruptions to production and infrastructure facilities, as well as decreased sales due to shutdowns.
- Ulsan frequently faces water shortage issues due to drought, particularly affecting industrial complexes with high demand for water.
- To address the raw water shortage, we plan to invest in blowdown water and wastewater reuse facilities. As of May 2023, we have completed a facility investment scale diagnosis.

Expected financial loss

- The financial impact of business site shutdowns due to water supply interruptions is estimated to range from a minimum of KRW 4.1 billion per day to a maximum of KRW 1.4797 trillion per year.

Response measures

- Expand water reuse to mitigate the risk of supply disruptions



* A high-carbon Shared Socioeconomic Pathways (SSPs) scenario that assumes a global surface temperature increase above 4°C by 2100.

CDP Water Security Excellence Award

At the '2023 CDP Korea Awards', **Hanwha Solutions** participated in the water management evaluation category for the first time. We achieved a 'Leadership (A-)' score, earning high marks for our water management policies and improvements in water intensity, and received the Excellence Award for Water Security.



STRATEGY

Waste Management System

The **Chemical Division** has established tasks under its environmental management strategy to minimize waste generated at business sites. It has set a waste intensity target(waste generated per revenue) and are continuously promoting the recycling of landfill and incineration waste.

The **Qcells Division** strives to reduce waste generation throughout the product production and processing processes. In line with the 'Circular Economy Performance Management System' implemented in 2020, it conducts activities such as upgrading production facilities, developing alternatives for hazardous chemicals, and enhancing sludge moisture content every year.

Water Reduction Activities

The **Qcells Division** implements the Ministry of Environment's Eco-assurance System established for recycling waste solar modules. To ensure proper collection and recycling of shipped modules, the division joined the Recycling Business Cooperative (E-Circulation Governance), outsourcing the recycling process and paying mandatory contributions based on the annually reported national recycling obligation.

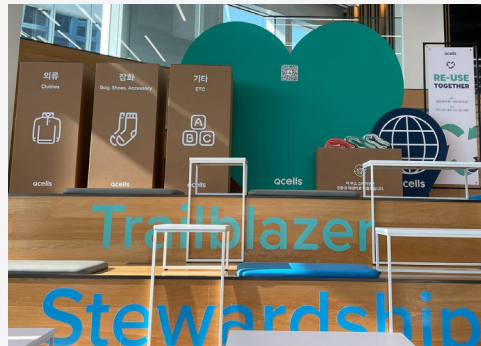
The **Chemical Division** actively recycles landfill and incineration waste, which constitutes 53% of our total waste. The division conducted assessments of waste generation across all business sites and developed a reduction plan. Its strategy includes increasing the recycling rate by utilizing wastewater sludge as cement raw materials, expanding the recycling of intermediate processed products, and recovering heat energy from major incineration wastes like toxic water. These efforts aim to further enhance recycling initiatives for incineration and landfill waste, including sludge.

The division is exploring the possibility of obtaining Zero Waste To Landfill (ZWTL) certification for these recycling activities. The division plans to pursue ZWTL certification based on the outcomes of our waste reduction initiatives.

The **Insight Division** operates under the Waste Management Act, managing waste wood, synthetic resins, metals, and oil to minimize waste generation.

CASE

In 2023, the **Qcells Division** organized the RE-USE TOGETHER campaign across domestic business sites, including the head office, domestic plants, Pangyo, and Gasan. The campaign aimed to raise awareness about environmental damage caused by unnecessary waste. With a focus on carbon reduction through item reuse, the division sets up eco-friendly booths and collected donated items. In total, the division collected 1,494 donated items, contributing to a reduction of 257 kgCO₂ eq, equivalent to the carbon absorbed by 30 pine trees in one year.



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PART 2. GENERAL ISSUE PERFORMANCE

RISK MANAGEMENT

Environmental Impact Assessment

We establish internal environmental impact assessment standards considering the applicability of laws, frequency of occurrence, extent of pollution, and environmental impact assessment criteria of products, followed by conducting environmental assessments for each process unit.

The results of the environmental aspects and the environmental impact assessment table are combined to calculate the final environmental impact rating. Based on these ratings, each team identifies significant environmental impacts, registers them in the internal Environmental Impact Register, and establishes improvement plans. The SHE Team manager reviews the feasibility of the objectives and detailed goals and provides support.

Beyond environmental impact assessments, we identify environmental accidents as major risks and establish response strategies. Additionally, we identify biodiversity-related risks and opportunities for four directly operated sites worldwide based on the TNFD's LEAP approach.

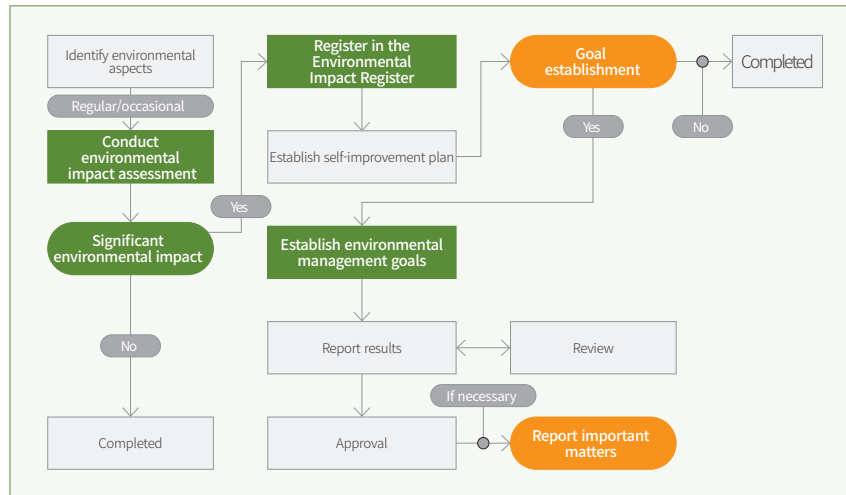


Risk Management Activities



Biodiversity Risk Management

Environmental Impact Assessment Process



We have developed a natural green area near the Yeosu Plant into an industrial complex, expanding the PVC production process on a factory expansion site of 4,104m². Environmental impact assessments were conducted in designated air quality control and special measures areas, resulting in short and long-term air pollution plans including sustained concentration target to control total air pollutant emissions.

2023 Environmental Impact Assessment Implementation Plan and Performance - Yeosu Plant

No.	Details	Investment (KRW million)	Progress and Effect	Community Environmental Impact
1	Connect PE Packing Hopper Air Emission Facilities	700	<ul style="list-style-type: none"> Install LD2/LP3 Process Packaging Hopper Dust Collecting Bag Filter Completed in March 2023 	<ul style="list-style-type: none"> Preventing community respiratory diseases caused by air pollutants
2	Install a new facility for adsorption for dust removal in the VC process	210	<ul style="list-style-type: none"> Completed in June 2023 	<ul style="list-style-type: none"> Preventing community respiratory diseases caused by air pollutants Preventing poisoning in the community due to liquefied gas VC leakage
3	Install additional TMS (VC, ECH)	120	<ul style="list-style-type: none"> Reduced emissions by adding a monitoring system for NOx to the existing hydrogen chloride TMS operation Completed in September 2023 	<ul style="list-style-type: none"> Preventing damage from hydrogen chloride leak accidents in the community Preventing community respiratory diseases caused by air pollutants

RISK MANAGEMENT

ISO 14001 (environmental management systems) Certification

The **Chemical** and **Qcells Divisions** have established an environmental management system based on ISO 14001 certification, applying it to the environmental management of their business sites. **Hanuha Solutions** aims to maintain ISO 14001 certification and operate an environmental management system aligned with global standards by conducting internal and post-audits annually, ensuring continuous enhancement of operational processes.

Division	ISO 14001 Certified Business Sites
Chemical	8 locations, including Yeosu 1,2,3 Plants, TDI Plant, Ulsan 1,2,3 Plants, and Central R&D Institute
Qcells	All production sites (2 locations)

Environmental Performance Evaluation and Management

The **Chemical Division** reports key environmental performance indicators to management to minimize environmental risks and respond proactively. Since 2020, the division has conducted environmental sessions twice a year under the supervision of the production safety director to enhance the workplace environment, with all sites holding regular environmental PL meetings at least once a month. The division actively participates in environmental expos and workshops and conduct environmental training for environmental managers four times a year to share and discuss key issues and benchmarking for each business site.

The **Qcells Division** manages environmental performance according to the internal environmental performance evaluation system and promotes verification and improvement through annual internal and external environmental audits.

Activities in Response to Environmental Regulations

We monitor the ever-changing requirements of global environmental laws and regulations, and conduct environmental inspections to proactively mitigate legal risks.

Environmental Law	Response Measures and Performance									
Act on the Promotion of Transition to a Circular Economy and Society (01.01.2024)	We are preparing for the transition to a sustainable circular economy society by promoting the efficient use of resources throughout the entire production, consumption, and distribution process. We are shifting away from the current focus on waste generation suppression to circular use and disposal. Our activities include reducing waste and metallic waste during production, minimizing natural resource use, promoting circular raw material utilization, and recycling existing landfill waste.									
The 3rd National Air Quality Improvement Plan (2022.12.27)	We are collaborating with the petrochemical industry to jointly address the Ministry of Environment's upcoming air emission allowance standards and total air emission allocation from 2025. As part of the National Air Quality Improvement Plan, we are conducting research to develop reduction roadmaps and optimal operation methodologies for each high-emission facility, aiming to proactively respond to tightening air quality regulations and minimize associated risks.									
Integrated Environmental Management System (01.01.2017)	We have established an integrated environmental system to measure and manage the environmental impact within our business sites. We maintain an in-house management system, including the installation of additional prevention facilities and upgrades to the monitoring system, to effectively follow up on environmental facilities.									
Integrated Environmental Management System (01.01.2017)	<table border="1"> <thead> <tr> <th colspan="3">Integrated Environmental Permit Status </th> </tr> <tr> <th>Chemical Division</th> <th colspan="2">Qcells Division</th> </tr> </thead> <tbody> <tr> <td>Yeosu 3, Ulsan 2 Plants (acquired in 2021)</td> <td>Yeosu 1,2, Ulsan 1,3, TDI Plants (acquired in 2022)</td> <td>Jincheon Plant (scheduled for 2024)</td> </tr> </tbody> </table>	Integrated Environmental Permit Status			Chemical Division	Qcells Division		Yeosu 3, Ulsan 2 Plants (acquired in 2021)	Yeosu 1,2, Ulsan 1,3, TDI Plants (acquired in 2022)	Jincheon Plant (scheduled for 2024)
Integrated Environmental Permit Status										
Chemical Division	Qcells Division									
Yeosu 3, Ulsan 2 Plants (acquired in 2021)	Yeosu 1,2, Ulsan 1,3, TDI Plants (acquired in 2022)	Jincheon Plant (scheduled for 2024)								

RISK MANAGEMENT

Green Investments

We invest in activities such as reducing air pollution emissions, minimizing the impact of harmful chemicals, and strengthening water resources management to prevent and mitigate environmental management risks. In 2023, we invested approximately KRW 19.54 billion in environmental facilities to promote environmental management. For 2024, we plan to invest approximately KRW 21.6 billion to further advance ESH management.

	Chemical Division		Qcells Division	
Investment details	Yeosu Plant · Improvement of VC Vent Gas system, installation of filters, establishment of Vent Scrubber in stone reservoirs, etc. · Construct of a hydrogen blending system by decomposition of VC		· Switch to high-efficiency lighting (LED) · Improvement of wet bench to reduce the use of process chemicals · Installation of new line (TOPCon) wet scrubbers, adsorption towers, and exhaust fans · Capacity increase and facility improvement of existing air pollution preventive facilities · Additional installation of electrostatic precipitator (Stand-by)	
	Ulsan Plant · Improvement of PE safety environment facilities			
Performance and target	2023 Performance	2024 Target	2023 Performance	2024 Target
	KRW 12.71 billion	KRW 16.39 billion	KRW 6.83 billion	KRW 5.21 billion

METRICS & TARGETS

The **Chemical Division** establishes performance indicators related to air pollutants and water consumption to monitor environmental management performance. To minimize the company's environmental impact, the division sets mid to long-term goals for each individual and monitors progress toward achieving these goals.

Environmental Targets and Performance

Item	Unit	2023		2024	Mid to long-term goals (2030)
		Targets	Performance compared to target	Target compared to the previous year	
GHG		0.383	0.389 (+2.2%)	0.375 (-3.6%)	0.330
Air pollutants	ton/KRW 100 million	0.028	0.025 (-10%)	0.024 (-4.9%)	0.016
Water consumption		2.61	2.72 (+4%)	2.58 (-5.2%)	2.36
Waste disposal		4.14	4.91 (+19%)	4.14 (-15.7%)	3.32
Energy intensity	GJ/KRW 100 million	691	668 (-3.3%)	666 (-0.3%)	595

INTRODUCTION

OVERVIEW

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Sustainable Products and Technologies

Issue Definition

Activities to develop technologies that eliminate negative factors by promoting the use of circular resources, enhancing product sustainability, and improving the environment's ability to self-regulate.

Issue Approach

We aim to lead in building a sustainable energy system and addressing climate change by accelerating the global energy transition. We will contribute to a sustainable future by developing various eco-friendly business models.



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GOVERNANCE

We implement a management system for sustainable product and technology development to secure future growth engines through the creation of next-generation products and advanced technologies.

The CEO of the **Chemical Division** receives biannual product development reports and reviews R&D status and progress through monthly research and innovation meetings. Similarly, the CEO of the **Qcells Division** receives monthly module and system reports to monitor development status.

Linking Performance with Compensation

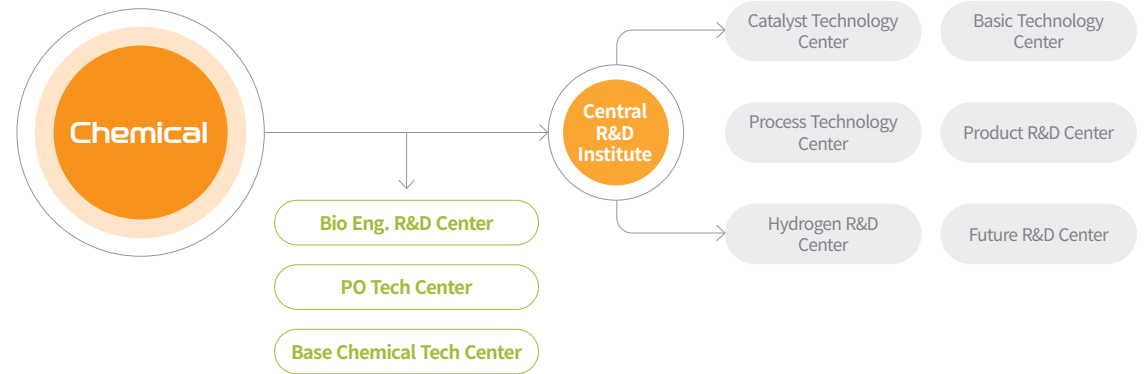
The **Chemical Division** includes the securing of new growth materials and core technologies in the CEO's KPIs to reinforce the connection between product and technology advancement and mid to long-term business performance. The division incorporates the attainment of sustainable growth technologies and the expansion of eco-friendly technology-based businesses in the KPIs of executives and managers in relevant departments.

Product and Technology Development Organizations

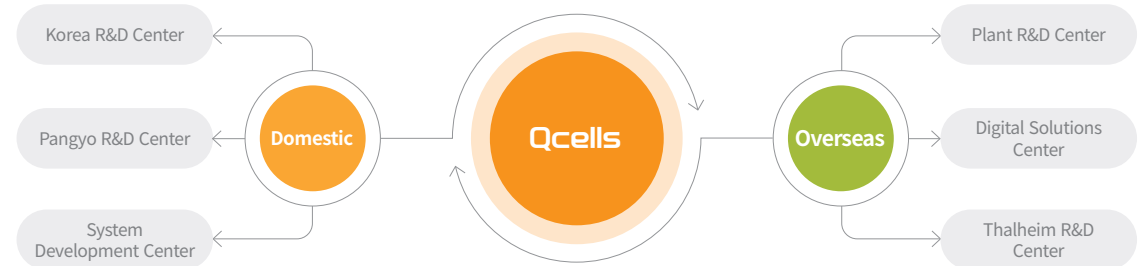
The **Chemical Division** is conducting research and development on sustainable products and technologies such as eco-friendly polyolefin (PO), polyvinyl chloride (PVC), hydrogen, and alkaline electrolysis cell (AEC) technology, centered around the Central Research & Development Institute. In 2023, the division established the Bio Eng. R&D Center to promote research related to cultured meat, which is gaining attention as a sustainable future food business.

The **Qcells Division** has established R&D organizations for solar HW and SW worldwide to conduct research for the development of solar solutions, including high-efficiency solar modules and inverters, along with related software.

| Chemical Division's R&D Organization |



| Chemical Division's R&D Organization |



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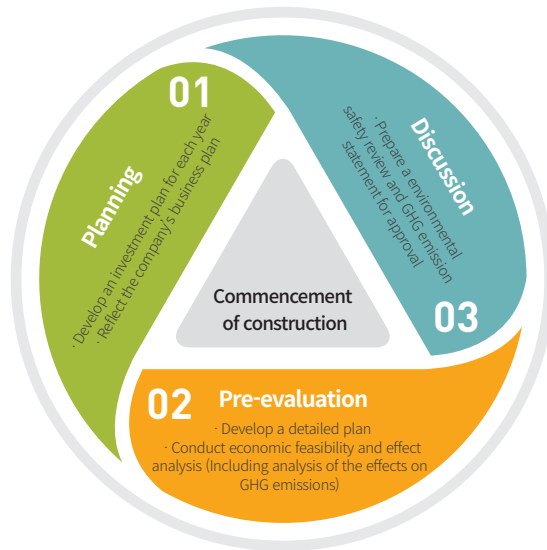
Compliance and Ethics Management

STRATEGY

Green Investment Strategies

We require an environmental safety review statement for all facility investments at our domestic factories to enhance the eco-friendliness of our products. This involves a detailed review process that includes an economic analysis to assess financial implications, along with preparing a GHG emission statement that factors in changes in emissions resulting from electricity consumption.

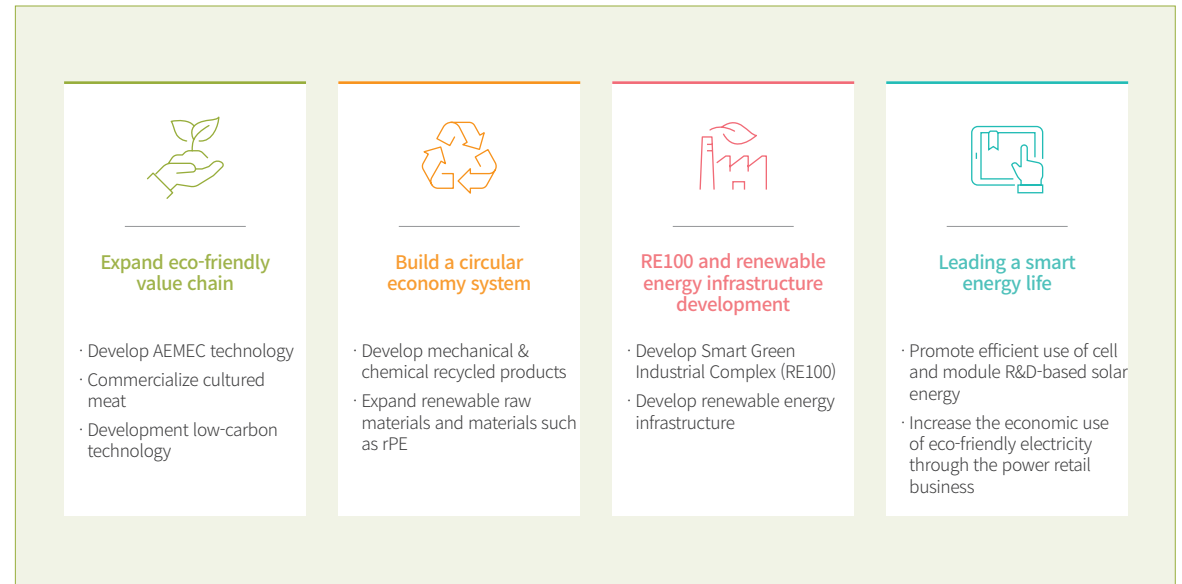
| Investment Process |



Expanding Sustainable Product and Technologies

We have developed a sustainable business strategy to position ourselves as a leading provider of smart, eco-friendly energy solutions and materials tailored to our customers' needs. Our focus lies on research, development, and investment activities aimed at advancing product technology, particularly in building a renewable energy value chain, reinforcing our leadership in photovoltaic technology, transforming the hydrogen ecosystem, developing circular technologies, and advancing low-carbon technologies. Through these initiatives, we aim to offer differentiated and innovative solutions across various fields and lay the groundwork for sustainable growth in the future.

| Sustainable Product and Technology Strategy |



STRATEGY

Leading a Smart Energy Life

Strengthening Leadership in Photovoltaic (PV) Technology

The **Qcells Division** is actively engaged in research and development efforts focused on perovskite tandem cells, a next-generation technology aimed at enhancing solar power generation efficiency. Leveraging proprietary technology, the division has achieved a tandem cell with a peak efficiency of 29.9% on a small area and are now concentrating on the commercialization process, targeting mass production by 2026. To facilitate this, the division is securing automated process technology and establishing a pilot facility at the Jincheon Plant, scheduled to commence pilot operations in the latter part of 2024.

In February 2024, the division launched the Q.TRON G2 utilizing our proprietary TOPCon cell manufacturing technology, Quantum Neo. The Q.TRON series boasts approximately 1% higher power generation efficiency than conventional PERC cells, delivering approximately 25 W more power than standard modules of the same size. In addition, it exhibits a low efficiency degradation rate of 0.33% per year and demonstrates high durability, ensuring prolonged and stable use.

Meanwhile, the **Chemical Division** is investing in ethylene vinyl acetate (EVA), a material crucial for solar modules, with the goal of extending cell life and enhancing module performance. Through a joint venture with GS Energy, the division is progressing with the construction of a new EVA production plant, anticipated to have an annual production capacity of 300,000 tons and slated for operation in the second half of 2025.

These initiatives underscore our commitment to advancing solar power capabilities, strengthening solar technology competitiveness, and driving the broader adoption of renewable energy.

Establishing a Renewable Energy Value Chain

The **Qcells Division** is making a significant investment of over KRW 3 trillion in Georgia, United States, to establish the Solar Hub, integrating polysilicon-ingot-wafer-cell-module photovoltaic production by 2024. This initiative aims to secure a complete value chain for photovoltaics and solidify our position as a leading company in North America. With the integrated production complex, the division anticipates reducing GHG emissions by minimizing transportation for material procurement and producing 8.4 GW of modules, equivalent to providing electricity to approximately 1.3 million US households for one year (resulting in a CO₂ reduction of 9.78 million tons annually). In addition, the division plans to supply clean polysilicon, generated from hydroelectric power, to minimize environmental impact during production. Through the Solar Hub, we aim to advance the virtuous cycle of our solar business and enhance our competitiveness.

Leveraging our vertically integrated solar power value chain, the **Qcells Division** offers customized Total Energy Solutions encompassing downstream businesses such as product sales, project development and operation, and power brokerage. In North America, the division provides comprehensive solutions from professional consulting for home solar installation to equipment supply, installation and construction, and financing. In Korea, our offerings include financial and energy efficiency consulting, power brokerage and bidding services, contributing to the stabilization of the domestic renewable energy power system through distributed energy solutions linked to various demand response (DR) projects.

In January 2024, the **Qcells Division** entered into a long-term solar partnership agreement with Microsoft (MS) for a total scale of 12 GW, marking the largest contract ever in the United States. This agreement entails providing Microsoft with a minimum of 1.5 GW of modules and engineering, procurement, construction (EPC) services annually for eight years from 2025 to 2032. Through this collaboration, we anticipate evolving into a comprehensive energy solution company.

STRATEGY

Building a Circular Economy

Development of Waste Plastic Pyrolysis Naphtha Production Technology

The **Chemical Division** participates in the Ministry of Trade, Industry, and Energy's Material and Component Technology Development Project to develop hydrotreatment and hydrolysis catalysts and processes. Our goal is to verify this as a commercialization technology, enhancing our chemical recycling capabilities and creating a virtuous cycle of resources.

Development of Technology to Improve Recyclability

The **Chemical Division** is developing technologies to enable the physical recycling of cross-linked polyethylene (XLPE) and ethylene-vinyl acetate (EVA). By energizing XLPE and EVA to eliminate cross-linking bonds, the division recycles these materials into high-quality resins that minimize issues such as color change, odor, and foreign body sensations caused by conventional heat treatment techniques.

The **Chemical Division** is also developing biaxially oriented polyethylene (BOPE) to improve the recyclability of flexible packaging films. BOPE is produced using machine direction (MDO) and transverse direction orientation (TDO) biaxial stretching processes, resulting in high physical strength, impact resistance, and transparency that are difficult to achieve with traditional polyethylene films. Moreover, BOPE-based flexible packaging films are composed solely of polyethylene (PE), making them easier to recycle than conventional composite-based films. The division is actively advancing our research and development in BOPE design technology and aiming for commercialization in 2024.

Acquiring Environmental Certifications

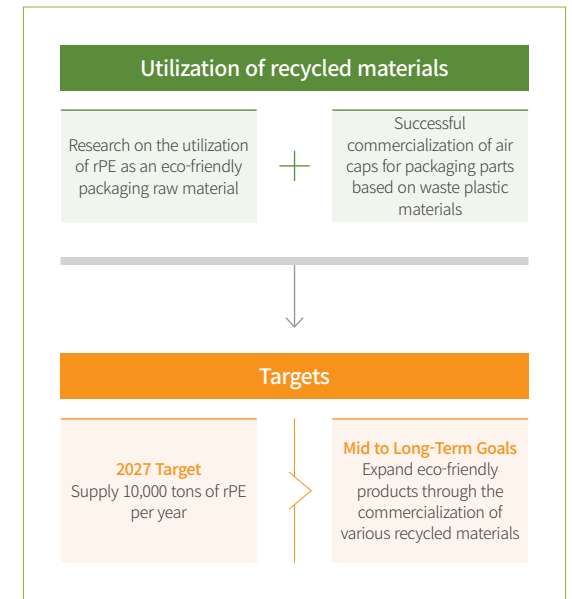
The **Chemical Division** manufactures products based on bio-based raw materials and promoted the commercialization of bio-PVC and obtained ISCC Plus certification. In 2023, the company expanded ISCC Plus certified type of products from two to ten. The division also obtained GRS certification for rPE products, contributing to the establishment of a circular economy.

Type	Definition	Certified Products
ISCC Plus	An international sustainability certification is given to products that use eco-friendly raw materials throughout the production process, in compliance with the EU's Renewable Energy Directives.	· 10 types of products, including caustic soda, PO, TDI, PVC, etc.
GRS	Global circular economy certification for products containing more than 20% of renewable raw materials	· rPE products

Expanding Renewable Raw Material Products

The **Chemical Division** is expanding its development of new products using waste plastic materials, focusing on Mechanical Recycling (MR) technology. Beginning with the use of rPE as a raw material for eco-friendly cosmetic containers in 2022, the division successfully applied and commercialized air caps for packaging automotive parts in 2023. Collaborations across various sectors such as electricity, electronics, agriculture, and hygienic packaging are underway to develop versatile rPE solutions, targeting an annual supply of 10,000 tons by 2027. These efforts align with global regulations on plastic production and waste disposal while fostering an industrial ecosystem for plastic circulation, aiming to simultaneously reduce the environmental impact of plastic use and lay the groundwork for a circular carbon economy.

The **Chemical Division** uses eco-friendly materials for raw and subsidiary materials in the manufacturing and sales process, and does not label them for ease of recycling. The **Qcells Division** uses recycled materials for 85-90% of the protective materials used to safeguard the appearance of solar modules. Starting in June 2023, the **Chemical Division** expanded the use of eco-friendly raw materials by applying FFS packaging bags made with rPE raw materials to 22 products at our Yeosu Plant.



STRATEGY

Green Businesses

R&D of Anion Exchange Membrane Electrolysis Cell (AEMEC)

The **Chemical Division** is conducting R&D for the commercialization of AEMEC technology to contribute to the creation of a green hydrogen ecosystem. AEMEC technology is a next-generation water electrolysis technology that can produce large quantities of hydrogen with low investment cost and low power consumption by combining the advantages of alkaline electrolysis cell (AEC) technology and proton exchange membrane electrolysis cell (PEMEC) technology.

The division aims to commercialize AEMEC technology and expand into a global business through proprietary technology expansion and large-area, large-capacity process development.

	Initial investment	Productivity	Mass production (commercialization)
AEC	▼ Low	▼ Low	Complete
PEMEC	▲ High	▲ High	Complete
AEMEC	▼ Low	▲ High	R&D in progress

Developing Cultured Meat Technology

In 2023, we engaged in Bio-ENG to bolster research and development of core technologies for cultured meat. We have established a dedicated research center and developed a platform for cultivating microstrains essential for cultured meat materials. Equipped with advanced process development and analysis facilities, we aim to efficiently advance technology development.

By 2026, we plan to finalize the development of several growth factors pivotal for cultured meat. Furthermore, our goal is to expand into the cultured meat business by 2030, aiming to address global climate challenges and future food shortage issues.

Investing in Food Tech Companies

We are actively promoting external cooperation by investing in Dana Green, a Korean start-up focused on cultured meat. Through this, we aim to accelerate the commercialization of cultured meat and support sustainable technology development that contributes to global environmental conservation and animal welfare.

Developing WTC Technology

In preparation for the transition to a Net Zero society, the **Chemical Division** is focusing on the production of eco-friendly products using renewable carbon resources such as carbon dioxide and biomass and the establishment of a circular carbon economy. The division has begun developing Waste-To-Chemicals (WTC) technology and is researching the production of eco-friendly chemicals using raw materials such as CO2 and plastic waste. These chemicals can be utilized in the manufacturing process of

various products. The division is conducting this research to reduce carbon emissions in the production of our chemical products.

The Catalyst Technology Center, within the **Chemical Division**, is developing high-performance catalyst active materials for eco-friendly syngas production through the KAIST-**Hanwha** Future Technology Research Center.

Through collaboration with the Ulsan National Institute of Science and Technology (UNIST), the division is striving to secure catalyst and process source technology. The division plans to develop a CO-hydrogenation reaction catalytic process technology, which is one of the main technologies for eco-friendly syngas production, and plan to produce low-carbon petrochemical raw materials such as olefins (C2-C4) and BTX.

Climate-Tech Investments

As a limited partner (LP), we invest in global funds dedicated to Climate-Tech, innovative technologies aimed at reducing carbon dioxide emissions across the Energy, Food, and Materials sectors. This approach enables us to stay informed about market dynamics and company trends in low-carbon technologies. It also allows us to identify investment opportunities, make direct investments in high-potential businesses, and collaborate on joint research and development of promising technologies.

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RE100 and Renewable Energy Development Project

Smart Green Industrial Complex (RE100) Project

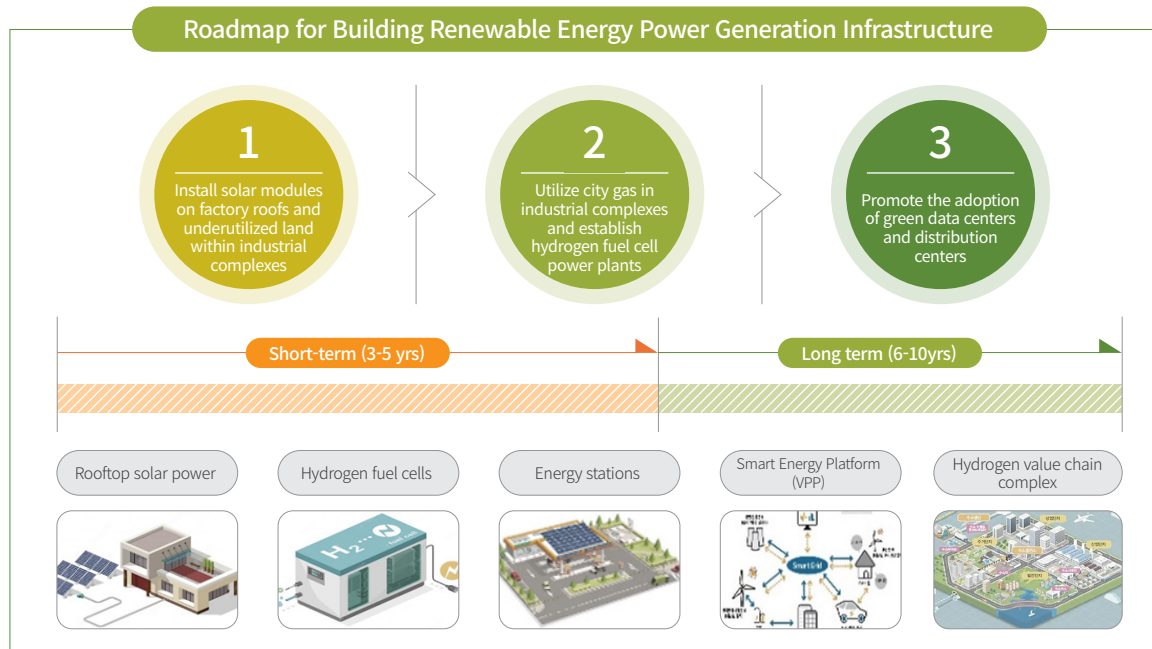
In November 2023, the **Insight Division** signed an MOU to create the RE100 Industrial Complex in Gyeonggi-do. The plan involves building renewable energy infrastructure, including solar power and hydrogen fuel cells, at H-Techno Valley in Hwaseong City. H-Techno Valley, spanning 740,000m², is an industrial complex for semiconductor and automobile industries located in Yanggam-myeon, Hwaseong-si, Gyeonggi-do. The division aims to achieve Net Zero by constructing a 40 MW renewable energy generation facility within the complex. Currently, the division is promoting the installation of solar power on the factory roofs in the industrial complex, aiming to introduce eco-friendly and strategic measures. By establishing an RE100 industrial complex with integrated renewable energy generation infrastructure, the division contributes to the national goal of achieving carbon neutrality.

Renewable Energy Development Project

The **Insight Division** is advancing the Smart Greenway pilot project to install rooftop solar power on the underutilized land of abandoned railways owned by the Korea National Railway. In 2024, the company plans to sign an MOU to install 30 MW of rooftop solar power on the abandoned railway lines of the Central Line and the East Sea South Line near Gyeongju City. By 2026, the division aims to expand the business to nearby areas such as Yeongcheon and Mungyeong, aiming to install over 100 MW of rooftop solar power.

The division entered an MOU with SK D&D in July 2023 for the solar power generation business, intending to pursue the design, procurement, and construction (EPC) business based on SK D&D's solar power pipeline.

The **Chemical Division** is participating in a national project to establish a hydrogen production base using AEC technology at the Daegwanryeong 3rd Wind Farm in Pyeongchang-gun, Gangwon-do. Upon completion of construction in 2025, our goal is to produce over 1 ton of green hydrogen per day through a 2.5MW water electrolyzer. The division aims to accelerate the commercial production of AEC-based hydrogen, thereby contributing to the widespread adoption of renewable energy.



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Eco-Friendly Business Investment Fundraising Activities

Hanwha Solutions' ESG bond management framework has been evaluated to align with the International Capital Market Association's (ICMA) Green Bond Principles (GBP), Sustainability Bond Principles (SBP), Sustainability Bond Guidelines (SBG), and the 2020 Green Bond Guidelines set by the Ministry of Environment. In December 2023, all our bonds received the highest ratings of G1 and Green1 from external evaluation agencies.*

| 2023 Eco-friendly Business Investment Funding and Assessment Status |

Hanwha Solutions' KRW 275 billion of ESG non-guaranteed public offering bond issued in January 2022

As of December 2023, the funds were fully allocated to the introduction of large-area wafers and the construction of high-efficiency solar cell and module production lines using TOPCon technology.

녹색채권 ESG 인증평가 보고서
한화솔루션(주) 녹색채권 (Green Bond)
 발행일: 2023.12.01.
 발행인: 한화솔루션(주)
 발행처: 한화솔루션(주)
 발행액: 275억 원
 평가일: 2023년 12월 29일
 평가기관: 한국ESG평가원

ESG 인증평가 결과	평가대상	평가대상 ESG 공시사항 개요
등급: G1	발행인	환경영향조사
	공시내용	제279-1호 공시서(내부자료)
	평가항목	발행목적
	평가기준	2023년 12월 29일
	평가일	2023년 12월 29일(목)

ESG 인증평가 요약

한국ESG평가원은 한화솔루션(주)의 ESG채권 공시정보를 국제자본시장협회(International Capital Market Association, ICMA)의 녹색채권원칙(Green Bond Principles, GBP), 사회적책임원칙(Social Bond Principles, SBP), 지속가능채권 가이드라인(Sustainability Bond Guidelines, SBG) 및 환경부 녹색채권 가이드라인(K2023.12)에 준하여 평가하는 것으로 평가한다.

또한, 한화솔루션(주)은 제279-1호 공시서(내부자료)를 통해 다양한 자금을 ESG채권 공시체계 상 플랫폼으로 공시하는 효과가 예상되는 등의 프로젝트에 대해 투입하였으며, 프로젝트 평가시점, 조달지출금의 및 사용되고 있는 프로젝트의 매우 우수한 수준으로 공인 중인 것으로 평가한다. 따라서 당사의 ESG 인증 평가항목에 기반하여 당사는 본 채권발행 ESG 인증평가결과를 차등 평가가 없는 'G1'등급에 선정한다. 다음 차이를 위한 주요 근거는 다음과 같다.

구분	내용
주요 항목	ESG채권 공시내역이 발행목적, 발행금리, 프로젝트별 ICMA의 GBP, SBP 및 환경부 녹색채권 가이드라인(K2023.12)에 준하여 공시한다.
공시항목	발행자는 본 공시정보에 발행금리, 발행 액, 발행 연도, 발행처, 채권 조달처, 채권 사용처, 채권 사용처별 ICMA의 GBP 및 환경부 녹색채권 가이드라인(K2023.12)에 준하여 차등 프로젝트별 공시한다.
프로젝트	본사의 ESG채권 공시내역이 프로젝트별 평가 및 관련 ICMA의 GBP, SBP, SBG 및 환경부 녹색채권 가이드라인(K2023.12)에 준하여 공시한다.

* Korea Ratings and NICE Investors Service

- All post-evaluations by external evaluation agencies* resulted in the highest grade (G1 and Green 1)
- Environmental improvement effects, such as increased renewable energy (solar) power generation per unit area of the same cell and module due to the introduction of new technology outlined in the report.

KRW 100 billion of ESG BLCP issued at Shinhan Bank in March 2023

As of December 2023, 8% of the funds were allocated to the **Chemical Division** for the investment in electrolyzer facilities and the conversion of solar cell and module production lines.

한화솔루션(주) Hanwha Solutions Corporation
녹색채권 인증평가 Green Bond Assessment
 승인일: 2023.03.27
 평가일: 2023.03.27
 승인기관: 한국ESG평가원

ESG 인증평가 결과	ESG 녹색채권 인증평가일: 2023.03.27.		
	인증대상	평가대상(주)	평가대상일
Green 1 (그린 1)	기업가용(%)	1,000	2023.03.07.
	기업가용(%)		2023.03.07.

인증등급(요약)

NICE 인증평가원은 한화솔루션(주)가 발행하는 본 기업가용(%)에 대해 '녹색채권'의 인증등급을 (Green 1 (그린 1))으로 평가한다. 또한, 한화솔루션(주)의 ESG 채권 관리체계(Greenwork)는 국제자본시장협회(ICMA)의 녹색채권 원칙(GBP), 사회적책임 원칙(SBP), 사회적책임 원칙(SBP), 지속가능채권 가이드라인(SBG) (Sustainability Bond Guidelines)에 [무합]하는 것으로 평가한다.

주요 평가 근거	주요 내용
프로젝트의 적절성	고효율 생산을 위한 신기술 도입 및 신기술 도입 효과
프로젝트의 선별적 적절성	신기술 도입 및 신기술 도입 효과, 평가기준, 평가항목에 대한
기업가용의 적절성	기업가용 목표 및 고조율 목표 달성
채권공시자의 적절성	적절한 공시공시 방법론 및 공시공시 체계 구축
환경영향 평가	환경영향평가를 위한 공시내역 시스템 및 내부적인 관리체계 구축

- Obtained the highest grade (Green 1) in the certification evaluation by NICE Investors Service.
- Reduction in electricity consumption and GHG emissions through the replacement of aging electrolyzer facilities and the transition to solar power lines highlighted in the evaluation report.

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RISK MANAGEMENT

We recognize eco-friendly business as a future growth engine and strive to mitigate risks associated with promoting related initiatives.

Both the **Chemical** and **Qcells Divisions** analyze trends in sustainable products, technologies, industries, markets, and competitors, identifying demand and trends through market intelligence. These insights inform development decisions made through R&D and manufacturing organization deliberations, subsequently shaping mid to long-term strategies.

The **Chemical Division** manages risks by tracking the progress of eco-friendly projects and changes in demand and trends of eco-friendly products and technologies at company-wide R&D strategy meetings held biannually. Regular industry-related newsletters, covering topics such as liquid hydrogen refueling stations, CCUS technology, and lithium market trends, are distributed weekly and shared with team members.

The Bio-ENG Research Center, within the **Chemical Division**, continuously monitors laws and permits trends related to cultured meat materials to mitigate associated risks. In addition, to address the rapid changes in the cultured meat market, the division engages in ongoing communication with the global ecosystem, including technology startups, large companies, academia, and institutions.

The **Qcells Division** identifies product and technology demand and trends through customer surveys and incorporates them into its sustainable product and technology development strategy.

METRICS & TARGETS

We set goals for sustainable product development and manage performance accordingly. The **Chemical Division** has entered into a research MOU with KAIST to enhance its capabilities in sustainable product production technology and has been jointly operating the Future Technology Research Center since 2021. Each year, the division establishes R&D goals and assess performance by monitoring progress throughout the year.

| 2023 Sustainable Technology Development Goals and Performance |

Type	Investment details	2023 Goals	2023 Performance
Process modeling technology	Comparison and analysis of the economic feasibility of CO ₂ capture technology	<ul style="list-style-type: none"> Economic feasibility evaluation of dry adsorption technology modeling LCA calculation for wet adsorption technology 	<ul style="list-style-type: none"> Economic feasibility evaluation of dry adsorption technology modeling (completed) LCA calculation for wet adsorption technology (completed)
AEC modeling and catalyst technology	Development of catalysts for hydrogen evolution reaction (HER)	<ul style="list-style-type: none"> Single-cell optimization and mechanism elucidation of NiMo catalysts PiNi catalyst synthesis and evaluation 	<ul style="list-style-type: none"> Single-cell optimization and mechanism elucidation of NiMo catalysts (completed) PiNi catalyst synthesis and evaluation (completed)
Development of high-performance carbon materials	Development of carbon material surface treatment technology	<ul style="list-style-type: none"> Performance change check through Si surface modification Powder ALD equipment setup for CMS modification and performance evaluation 	<ul style="list-style-type: none"> Performance change check through Si surface modification (completed) Powder ALD equipment setup for CMS modification and performance evaluation (completed)
Catalytic stabilization technology	Development of catalyst stabilization technology using ALD	<ul style="list-style-type: none"> ALD process optimization and multi-catalyst synthesis for highly dispersed catalyst synthesis 	<ul style="list-style-type: none"> Catalyst condition setting completed and system construction in progress
	Development of inhomogeneous catalyst stability innovation technology	<ul style="list-style-type: none"> Methane dry reforming catalyst research MDA manufacturing solid acid catalyst research 	<ul style="list-style-type: none"> Derivation of active substances with excellent coke resistance and long-term stability in high-temperature DRM reactions Securing the scale-up manufacturing method for MDA solid acid catalyst design is in progress

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Issue Definition

Activities to create a work environment that protects the physical and mental safety and health of workers are supported by a comprehensive safety and health management system.

Issue Approach

We are constructing a workplace where employees and suppliers can work safely to foster a sustainable corporate culture. We prioritize safety as our core agenda, ensuring compliance with regulations through a global-level ESH governance and system, and strive to achieve the value of ESH by fulfilling our social responsibilities.



GOVERNANCE

We prioritize the safety of our employees and continuously enhance our safety and health governance system to create a workplace free from accidents.

The **Chemical Division's** Safety and Health Management Committee, chaired by the CEO, includes the CPO/CSO, SHE Office Head, site managers, and external experts, ensuring rational and objective decision-making regarding safety and health matters. This committee conducts regular improvement activities, develops implementation plans based on the company's safety and health strategy, and forms a responsible organization with the aim of addressing the root causes of accidents. Under Article 11 of the ESG Committee Regulations, the ESG Committee is mandated to review safety and health risks, enabling identification of risks at the company-wide level and development of action plans to prevent safety hazards proactively.

Linking Performance with Compensation

Hanwha Solutions integrates safety management performance into the KPIs of key executives, including CSOs, and aligns evaluation results with the compensation system to enhance accountability for safety management.

Compensation-Linked KPI Status

Division	KPI Status
All	Included Lost Time Accident Rate (LTIR) targets in KPIs for key executives and team manager
Chemical	Included LTIR into KPIs for the CPO/CSO and SHE Office Head
Qcells	Included number of accidents, injuries, and safety improvement rate into KPIs for organizational heads worldwide, including the SHE Manager (CSO)
Insight	Included prevention and management activities for serious accidents in KPIs for the Safety and Health Manager (CSO)

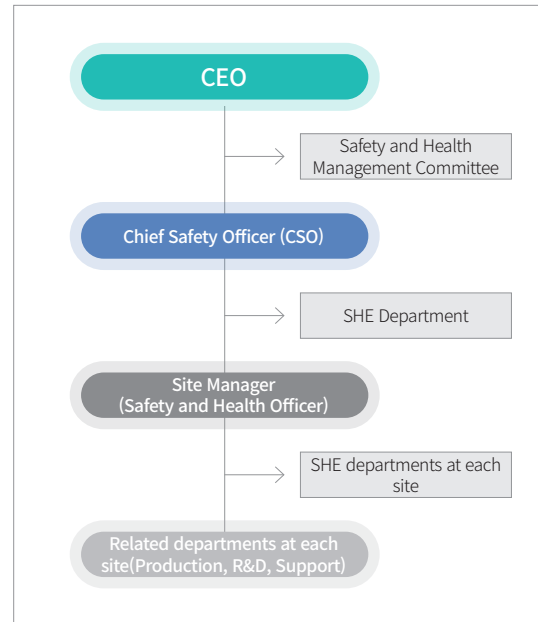
Safety and Health Management Organizations

The **Chemical Division** conducts inspections to ensure legal compliance and the implementation of safety and health at business sites, led by the CPO/CSO responsible for the company's safety, health, and environment.

The **Qcells Division** is dedicated to fostering an autonomous safety culture through the ESH Office, acting as a control tower for safety and health management. This includes establishing safety policies, conducting safety audit and evaluations, and designating safety and health personnel and an environmental safety management department at each plant and R&D Center to oversee activities such as training and safety management of suppliers.

The **Insight Division** appoints a safety and health manager, Safety and Health officer, and supervisor at each business site under the supervision of the safety and health Office, aimed at preventing safety and health accidents.

Safety and Health Management Organizations



Roles of Each Safety and Health Organizations

Organization	Roles
CSO	<ul style="list-style-type: none"> Oversee work related to safety, health, and environment Evaluate workplace safety, health, and environment implementation status
Safety and Environment Department	<ul style="list-style-type: none"> Manage tasks related to safety, health, and environment Conduct evaluations and respond to related laws Establish regulations related to safety, health, and environment
Site Managers	<ul style="list-style-type: none"> Oversee workplace safety, health, environment, and loss prevention Perform duties stipulated by the Occupational Safety and Health Act, including establishing a comprehensive accident prevention plan Attend Occupational Safety and Health Committee and Supplier Safety and Health Council
SHE departments at each site	<ul style="list-style-type: none"> Carry out duties specified in the Occupational Safety and Health Act, assisting Assist site managers in managing the safety and health environment of the site Legal compliance and safety, health, and environment
Related departments at each site	<ul style="list-style-type: none"> Responsible for safety, health, and environment and loss prevention Implement safety, health, and environment measures, including safety inspections, training, etc.

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Safety and Health Management Strategy

In response to the rapidly changing safety and health environment, we have developed the mid to long-term safety, health, and environment (SHE) strategy. This strategy is based on thorough accident analysis, safety culture measurements, staff and facility reviews, and employee interviews.

With this strategy in place, we have identified four strategic tasks to establish an autonomous safety and health management system and set annual goals across the company and developed plans to achieve these tasks at each of our business sites.



Safety and Health Management System

We have established a safety and health environment as our primary management philosophy and are committed to fulfilling our social responsibilities by operating a safety and health management system aimed at promoting exemplary ESH management.

SHE Policy

We have developed SHE policies and regulations based on ISO 45001 (safety and health management systems) and ISO 14001 (environmental management systems), which have been approved by the CEO of each division. These policies are implemented across all company employees and effectively communicated to stakeholders, including local residents.



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Reinforcing Safety Leadership

Spreading Safety Leadership

In March 2024, the **Insight Division** plans a mountaineering campaign attended by executives, team managers from each business department, and the Safety and Health Manager to demonstrate commitment to zero accidents. Through hiking, we aim to enhance management teamwork and achieve zero serious safety and health incidents.

The **Chemical Division** is promoting the operation of the Safety Committee, comprising executives from all business sites, including the Production Safety Manager and SHE Manager, to strengthen the safety and health management system. The committee will discuss methods to enhance the system by reviewing risk assessment outcomes for major factors like fire, explosion, and leaks, establishing improvement plans, and sharing results from safety culture leading indicators, such as on-site risk mitigation activities and participation rates in safety suggestions.

On-Site Safety and Health Activities Centered on Team Managers

The **Chemical Division** conducts toolbox meetings (TBMs) and critical task observation (CTO) activities under on-site leadership. Team leaders attend at least once a month to provide feedback, leading the discovery of more than 10 risk factors monthly through on-site inspections supervised by them. Similarly, the **Qcells Division** holds TBMs and monthly risk assessment meetings led by site managers, including plant and center managers, to address major risk factors. To enhance the safety competency of new and less experienced employees, observation activities with team managers are conducted to identify risks together.

Efforts are made to cultivate safety knowledge among employees and improve site safety through safety and health coaching, conducted by responsible executives down to team managers, assistant managers, and shift managers. Under the supervision of team managers, safety activities on site are actively encouraged, ensuring safety and health activities are carried out in small units.

Strengthen Safety Communication

The **Qcells Division** utilizes CEO Messages and health and safety essays to communicate the CEO's strong commitment to safety to all stakeholders at each business site. In addition, the division has developed the Environment, Health, and Safety

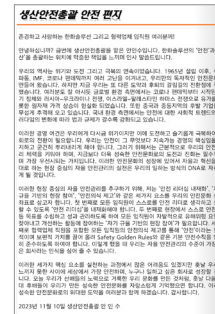
Guide and the Handbook for High-Risk Construction Work, which comprehensively cover workplace safety practices to enhance employees' understanding of safety regulations.

Safety Commitment Contest

At the end of every January, we organize a Safety Commitment Contest to enhance workers' safety awareness and to advocate for zero accidents at our sites. In 2023, the contest took place separately at the **Chemical Division's** Yeosu and Ulsan Plants, as well as at **Qcells' Jincheon Plant**, aiming to reinforce the commitment to creating a safe working environment.

Sending Safety and Health Letters

The **Chemical Division** has distributed a safety and health letter authored by the Production Safety Manager to all employees to enhance safety awareness. The letter emphasizes three key safety and health elements: internalization of safety leadership, on-site participation through self-discipline, and safety awareness. Through these efforts, we aim to communicate the goal and vision for safety with all members and endeavor to create a safer workplace.



Safety and Health Meetings

The **Insight Division** conducts safety and health meetings with executives from each business unit, safety and health management managers from each business site, and team managers from related departments.

2023 Safety and Health Meetings Held 12 times

- ① Shared recent serious accidents and similar cases within the industry
- ② Shared the safety and health status of each site
- ③ Delivered safety and health management messages
- ④ Disseminated recent major safety and health issues (media, trends, etc.)
- ⑤ Shared the performance of safety and health activities

Visible Felt Leadership (VFL) Activities

The **Chemical Division** is enhancing its safety leadership through the implementation of Visible Felt Leadership (VFL) activities at all business sites in Yeosu and Ulsan. Each month, plant managers or executives responsible for safety conduct on-site inspections to identify hazards, address concerns, and engage in constructive safety dialogues. Afterwards, meetings are held in departmental offices and conference rooms with department heads and safety and environment supervisors. During these sessions, the division shares updates on daily work status, highlight potential hazards and near misses, discuss ongoing safety improvement efforts, address areas requiring support, and review safety observation results to identify resolutions. Through these activities, the division strives to reinforce safety leadership and ensure a secure work environment for our employees.

Improving the Supplier Safety and Health Evaluation System

We have enhanced the safety and health evaluation system for our suppliers by subdividing the rating system from three to five grades and strengthening the evaluation system, increasing the safety evaluation score to 50%. Both the **Chemical** and **Qcells Divisions** conduct safety and health evaluations of suppliers in collaboration with credit rating agencies. Suppliers' safety and health capabilities are classified into grades 1 to 7, with contracts signed for suppliers rated grade 5 or higher. The **Chemical Division** offers consulting sessions for companies rated grades 6-7 to improve their ratings, followed by re-evaluations. Based on the evaluation results, the **Qcells Division** provides supervisor training and risk assessment support for suppliers, conducting various accident prevention activities such as workplace safety rounds, joint safety and health inspections, and monthly council meetings.

Safety and Health Evaluation of Suppliers

The **Insight Division** conducts safety and health evaluations for suppliers. In 2023, the division conducted safety and health assessments on a total of 76 suppliers, comprising 32 existing and 44 new suppliers.

STRATEGY

Fulfilling Safety and Health Obligations and Improving Competencies

Effective Safety and Health Training

We provide customized health and safety training based on relevant laws and regulations, such as the Occupational Safety and Health Act. The **Qcells Division** conducts an annual survey on the training needs of employees to enhance the efficiency of safety training. Based on collected opinions, an effective training plan is established, considering direction, topics, and methods, and participatory training is conducted with the aim of improving safety and communication skills among managers, supervisors, and workers. The **Insight Division** offers online training for safety and health supervisors, with 48 individuals having completed the training thus far.

Division	Date	Target	Details
Chemical	03.24.2023, 03.27.2023	Employees	On-site safety inspection handbook training
	06.23.2023	Employees	Briefing session on risk factors during work
	10.12.2023	Employees	Principle and installation of explosion-proof electrical appliances
	10.17.2023	Employees	Drawing analysis method, safety valve and flare stack design
	10.30.2023	Employees	Understanding the SMS system
	02.16.2024	CEO, Executive Officer	Psychology-based safety management trend training
	24.02	Employees	5S (Tidying, Cleaning, Cleanliness, Hygiene, Habitualization) training

Hanwha Solutions and Korea National University of Transport Sign MOU

The **Chemical Division** has signed an MOU with Korea National University of Transportation to support the completion of the Future Convergence University (four-year program) and Specialized Graduate School (two-year program) for prospective employees. By 2024, the division expects to secure eight professionals (four with master's degrees and four with bachelor's degrees) in safety disciplines.

Expert Course Training on Serious Accident Punishment Act

The **Insight Division** provided an expert course on the Serious Accident Punishment Act to the CSO. From September to December 2023, the training, conducted by Yonsei University's Graduate School of Law, covered practical measures to respond to the Serious Accident Punishment Act, strengthening professional management in safety and security cases, and minimizing corporate risks. The **Qcells Division** also supports appointed CSOs in completing CSO training courses.

Supplier Safety and Health Training

The **Insight Division** conducts various health and safety trainings for suppliers, including regular, recruitment, MSDS, and special training. In 2023, 1,418 training sessions were held, with 9,258 suppliers in attendance.

Strengthening Emergency Preparedness

The **Chemical Division** conducts emergency drills to enhance the ability to respond quickly, safely, systematically, and effectively, aiming to minimize damage in the event of a workplace emergency. These drills, tailored to various scenarios reflecting the characteristics of each business site, occur twice yearly in the first and second half of the year. Following the drills, the division analyzes the results to identify issues in the response process and establish improvement activities, strengthening the emergency response system.

H1 2023 Company-wide Joint Emergency Drills |

Classification	Details
Training	PE Production Team 3 P-908A Gas Leak and Fire
Date	06.23.2023 10:00-11:00
Organized by	SHE Manager of Base Chemical and PO
Participants	50 employees (41 from Hanwha Solutions , 9 from suppliers)
Equipment involved	2 fire engines, 1 ambulance, 1 vacuum absorber and 30 pieces of disaster prevention equipment
Areas for improvement	Check required for fire truck loudspeaker; insufficient use of stretcher when rescuing patients.

The **Qcells Division** implements regulations aimed at minimizing the impact on its employees and local residents and reducing property loss during emergencies. Each business site conducts emergency drills semiannually, focusing on scenarios like fire, leaks, and explosions tailored to site characteristics. Each site also maintains an emergency response system with dedicated teams such as disaster prevention, recovery, and support.

The **Insight Division** has developed an emergency response manual and plan for each business site. These plans outline response scenarios for emergencies such as fires and falls, as well as the roles of designated personnel. Emergency drills are conducted at least once a year at each site based on these plans.

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Entering a Safety Management Agreement

In July 2022, the **Chemical Division** signed an MOU with Korea Gas Safety Corporation (KGS) to enhance safety management systems and implement ESG management at petrochemical facilities. The safety technology cooperative body established through the agreement will promote a roadmap for IT-based mid to long-term safety management solutions, strengthen on-site safety management through cutting-edge diagnostic techniques, foster experts in facility safety management technology, and facilitate mutual growth through win-win cooperation programs with small and medium-sized enterprises.

Workplace Health Management Activities

To ensure smooth health management of employees and suppliers, the **Chemical Division** mandates the implementation of health management guidelines for each business site, including health checkups, management of suspected cases, and investigation and management of harmful factors for musculoskeletal, cerebral, and cardiovascular diseases. Regular work environment diagnoses are conducted semiannually at each site to identify hazards in the workplace, with diversified activities implemented for worker health management.

Business site	Health Management Activities
Yeosu Plant	Health manager-led consultations and check-ups
	Assessment of the suitability of cerebrovascular disease patients for high-risk work
	Investigation of cresol musculoskeletal hazard
Ulsan Plant	Inspection of 43 rest facilities and placement of humidifiers to maintain humidity
	Follow-up exams and consultations led by occupational physicians for individuals with symptoms
	Job stress assessment questionnaire and training facilitated by external lecturers
TDI Plant	Light measurements in the welding room of site 1
	Survey on the current status of noise management in sites 1 and 3
	Investigation on the status of heavy cargo operations
TDI Plant	Musculoskeletal disease prevention training
	Mental health training organized by public health centers
	Air quality, noise, and light measurements for in 6 rest facilities

Health Care Programs

The **Chemical Division** has initiated a walking program to foster employee interest in health. Utilizing the WalkOn app, all employees, including shift workers, can participate regardless of their working hours. Challenges such as the "Walk 400,000 Steps in 61 Days" and mileage challenges were introduced to incentivize participation. As a result, 1,069 individuals, accounting for 49% of all employees, joined the program, with 429 successfully completing the challenge.

Classification	Yeosu	Ulsan	TDI	R&D Center	High Pressure Tank	Bio Eng
Participation rate	41%	53%	68%	55%	100%	75%
Total employees	1,130	559	136	311	31	16
Number of participants	465	297	93	171	31	12

The **Qcells Division** conducts special health checkups for workers exposed to harmful factors by process and operates health improvement programs such as smoking cessation, sobriety, obesity, and counseling programs for those with symptoms identified during the examination and voluntary participants led by the health manager. Additionally, the division aims to create a healthy workplace by introducing low-frequency stimulators in the health management room and distributing health newsletters.

Similarly, the **Insight Division** is running an anti-smoking campaign to reduce smoking-related diseases, improve employee health, and foster a pleasant work environment. In April 2023, applicants received smoking cessation aids upon registering for two smoking cessation clinics at the public health center and received monthly check-ups on their status until September.

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Promote Safety Awareness and Culture

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Safety Golden Rules

The **Chemical Division** has established Safety Golden Rules, mandatory for all employees, suppliers, and visitors, to dismantle the culture of tolerating unsafe behavior and foster a robust safety culture. Currently, the division is monitoring employees and suppliers to ensure compliance with these rules.

01.2022

· Eight essential safety rules in the workplace were selected based on an employee survey

08.2022

· An operational plan was established to enhance employees' awareness of Safety Golden Rules

In-House Communication Channel, Square

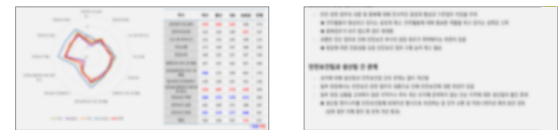
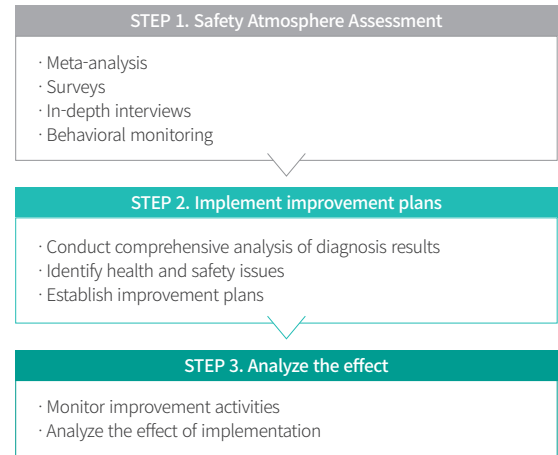
The **Chemical Division** operates an in-house communication channel called Square, where various news contents such as company updates, health and safety activities, and innovation cases are shared. This platform helps resolve information imbalances across workplaces, promotes learning and growth in health and safety, and ensures a safe work environment for all employees, contributing to the achievement of common goals.

Safety Culture Assessment

Every year, we conduct a safety culture survey for our employees and suppliers using the **Hanwha Group's** Safety Culture Assessment tool (ECO-YHES Will2.0), which comprises 50 questions across five categories: safety leadership, safety management, line accountability, training, and communication. Through this process, we assess and evaluate the safety culture level and establish improvement plans. Additionally, we promote safety culture through consulting sessions with specialized organizations, ESH personnel training, and safety letters.

Safety Atmosphere Assessment

From January 2022 to April 2023, the **Chemical Division** conducted safety atmosphere assessments at the Yeosu and Ulsan Plants and Daejeon R&D, led by safety experts and psychologists. Through surveys and in-depth analysis, the division diagnosed the safety atmosphere, identifying strengths and weaknesses in management, perceptions, attitudes, and behaviors. The division then developed indicators to address weaknesses, established improvement plans, and analyzed the effectiveness of these activities to gauge the enhancement of safety culture.



Win-Win Cooperation Between Large Companies and Small and Medium-Sized Enterprises (SMEs)

Each of our business sites actively participates in the Win-Win Cooperation Between Large Companies and SMEs program facilitated by the Korea Occupational Safety and Health Agency. This initiative focuses on enhancing the health and safety standards of suppliers and preventing occupational accidents through risk assessment and technical support activities.

Within the **Chemical Division**, the division offers consulting services to assist suppliers in establishing robust health and safety systems based on risk assessment. Furthermore, the division collaborates with external organizations to provide training sessions aimed at enhancing the competence of safety managers employed by our suppliers. The division also implements an evaluation system for suppliers to continuously assess and manage their performance, fostering a culture of health and safety participation among them. Through various initiatives like safety protection campaigns, consultation sessions at employee health centers, and the operation of coffee tea, the division aims to promote mutual growth with our suppliers.

Similarly, the **Qcells Division** regularly evaluates the health and safety capabilities of suppliers using safety and environment management guidelines. Any occupational accidents that occur at supplier sites are immediately reported to the company by the supplier's environmental safety personnel. Additionally, the division conducts regular council meetings with in-house suppliers and quarterly joint health and safety inspections to ensure ongoing improvement. To prevent safety accidents at suppliers, it organizes various programs such as ESH quiz contests, slogan contests, fire fighting competitions, and health promotion initiatives, aimed at establishing a robust safety culture.

STRATEGY

Promote Safety Awareness and Culture

Safety, Health and Environment (SHE) Awards

Every year, the **Chemical Division** holds health and safety awards and workplace health and safety environment awards to bolster employees' engagement in safety culture and foster an environment focused on health and safety initiatives. In 2023, the 2023 SHE Awards ceremony recognized three teams and three units for their contributions to accident prevention and creating a workplace free from safety incidents, aiming to encourage employees in establishing a safe working environment.

| SHE Awards – Team |

Type	Team	Award Details
Grand Prize	Yeosu VC Production Team 2	Removal of hazards through on-site safety activities per shift and GHG reduction via hydrogen blending and waste heat recovery systems
Top Prize	Yeosu PE Production Team 2	Prompt establishment of site-specific safety management systems
Top Prize	Ulsan PE Production Team	Enhanced process operation stability via analysis of shutdown histories

| SHE Awards – Unit |

Type	Team	Award Details
Grand Prize	Ulsan Plasticizer Production Team Group D	Mitigation of high-risk job accidents through CTO initiatives
Top Prize	Yeosu VC Production Team 1 VC1 and Group B	Prevention of secondary accidents via shift-centric safety management and rapid emergency response
Top Prize	Yeosu Quality Assurance Team Petroleum Resin Lab	Selection of 8 major autonomous safety management activities including precautionary measures post detection of high-pressure gas cylinder leaks

The **Qcells Division** operates an ESH reward system to incentivize safety management and accident prevention activities. Employees who contribute to solving important issues, such as discovering and improving safety risks, are selected as recipients of ESH merit awards. Business sites with no accidents or violations are also recognized to encourage the active participation of all members.

Twice a year, The **Insight Division** rewards employees who have achieved excellent performance in health and safety activities. In September 2023, the division awarded employees who identified risk factors within the workplace in the first half of the year, and in February 2024, two supervisors and one safety manager were awarded for their performance in the second half of the year. In 2024, the division plans to hold a health and safety video production contest for each site to reward outstanding participants.

Coffee Truck to Promote the Right of Work Suspension

The **Insight Division** carries out various promotion activities within the business sites to inform about the right of work suspension. In addition to the existing banners, A-type signboards, and banners, the division operates a coffee truck in the workplace during the warm season as a campaign to promote the right. Through this, the division emphasizes the importance of the right of work suspension while providing cold beverages to prevent heat stroke among workers.



Listening to the Health and Safety Opinions of Suppliers

The **Qcells Division's** Jincheon Plant listens to suppliers' opinions on safety issues through suggestion boxes and a supplier council, taking appropriate measures in response. This resulted in the handling of seven grievances, such as marking pedestrian paths in the perimeter of the plant and improving drip trays in the warehouse. The **Insight Division** has established worker suggestion boxes at each site to gather health and safety feedback from suppliers and regularly listens to workers' opinions at labor-management council meetings. Through this effective grievance handling channel, the division achieved a 100% grievance handling rate in 2023.

| Grievance Channels by Division |

Division	Grievance Handling Channel
Chemical	· Health and safety council (monthly) · Health and safety suggestion box
Qcells	· Health and safety council (monthly) · Health and safety suggestion box
Insight	· Health and safety suggestion boxes in construction sites · Anonymous open chat rooms using QR codes



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Establishing a Safety Culture

Improving Risk Factors

The **Chemical Division** meticulously manages high-risk factors prone to serious accidents, particularly focusing on hazardous work environments. The division enforces scheduling caps to prevent the concentration of potentially fatal or severely injurious tasks at specific times and implement detailed work plans accordingly. The division's efforts extend to mitigating risk factors associated with processes susceptible to major industrial accidents, with a specific emphasis on executives and team managers. At the company level, ongoing monitoring is conducted to assess critical risk factors across internal and external workspaces. The division actively promotes on-site risk identification initiatives, aiming to expand their impact through a safety mileage system.

Implementation of the Right of Work Suspension

To ensure worker safety, we have implemented the right to stop work in accordance with Article 52 of the Occupational Safety and Health Act, allowing workers to suspend work in dangerous situations voluntarily.

The **Insight Division** has installed on-site signboards and conducts regular training on the right to suspend work for new hires to alleviate worker concerns. The division aims to mitigate health and safety risks by maintaining records of work suspension instances. In 2023, the division documented 21 cases of work suspension.

Gasan System Development Center Acquires Safety Management Certification

The **Qcells Division's** Product Development Office at the Gasan System Development Center achieved certification as an excellent safety management laboratory from the Ministry of Science and ICT in December 2023. The center promptly addresses laboratory risk factors and maintains a safety management system that includes regular safety meetings to execute management plans. During the certification evaluation, the guidelines promoting voluntary participation in accident prevention activities within the laboratory and the safety awareness among researchers were recognized. Moving forward, the center's safety management protocols will serve as a benchmark, progressively extending to other research facilities. In addition, the **Qcells Division** conducts evaluations on company KPIs and site-specific indicators to reinforce environmental safety commitments at the team level and foster a robust safety culture.



RISK MANAGEMENT

Risk Assessment

At **Hanwha Solutions**, we are committed to establishing a culture that prioritizes environmental health and safety, guided by ISO45001 standards. Every year, we conduct comprehensive reviews of our operational performance and related matters, enabling us to identify and address health and safety risks effectively.

In the **Chemical Division**, the division continuously evaluates the effectiveness of its safety and health risk mitigation measures and strive to minimize safety risks. By 2025, the division plans to introduce a state-of-the-art risk-based inspection (RBI) system at its Yeosu and Ulsan Plants, enhancing safety management by considering potential risks unique to each production facility. It's goal is to achieve global safety management standards and foster a safety-focused environment.

The **Qcells Division** has developed a Risk Assessment Conference Guide to improve on-site risk factors. The division conducts regular risk assessments, complemented by daily assessments using a mobile app to identify real-time risk points. Weekly guidance on environmental safety management priorities and regular risk assessment meetings further strengthen its line responsibility system and promote worker engagement.

The **Insight Division** conducts risk assessments to proactively prevent safety risks. The division conducts initial risk assessments during new site construction, followed by frequent assessments twice a month to identify and address potential risk factors. Supervisors and health and safety managers review these assessments, which are then approved by site directors. Moreover, its ES Department conducts daily site inspections, while the PLS Department's Jade plant conducts weekly inspections to proactively address risk factors and prevent accidents.

| 2023 Chemical Division's Regular Risk Assessment Results |

Classification	Details
Participant	Chemical Division's entire Yeosu Plant (production team, engineering team, support team)
Evaluator	Engineers of each department, safety and environment managers, supervisors, etc. ※ The evaluation results of the relevant department were further reviewed by the SHE Team.
Method	Existing Yeosu Plant's work risk assessment integrated with JSA ※ Scheduled to switch to JSA-based work risk assessment in 2024
Results	① Reflect the results of regular evaluations in related documents such as work procedures. ② Manage high-risk grades (A-B grades) listed in the Important Risk Register with follow-up actions. ③ Implement the identified risk factor mitigation action plan. ④ Conduct training for work-related team members and related departments based on the results.

| 2023 Qcells Division's Regular Risk Assessment Results |

Classification	Details	
Participants	All processes of Qcells' Jincheon Plant	
Evaluator	Process engineers, EHS personnel, supervisors, and workers in each department *The evaluation results of the relevant department were further reviewed and revised by the Environment and Safety Team.	
Method	4M risk assessment	
Results	Risk Factors	Improvement Measures (degree of improvement in risk level)
	Pinch incidents due to photoelectric sensors releasing during maintenance work.	Change the system logic of photoelectric sensors (9->6)
	Increasing accidents such as crushing, falling, and tipping by cargo have risen due to the uptick in logistics movement	Install stationary work docks to prevent cargo accidents (8->4)
Robot collisions occur when processing alarms in the facility	Establish dual safeguards and establishment of work standards (6->3)	

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RISK MANAGEMENT

Safety and Health Risk Management Activities

Conducting Safety Reviews

Beginning in 2024, the **Chemical Division** has restructured the safety review evaluation process, transitioning from the SHE Office to the Safety and Health Team at each business site. This change allows on-site personnel, who possess the most knowledge of the site's characteristics and current status, to identify risk factors specific to each site and develop corresponding improvement plans.

Safety and Health Inspections Across Each Site

We conduct various safety and health inspection activities to strengthen the safety of our employees.

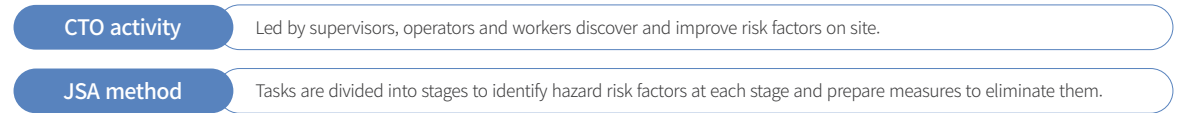
| 2023 Safety and Health Inspection Status |

Inspection	Organized by	Frequency
Workplace safety inspection	Business site	Monthly
Joint labor-management safety inspection	Business site	Monthly
Theme safety inspection	Business site	Monthly
Process safety management (PSM) system inspection	Business site	At all times
Statutory facilities (high pressure gas, firefighting, etc.) inspection	Business site	At all times
Process facilities (facilities, piping, etc.) inspection	Business site	At all times

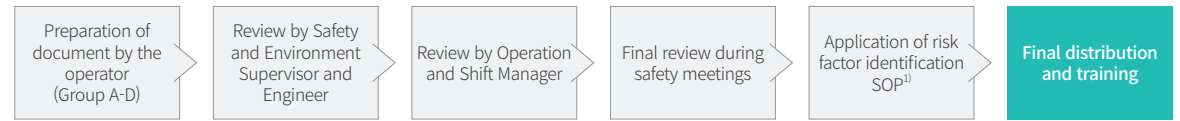
Critical Task Observation (CTO)

The **Chemical Division** is led by a supervisor who possesses the most comprehensive knowledge of onsite risk factors, tasked with discovering and improving them. The division intends to employ the Job Safety Analysis (JSA) method during Critical Task Observation (CTO) activities to thoroughly analyze and identify risk factors. JSA involves breaking down specific tasks into individual phases, pinpointing risk factors and potential accidents, and implementing measures to eliminate or prevent them. Unlike traditional risk assessment methods that may overlook specific risks by evaluating overall risks regardless of task sequence, JSA allows for the detection of more risk factors by analyzing risks at each stage of the operation.

CTO focuses on identifying various hazards that may arise during work and reducing the risk of accidents. As it is centered on supervisors such as shift managers with extensive onsite experience, and operators and workers conduct risk assessments themselves, they can identify and respond to risk factors more quickly and accurately.

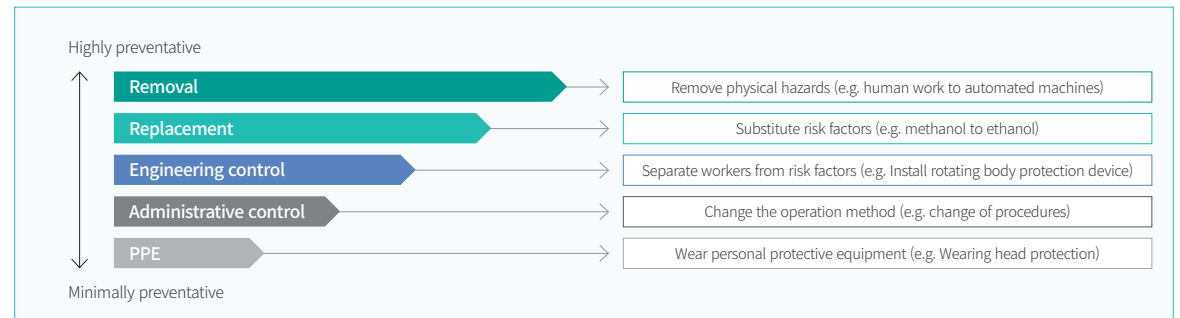


| Ulsan PE Production Team's CTO Process |



1) Standard Operating Procedure

| Improvement Measures Guidelines |



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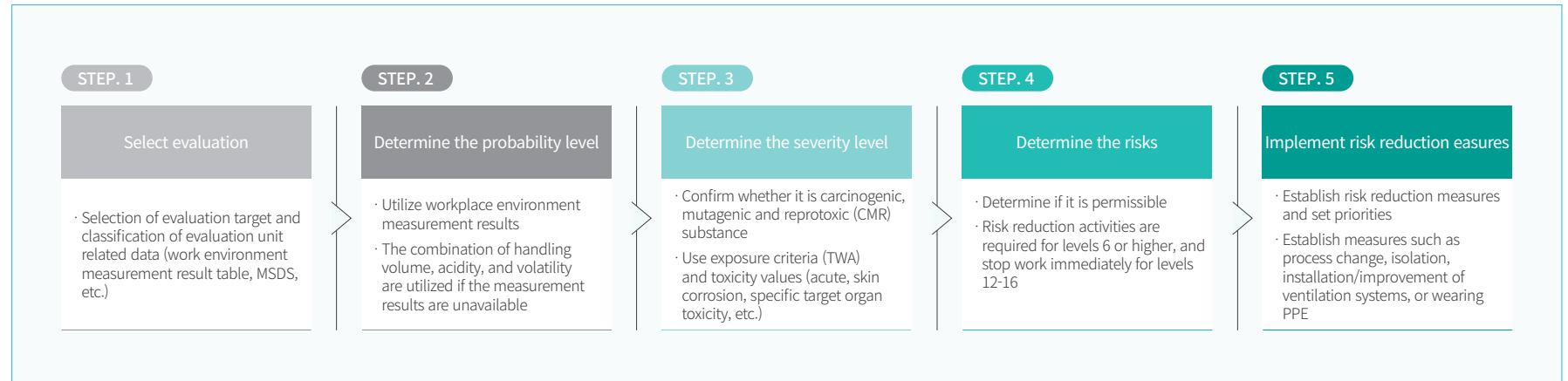
Chemical Risk Management

Chemical Risk Assessments

We evaluate the risks associated with all chemical substances we handle to enhance our employees' working environment. For processes identified as high-risk, we develop risk management measures. We have adopted the Chemical Hazard Risk Management (CHARM) system developed by the Korea Occupational Safety and Health Agency, drawing on techniques from the UK Health and Safety Executive (HSE) for risk assessment.

CHARM utilizes qualitative assessments based on workplace measurements, MSDS toxicity information, and exposure criteria. In 2023, we assessed chemical risks across 36 departments in Yeosu and Ulsan, and the findings will be shared with supervisors to develop improvement strategies. Furthermore, we aim to minimize chemical risks by implementing in-house chemical management standards that exceed legal requirements.

| Chemical Risk Assessment Procedure |



Occupational ISO 45001 (Health and Safety Management Systems) and Related Certifications

The **Chemical** and **Qcells Divisions** have maintained ISO 45001 certification across all business sites. This certification signifies compliance with international standards for occupational safety and health management, ensuring activities are managed to eliminate hazards and minimize health risks.

Through this certification, we demonstrate our dedication to safety and health management, instilling trust in customers and stakeholders while emphasizing our responsibility for safety and health. Our safety and health management system, rooted in ISO 45001 certification, focuses on risk management to reduce the occurrence of workplace accidents and illnesses.

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METRICS & TARGETS

Safety and Health Indicators

We analyze health and safety performance using division-specific indicators, identifying areas needing improvement and establishing future response strategies accordingly.

Division	Type	Initiatives	2023 Target	2023 Performance	2024 Target
Chemical	Accident	Injury	3 cases or less	3 cases	0 case
		Fire, explosion, leak	0 case	1 case	0 case
		LTIR	0.3	0.3	0
	Safety Culture	Bradley Curve ¹⁾	-	2.7	2.9
		Safety Leadership ²⁾	78.0	79.7	82.0
		On-site Participation	85.0	96.8	100

1) Instinctive (0-2.0), Dependent (2.0-2.9), Independent (3.0-3.5), Complementary (3.5 and above)
 2) Diagnosis of leader's participation in safety management and impact on members: Pathological (0-70 points), Passive (71-77 points), Systematization (78-82 points), Active (83-89 points), Benchmarking (90-100 points)

Division	Type	Initiatives	2023 Target	2023 Performance	2024 Target	
Qcells	Accident	Injuries	LTIR	0.89	1.15	0.83
		Process accidents	Fire, Leak, Explosion	0 case	0 case	0 case
	Accident prevention	Environmental safety inspection and improvement	Improvement rate	100%	100%	100%
		Near miss incident management	Reporting transparency	1.1 and above	2.6	1.1 and above

Division	Initiatives	2023 Performance	2024 Target
Insight	Attend health and safety fairs and seminars	2 times	2 times
	Safety rounds by the CSO	15 times	7 times
	Safety and health support inspection	28 times	21 times
	Safety and health evaluation inspection in response to the Serious Accident Punishment Act	15 times	15 times
	Safety and health Meetings	12 times	12 times
	Safety and health activity awards	1 time	2 times
	Fulfillment of the right of work suspension	21 cases	At all times
	Listening to workers' opinions	41 cases	At all times
	Accident-free commitment contest	-	1 time

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METRICS & TARGETS

Safety and Health Goals

Every year, we establish a health and safety plan and present reports to the board of directors for deliberation. Our goal is to build a global-level health and safety system, outlined in a mid to long-term roadmap until 2030, which includes three stages: establishment, internalization, and execution.

Goal	Establishment (2023-2024)	Internalization (2025-2027)	Execution (2028-2030)
Strengthen safety leadership	<ul style="list-style-type: none"> Strengthen management and manager-centered safety leadership Improve safety leadership coaching (position level → individuals) Spread safety leadership for suppliers Strengthen individual evaluation of health and safety managers and supervisors 	<ul style="list-style-type: none"> Conduct change management of site manager safety leadership Execute autonomous safety management Operate safety leadership enhancement program 	<ul style="list-style-type: none"> Strengthen overall leadership of employees Establish safety leadership for all employees
Encourage voluntary on-site safety participation	<ul style="list-style-type: none"> Implement risk assessment centered on high-risk tasks and processes Encourage the discovery of site-centered hazards and risk factors Improve supplier assessment system and expand of win-win safety management 	<ul style="list-style-type: none"> Implement on-site employee-led risk assessment Conduct voluntary identification and improvement of hazard risk factors Support the establishment of a safety management system for suppliers 	<ul style="list-style-type: none"> Conduct active and voluntary preventive management Establish voluntary safety management system for suppliers
Promote safety awareness and culture	<ul style="list-style-type: none"> Strengthen meetings and communication organized by management Emphasize awareness of complying with basic safety rules Diversify promotional channels and contents such as health and safety video production 	<ul style="list-style-type: none"> Reinforce site and team-centered awareness activities (meetings, events, awards, etc.) 	<ul style="list-style-type: none"> Establish a culture of free interactive communication between the company, site, and team
Enhance safety capabilities	<ul style="list-style-type: none"> Conduct training on the importance of improving harmful risk factors for supervisors (CTO & JSA) Enhance the effectiveness of education through video visualization Strengthen inspection of the response to the Serious Accident Punishment Act 	<ul style="list-style-type: none"> Improving hazardous risk factors centered on on-site employees, training on risk assessment techniques Secure the ability to update SOPs based on risk assessment <p>LTIR targets for Chemical Division in 2025: 0, 2026: 0, 2027: 0 LTIR Targets for Qcells Division in 2025: 0.5, 2026: 0.3, 2027: 0.1</p>	<ul style="list-style-type: none"> Learn risk assessment methods and share best practices among site workers <p>LTIR targets for the Chemical Division in 2030: 0</p>
Conduct safety and health investments	<ul style="list-style-type: none"> Invest with a focus on legal compliance and upgrading old equipment Enhance accessibility to the harmful risk factor discovery system (e.g., preparing safety proposals using mobile phones) 	<ul style="list-style-type: none"> Address high-risk factors identified through risk assessment Advance the access management system (e.g., access control, provision of health and safety information, etc.) 	<ul style="list-style-type: none"> Revitalize investments in health and safety based on risk assessment Enhance the smart safety management system (e.g., hands-on safety training, VR training, etc.)

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ESG Management in the Supply Chain

Issue Definition

Activities to enhance the ESG competitiveness of suppliers in the supply chain and minimizing sustainability-related risks, including material sourcing.

Issue Approach

We conduct ESG and health and safety assessments of suppliers to identify risks within the supply chain. Based on the evaluation results, we identify weaknesses and areas for improvement among our suppliers and provide consulting to strengthen ESG capabilities throughout the supply chain.



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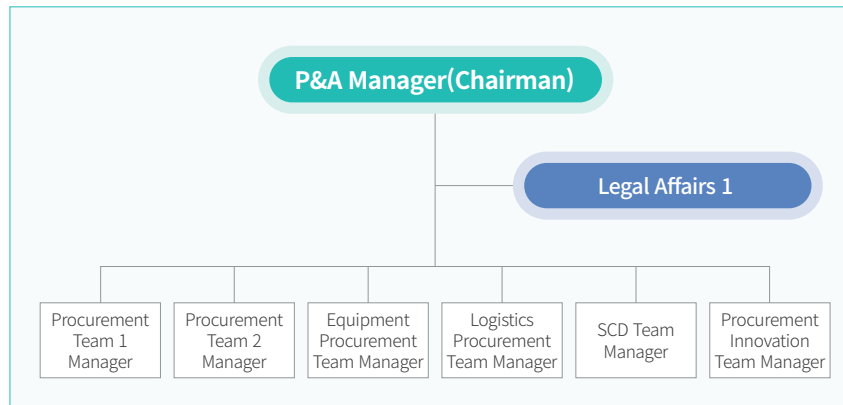
GOVERNANCE

In May 2021, we established an ESG Committee under the Board of Directors to review the ESG risks of suppliers with the goal of establishing effective ESG management in the supply chain, under Article 11 of the ESG Committee Regulations. The ESG Committee conducts quarterly reviews on fair trade and win-win cooperation policies and major activities for supply chain ESG management.

The **Chemical Division** reports to the Safety & Health Management Committee on the details of health and safety assessments, results, and measures for suppliers, and seeks to improve the level of health and safety in the supply chain.

The P&A Office and purchasing teams work together organically to plan and operate various programs for the mutual growth of suppliers and ESG reinforcement of supply chains. Starting with the deliberation of transaction details in December 2023, the Subcontract Internal Review Committee is held every month. We deliberate with legal affairs and executives in the P&A Office on legal compliance matters in the purchase planning and purchase process, and report on the results of new planning and operation of win-win cooperation programs.

Organizational Chart of the Subcontracting Internal Deliberation Committee



STRATEGY

Supply Chain ESG Management Policy

We have established a code of conduct for our suppliers and specify compliance with the code of conduct as a clause in the contract.

Supplier Code of Conduct

Implemented Date	May 2023	
Purpose	Comply with supply chain ESG management evaluation requirements, such as the Corporate Sustainability Due Diligence Directive	
Details	① Labor Rights - Voluntary work - Protection of underage workers - Adhere to working hours - Wages and benefits - Humane treatment - Non-discrimination and anti-harassment - Freedom of association	③ Environment - Acquisition of environmental permits - Pollution prevention and resource use reduction - Management of hazardous substances - Solid waste - Air pollution control - Compliance with substance regulations in products - Water management - Energy and GHG - Biodiversity conservation
	② Safety and Health - Occupational safety - Emergency preparedness - Prevention of occupational accidents and diseases - Occupational health - Physically burdened work management - Facility safety management - Sanitation, food, housing - Health and safety training	④ Ethics Management - Integrity - Prohibition of unfair advantage - Information disclosure - Intellectual property protection - Fair trade, advertising and competition - Identity protection and non-retaliation - Privacy - Responsible resource management
Target	Hanwha Solutions suppliers and employees	

The **Insight Division** has established Supplier Management Regulations, outlining the responsibilities and roles of the relevant departments.

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STRATEGY



Promoting Sustainable Procurement

We establish standards and guidelines for procuring sustainable products to promote eco-friendly purchasing and create a virtuous cycle.

Guidelines for Purchasing Eco-Friendly Products

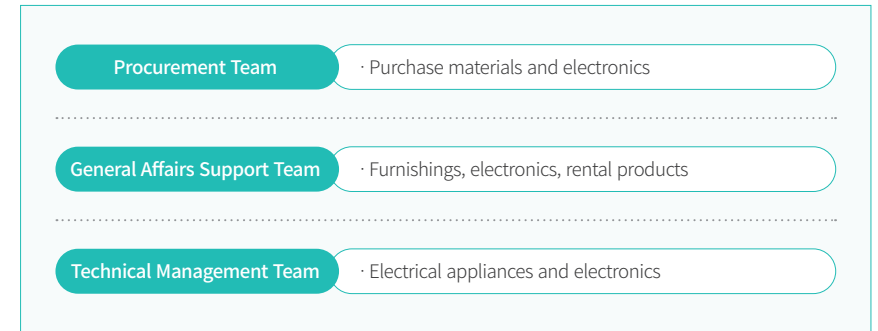
To reduce carbon emissions from the supply chain, we have established and provided an internal guide for purchasing green products. Green products minimize energy and resource use, greenhouse gases, and pollutants, encompassing items with eight major green product certifications recognized by the government and other environmental certifications.

| Green Product Certifications |

Classification	Name of certification	Applicable Law
	Environmental Sign Certification	· Environmental Tech and Industry Support Act
	Excellent Recycling Certification	· Act on the Promotion of Saving and Recycling of Resources · Industrial Technology Innovation Promotion Act
	Green Certification	· Framework Act on Low-Carbon, Green Growth
	Low Carbon Certification	· Environmental Tech and Industry Support Act
	Renewable Energy Certification (REC)	· Act on the Promotion of the Development, Use and Diffusion of New and Renewable Energy
	Excellent Certification of Standby Power Reduction	· Energy Use Rationalization Act
	High-efficiency Energy Equipment Certification	· Energy Use Rationalization Act
	Energy Efficiency level 1 or higher Certification	· Energy Use Rationalization Act

We designate and manage green purchase items for each department, with the Environment and Safety Team compiling annual results to encourage further expansion. Departments prioritize eco-friendly products when purchasing items eligible for green purchase, following internal guidelines. We are currently developing a system to strengthen green purchasing, effectively manage purchase performance and items, and gradually reduce supply chain carbon emissions by expanding the range of eligible eco-friendly products each year.

| Managed Products by Department |



Under our green purchasing strategy, we invested a total of KRW 50 million in eco-friendly products and services in 2023. Moving forward, we are committed to further expanding our procurement of eco-friendly products and services.

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Shared Growth Activities

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Technology and Training Support

Supporting Green Startups

We select eco-friendly startups and provide various forms of support to foster mutual growth, including financial assistance to develop their business models. In 2023, we partnered with Oysterable, a plastic collection box platform, to support a project promoting the separation and disposal of plastic bottles. Currently, we have installed a plastic bottle collection box at COEX, allowing citizens to earn points when they return plastic bottles. These points can be redeemed for items like t-shirts and drinks.

Component Analysis Support

We operate an ingredient analysis support system that facilitates comparative analysis of raw material ingredients, aiding in cost reduction for both suppliers and clients. In 2023, we supported over 400 component analyses for 75 companies.

Online Training Support

We launched an exclusive website for virtual supplier training to enhance their ESG management capabilities. In 2023, we conducted online training sessions for 983 participants from 556 companies, covering topics such as trade secret and technology protection, ESG management fundamentals, industrial safety, and compliance with the Serious Accident Punishment Act, with an investment of KRW 10 million. In addition, we offered ESG training to 215 employees from 130 companies focusing on ESG management and strategy.

Eco-Friendly Global Recycled Standard (GRS) Certification Acquisition Support

The **Chemical Division** strives to strengthen mutual growth with suppliers and expand the use of eco-friendly raw materials. The division covers expenses for the acquisition of GRS certification

and provide consulting for suppliers of raw materials and product shipping regarding rPE materials.

Financial Assistance

Win-Win Fund

Through strategic partnerships with major banks, we've established a win-win fund of KRW 71 billion to support our suppliers. This fund offers loans and lower interest rate benefits, enabling suppliers to access financing at a reduced interest rate of 0.4-2.0%p compared to the market rate. In 2023, we provided loans totaling KRW 19.9 billion to 25 suppliers, assisting them with their financial needs.

Win-Win Payment System

To facilitate effective fund management for our suppliers, we have implemented a win-win payment system in collaboration with financial institutions. This system allows suppliers to quickly secure cash at low cost leveraging our strong credit rating. In 2023, approximately KRW 270 billion was distributed through this system, contributing to the financial stability of our suppliers.

Early Payment of Delivery Payment

Before Lunar New Year and Chuseok holidays, we make payments to small and medium-sized suppliers who may face financial challenges due to increased expenses such as employee bonuses. In 2023, approximately KRW 51.1 billion was paid to 571 suppliers.

Enhancing the Cash Payment Rate

The **Chemical Division** pays 100% of the in cash to ensure the financial health of small to medium-sized suppliers. Similarly, the **Qcells Division** pays 100% of the payment in cash to suppliers who have signed a mutual growth agreement, helping them enhance their business stability through improved cash flow.

Market Support

Open Sourcing

We operate an open-sourcing system to offer new trading opportunities to companies demonstrating competitive capabilities in technology, quality, and cost. Upon receiving business transaction applications, we conduct procedures including written examinations and capability evaluations through internal audits. Approved companies are then selected for partnership.

| Open Sourcing System Process |

Classification	Details	
Target	All companies with competencies that can be applied to photovoltaic/chemical business, packaging, construction/facilities	
Submission	opensourcing@hanwha.com	
Processing Procedure	① Potential supplier submits application ③ Register in the temporary supplier pool ⑤ Register as a regular supplier	② Conduct written review (Open Sourcing Secretariat) ④ Conduct sample, due diligence, supply capability assessment

Fostering a Culture of Fair Trade

Four Principles of Fair Trade

We have introduced the Four Principles of Fair Trade to establish a fair trade order with suppliers and create a foundation for win-win cooperation. In 2023, we signed fair trade agreements with 195 suppliers.

Four Fair Trade Practices

1. Contract Signing Practices for Win-Win Cooperation between Large and SMEs
2. Practices for Fair Selection (Registration) of Suppliers
3. Subcontracting Internal Review Committee Operation Practices
4. Guidelines for Document Issuance and Storage

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Shared Growth Activities

Strengthening Competitiveness

Recruitment Support

We collaborated with our affiliates, corporate banks, and Korea Polytechnics to organize the **Hanuha** Group's Job Fair for Suppliers, aimed at supporting supplier recruitment efforts. As a result of our assistance, five suppliers successfully hired 10 individuals.



Consulting Support

The **Chemical** and **Qcells Divisions** offer ESG consulting and supplementary training valued at KRW 9 million to 29 major suppliers, aimed at identifying weaknesses and areas for improvement based on ESG assessments.

The **Chemical Division** extends safety and health (SH) consulting to 150 suppliers, focusing on seven key areas outlined in the Enforcement Decree of the Serious Accident Punishment Act to enhance their diagnostic and safety capabilities.

Classification	ESG consulting	SH consulting
Target	13 companies in the Chemical Division , 16 companies in the Qcells Division	150 construction suppliers of the Chemical Division
Organization	KoDATA	NICE D&B
Details	ESG assessment and improvement consulting	Safety and health assessments and improvement activities with suppliers to prevent compliance risks related to the Serious Accident Punishment Act

Participation in Win-Win Cooperation Program

We actively participate in the health and safety win-win cooperation project hosted by the Korea Occupational Safety and Health Agency, which aids our suppliers in enhancing their safety management capabilities. Through this initiative, we provide health and safety management programs focused on technical guidance and risk assessment, narrowing the gap in health and safety standards between parent companies and suppliers, and fostering a culture of voluntary win-win cooperation.

Strengthening Communication

VOC Management

We maintain a health and safety council and utilize both offline and online safety suggestion boxes to gather feedback from suppliers monthly. These suggestion boxes are strategically placed in areas frequented by suppliers at each site, and QR codes are distributed to facilitate easy expression of opinions. We recognize valuable suggestions and diligently address areas needing improvement, achieving a 100% resolution rate for all grievances across all categories in 2023.

Meetings with Suppliers

We conduct regular supplier meetings with key suppliers to share important company updates and address any concerns or suggestions they may have. In 2023, we held two such meetings, during which suggestions for improving convenience facilities in the plants and modifying assessment and payment processes were discussed. All suggestions were successfully addressed and resolved.

| Supplier Meeting Status |

Date	2023.07.18	2023.12.13
Grand Prize	Ulsan Plant's 10 suppliers	Yeosu Plant's 10 suppliers
Suggestions	Suggestions received: 4 Suggestions resolved: 4	Suggestions received: 9 Suggestions resolved: 9



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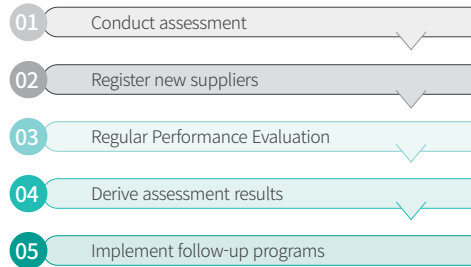
RISK MANAGEMENT

Supply Chain Risk Management

We have implemented the Supplier Selection and Management Guidelines, conducting regular assessments when registering new suppliers. These evaluations encompass ESG sustainability factors such as safety, health, environment, compliance, and anti-corruption, as well as adherence to deadlines. Utilizing an itemized checklist during assessments, we conduct thorough evaluations, incorporating credit risk ratings, financial data, and business stability assessments provided by external experts. We also continuously monitor regulatory compliance and reassess existing suppliers, operating an evaluation system for each order. Based on these evaluations, we select outstanding suppliers and consider assessment results during contract renewals.

The **Chemical Division** is preparing to enhance its supplier selection process. In the first quarter of 2024, the division will review and establish criteria for selecting companies with outstanding environmental and safety capabilities. By the third quarter, the division intends to develop an ESG purchasing policy, emphasizing incentives such as bid points for suppliers with exceptional ESG assessment results, with plans to finalize the policy by the fourth quarter.

| Supplier Assessment Management Process |



| Supplier Status |

Chemical and Qcells	Insight
1,643 companies	272 companies

The **Insight Division** regularly assesses new supplier registrations via its website and conducts annual performance evaluations. New registrations require compliance and anti-corruption pledges, with business stability assessed through a comprehensive evaluation by external credit agencies.

In 2023, the division evaluated 37 suppliers (7 design, 13 equipment, 17 construction suppliers) performing various tasks, selecting five with A grades (90 points or more), 26 with B grades (70 points or more), and six with C grades (less than 70 points). In 2024, the division will hold meetings with suppliers and consider incentives for top performers based on these results.

By June this year, we aim to complete ESG assessments and consulting for 29 companies in collaboration with credit rating agencies, offering incentives such as Dongbanmall points to highly-rated companies and additional consulting sessions to those with lower ratings.

Conflict Minerals Management

We pay attention to conflict minerals such as tin, tantalum, tungsten, and gold mined in conflict zones in Africa based on the U.S. Conflict Minerals Act. We recognize that mineral mining conflicts can result in numerous social issues, including violations of local residents' rights, environmental degradation, and funding for conflicting organizations.

To mitigate these risks, the **Qcells Division** ensures that its module products are free from conflict minerals. The division also commits to conducting regular supply chain due diligence and assessments to further minimize the risks associated with conflict minerals.

METRICS & TARGETS

We continuously develop and implement indicators and targets to enhance the ESG capabilities of our suppliers. In 2023, we provided ESG and SH consulting support along with various communication activities for our suppliers. We plan to expand our support activities further to enhance the ESG competitiveness of our suppliers.

| ESG Management Indicators and Targets for Suppliers |

Activity	2023	2024
ESG consulting for suppliers	29 companies	50 companies
Supplier SH consulting	150 companies	190 companies
Regular discussions such as regional meetings	2 times	More than 2 times
Supplier ESG support visits	29 companies	50 companies

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Transparent and Ethical Governance

Issue Definition

Activities to establish an ethical governance structure by maintaining a board of directors with independence, expertise, and diversity, and ensuring transparent information.

Issue Approach

Good corporate governance is fundamental for corporate competitiveness, long-term growth, and stakeholder protection. We maintain an independent, diverse, and expert board of directors to ensure transparent decision-making and responsible management oversight, fostering a transparent and ethical governance structure through comprehensive disclosure of board activities.

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Board Composition

Board Composition Status

We transparently disclose information about directors appointed at the general meeting of shareholders in accordance with the Commercial Act and the Articles of Incorporation. As of March 2024, the Board of Directors consists of nine members, including three inside directors, one non-executive director, and five outside directors, with outside directors comprising 56%.

Role	Name	Position	Gender (date of birth)	Areas of Expertise	Career Experience	Date of Appointment	Term
Inside Director	Koo Yung Lee	CEO of Qcells Division	Male (04.1964)	Business Administration	- Former Head of Business, Hanwha Chemical - Former CEO, Hanwha Chemical - CEO, Hanwha Solutions Qcells Division (current)	03.23.2023 (Re-appointed)	2 years
	Dong Kwan Kim	CEO of Strategy Division	Male (10.1983)	Business Administration	- Former CCO, Hanwha Q CELLS & Advanced Materials - CEO, Hanwha Corporation, Hanwha Aerospace (current) - CEO, Hanwha Solutions Strategy Division (current)	2024.03.26 (Re-appointed)	2 years
	Yi Hyeon Nam	CEO of Chemical Division	Male (03.1964)	Business Administration	- Former Head of Hanwha General Chemical's New Business Promotion Department - Former CCO of Polyolefin Business of the Chemical Division - CEO of the Chemical Division (current)	2024.03.26 (Re-appointed)	2 years
Non-Executive Director	In-Hwan Kim	CEO of Hanwha Advanced Materials	Male (04.1968)	Business Administration	- Former Head of Polymer Department at Hanwha Total Energies - Former CEO of the Advanced Materials Division - CEO of the Hanwha Advanced Materials (current)	03.23.2023 (Newly elected)	2 years
Outside Director	A Young Lee	Outside Director	Female (05.1973)	Finance and Accounting	- Former Supervisory Committee member of the Financial Services Commission - Deliberation Committee member of the Ministry of Economy and Finance Certified Public Accounting Standards (current) - Professor of Division of Business Administration and Accounting, Kangwon National University (current)	2024.03.26 (Newly elected)	2 years
	Jeong-Ho Seo	Outside Director	Male (08.1969)	Law (Lawyer)	- Former National Tax Service, Ministry of Finance and Economic Affairs - Former Examiner, National Tax Tribunal - Lawyer, WIZ Law Group (current)	2024.03.26 (Re-appointed)	2 years
	Ji-Hyeong Park	Chairman of the Board	Male (01.1968)	Economics	- Former professor, Wayne State University - Former Director of Center for Asia, Seoul National University - Professor of Economics, Seoul National University (current)	2024.03.26 (Re-appointed)	2 years
	Jae Soo Chang	Outside Director	Male (07.1962)	New business and technology development	- Former head of Science&Technology Center at Samsung - CEO of Korea University Holdings (current)	03.23.2023 (Newly elected)	2 years
	Satoshi Shima	Outside Director	Male (04.1958)	New business strategy	- Former member of the House of Representatives in Aichi Prefecture - Former Senior vice-president, CEO's office of the Softbank Corp.	2024.03.26 (Re-appointed)	2 years

Composition and Duties of Board Committees

To ensure professionalism and objectivity in decision-making, we operate five committees within the board: Audit Committee, Outside Director Candidate Recommendation Committee, the Insider Trading Committee, ESG Committee, and Compensation Committee.

In 2023, we established the Compensation Committee, composed entirely of outside directors, to ensure transparency in determining directors' remuneration.



Board Committee Regulation

Composition and Duties of Board Committees |

As of 3.26.2024

	Board of Directors				
Composition	Audit Committee (3 outside directors)	Outside Director Nomination Committee (4 outside directors)	Internal Transactions Committee (4 outside directors)	ESG Committee (4 outside directors)	Compensation Committee (4 outside directors)
Chairman	A Young Lee	Jeong-Ho Seo	Jeong-Ho Seo	Jae Soo Chang	Jae Soo Chang
Members	Ji-Hyeong Park, Jae Soo Chang	A Young Lee, Ji-Hyeong Park, Jae Soo Chang	A Young Lee, Ji-Hyeong Park, Jae Soo Chang	A Young Lee, Ji-Hyeong Park, Jeong-Ho Seo	A Young Lee, Ji-Hyeong Park, Jeong-Ho Seo
Duties	<ul style="list-style-type: none"> Supervise the management and executives Appoint an external auditor Control internal risks 	<ul style="list-style-type: none"> Establish, check, and improve the principles for the appointment of outside directors Verify outside director candidates 	<ul style="list-style-type: none"> Oversee compliance with insider trading policies as per the Fair Trade Act Develop, implement, and authorize internal transaction management standards (approving transactions exceeding KRW 5 billion) 	<ul style="list-style-type: none"> Establish mid to long-term ESG policies and deliberate on major issues Establish and revise ESG regulations Review ESG activities and conduct evaluations 	<ul style="list-style-type: none"> Deliberate on remuneration ceiling for registered directors Review directors' remuneration
Number of Meetings Held	10 times	2 times	13 times	7 times	2 times
Agenda	19 (9 resolutions, 10 reports)	2 (2 resolutions)	45 (45 resolutions)	17 (6 resolutions, 11 reports)	3 (2 resolutions, 1 report)

It reflects the performance of the Board of Directors from January 1, 2023, to March 26, 2024.

Board Operations

We operate a governance system in accordance with the Corporate Governance Charter established in 2021 to effectively oversee the company's management, coordinate interests, and ensure fairness, transparency, and independence.



Board Operation Status

Our Board of Directors holds regular quarterly meetings and occasional sessions. The Articles of Incorporation mandate a seven-day notice period before board meetings to allow a thorough review of agenda items. In 2023, we conducted a total of 14 meetings, with all details transparently disclosed on our website.



Board Independence

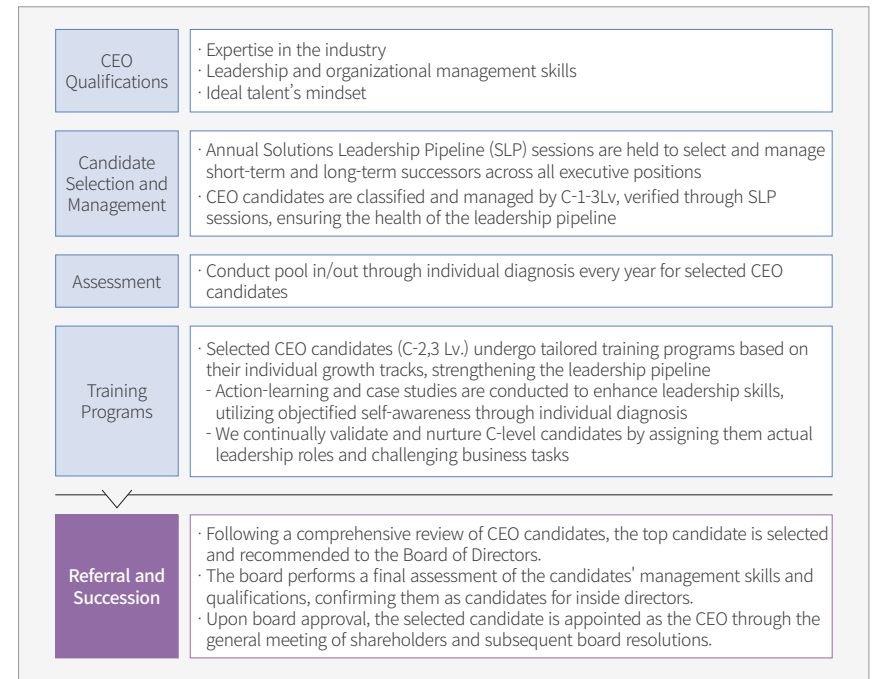
Under the regulations of the Board of Directors, we ensure independence in decision-making by prohibiting directors with special interests from exercising voting rights and being counted in the number of directors present.

We examine and verify the qualifications of outside director candidates through the Outside Director Nomination Committee, composed solely of outside directors. Information related to the appointment of directors is disclosed before the General Shareholders' Meeting to allow for a review of the specificity and consistency of director candidates.

To maintain independence in management decision-making, Article 29 (Number of Directors) stipulates that at least half of the members of the Board of Directors must be outside directors. Starting in 2024, the Chairman of the Board of Directors is appointed from among the outside directors separately from the CEO. In March 2024, the board appointed Ji-Hyeong Park as the Chairman.

We operate a CEO succession policy that is transparent and independent, identifying and nurturing potential CEO candidates based on long-term strategic direction and qualifications.

CEO Succession Policy



Board Diversity

Our Board of Directors comprises experts with diverse backgrounds transcending race, nationality, and gender. We aim to make informed decisions by providing timely management information to our external board members, who are global experts in various fields, including foreign nationals (Japanese) and women.

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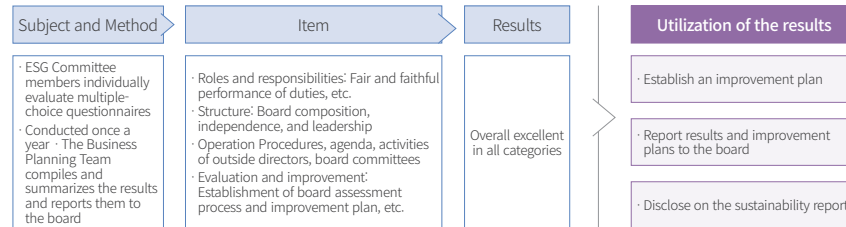
Board Operations

Board Assessment

We have implemented a board of directors evaluation system and conduct yearly assessments. Regular assessments are led by the CEO for inside directors, and comprehensive internal evaluations are conducted for outside directors at the end of their two-year term, focusing on adequacy, expertise, and participation in advising on major decision-making. The results of the assessment are reported to the board and reflected in the reappointment of directors to encourage them to actively perform their duties and engage in responsible management activities.

The board assessment consists of 39 items across four areas, including roles and responsibilities, structure, and operations. In the 2023 assessment, the board of directors received an overall excellent rating across all categories.

Board Assessment Details



The **Chemical Division** integrates safety and health management performance into the CEO's KPIs, incorporating non-financial factors into the assessment and remuneration of executives.

Board Remuneration

To enhance transparency and fairness in the roles of outside directors and ensure effective supervision of management activities, the company adheres to the total directors' remuneration limit approved by the general shareholders' meeting. This limit is set at KRW 9 billion, and all director remunerations are paid within this approved amount.

Furthermore, the CEO is granted Restricted Stock Units (RSUs) to be held for up to 10 years instead of short-term performance bonuses, promoting responsible long-term management.

(Unit: KRW million)

Role	Total	Average per Person	Number of People
Registered directors	4,638	1,159	4
Outside Director	271	97	3
Audit Committee members	254	78	3
All	5,163	516	10

Board Expertise

Our Board of Directors comprises nine individuals with diverse expertise and experience. We conduct various activities, including training sessions aimed at enhancing the expertise of outside directors, ensuring they receive the necessary support from external experts as outlined in the regulations. In 2023, ESG training was provided to all outside directors in Korea, and regular training sessions were conducted for audit committee members to enhance their understanding and expertise of the internal accounting management system, and the latest legal updates.

Board Skill Matrix

* Newly elected on 03.26.2024

Classification	Koo Yung Lee	Dong Kwan Kim	Yi Hyeon Nam	In-Hwan Kim	Satoshi Shima	Jeong-Ho Seo	Ji-Hyeong Park	Jae Soo Chang	A Young Lee*
Leadership	●	●	●	●	●	●	●	●	●
CEO experience	●	●	●	●				●	
Global	●	●	●	●	●		●	●	
Business and Accounting	●	●	●	●	●	●	●	●	●
Policy and Administration					●	●			●
Research and Development				●			●	●	●
Law						●			
Date of Appointment	2019	2020	2022	2023	2020	2020	2020	2023	2024
Independence					●	●	●	●	●
Age	04.1964	10.1983	03.1964	04.1968	04.1958	08.1969	01.1968	07.1962	05.1973
Nationality	Korea	Korea	Korea	Korea	Japan	Korea	Korea	Korea	Korea
Gender	Male	Male	Male	Male	Male	Male	Male	Male	Female

Audit Committee Training Implementation Status

Date	Organized by	Auditor	Reasons for absence	Detail
02.16.2023	Samjeong KPMG Accounting Firm	Man-Gyu Choi, Ji-Hyeong Park, Han-Joo Lee	-	Pre-approval of audit strategy and non-audit work
03.09.2023	ACF Audit Committee Forum	Man-Gyu Choi, Ji-Hyeong Park, Han-Joo Lee	-	Fraud investigations and the role of the Audit Committee
04.27.2023	Samjeong KPMG Accounting Firm	Man-Gyu Choi, Ji-Hyeong Park, Jae Soo Chang	-	Introduction to the annual audit schedule and focus areas
06.01.2023	ACF Audit Committee Forum	Man-Gyu Choi, Ji-Hyeong Park, Jae Soo Chang	-	Corporate Internal Control and Audit Committee
09.22.2023	ACF Audit Committee Forum	Man-Gyu Choi, Ji-Hyeong Park, Jae Soo Chang	-	Roles and responsibilities of internal audit and audit committee
12.22.2023	ACF Audit Committee Forum	Man-Gyu Choi, Ji-Hyeong Park, Jae Soo Chang	-	2023 K-IFRS changes and trend, and Q&A

Shareholder-Friendly Management

Transparent Disclosure of Management Information

We strive to provide market stakeholders with timely and accurate information regarding our overall management activities. In addition to mandatory disclosures and legal requirements, we disclose matters that could significantly impact the decision-making of shareholders and stakeholders. To ensure fairness and equal access to information, we disclose within the defined scope of corporate information, enabling all stakeholders to access information simultaneously.

Stock Issuance Information

The total number of shares authorized for issuance under the articles of incorporation of **Hanwha Solutions** is 300,000,000 shares. Out of the 202,472,690 shares issued, 28,004,805 shares have been decreased, resulting in a total of 174,467,885 shares issued as of December 31, 2023.

Voting Rights Status

We ensure fair shareholder rights by enabling them to participate in collective decision-making. As part of this, the voting rights of 2,544,616 non-voting preferred shares were reinstated and converted into 2,544,616 voting preferred shares.

Type	Number of shares	
Total number of outstanding shares	Common shares	171,892,536
	Preferred shares	2,575,349
Number of non-voting shares	Common shares	2,809,163
	Preferred shares	2,575,349
Number of shares with voting rights restored	Common shares	-
	Preferred shares	2,544,616
Number of shares eligible for voting rights	Common shares	169,083,373
	Preferred shares	2,544,616

Strengthening the Shareholders' Rights and Interests

Shareholder-Friendly Policy

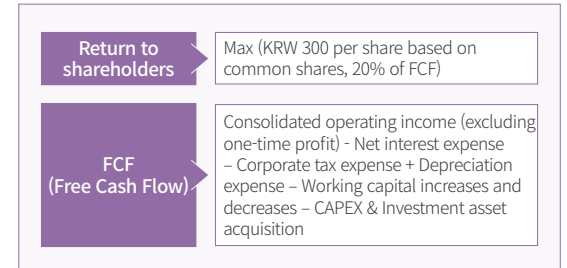
We grant appraisal rights to gather the opinions of minority shareholders and protect the rights of dissenting shareholders in the event of significant changes in the company's ownership structure or business operations.

By introducing both paper and electronic voting systems, we encourage shareholders to actively participate by exercising their voting rights without attending shareholders' meetings. Additionally, we promote proxy voting to facilitate the easy exercise of voting rights by all shareholders.

Through the implementation of a shareholder proposal system, we actively engage shareholders in management participation and collect diverse opinions. Shareholders holding more than 5/1000 of total outstanding shares can propose agenda items for the general meeting of shareholders to directors, fostering a shareholder-friendly management environment.

Shareholder Return Policy

We announced our mid to long-term shareholder return policy at the 48th General Shareholders' Meeting on March 23, 2022, and at Corporate Briefings held on February 18, 2021, February 17, 2022, and February 16, 2023, aiming to return 20% of our free cash flow to enhance shareholder value. However, over the past two years, the company has faced challenges in raising funds for shareholder returns due to negative consolidated free cash flow resulting from concentrated growth investments. Consequently, this has led to three consecutive years without dividend payments. In 2023, despite negative consolidated free cash flow due to investments in the U.S. solar power business, we plan to revise our mid to long-term shareholder return policy and aim to pay a minimum dividend until the end of 2025, balancing growth investments and short-term shareholder returns.



Shareholder Communication

We maintain active communication with shareholders and investors through various channels, including publishing a written prospectus on the company's website, conducting regular IR conferences and calls, and sharing important business operational updates. We transparently disclose information to stakeholders about the company's ESG management intentions and activities through the publication of sustainability reports, corporate governance reports, and general management updates.

| 2023 Major Activities |

Type	Details	Performance
Company briefing session	<ul style="list-style-type: none"> Quarterly earnings announcement (conference call and audio webcasting) and release of Korean/English earnings announcement materials Briefing session on major disclosures 	5 times
NDR (Non-Deal Roadshow)	<ul style="list-style-type: none"> Domestic: Regular NDRs following company briefing sessions Overseas: Company briefing sessions, Regular NDRs, and Overseas NDRs 	8 times (4 domestic, 4 overseas)
Conference/Corporate Day	<ul style="list-style-type: none"> Participate in domestic and international conferences and corporate day events organized by securities companies and conduct meetings with investors 	14 times (6 domestic, 8 overseas)
1 on 1 and multiple meetings	<ul style="list-style-type: none"> Frequent visits and conference calls 	About 150 times

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Compliance and Ethics Management

Issue Definition

Activities to prevent corruption and bribery, and ensuring compliance with all applicable laws and regulations.

Issue Approach

Ethics and compliance are crucial elements in solidifying the foundation of sustainability and mitigating risk factors in business operations. We adhere to both domestic and international laws and regulations across all our activities, establishing an ethics management system and implementing related initiatives. We aim to cultivate a noble and ethical corporate culture as a global company and fulfill our social roles and responsibilities.

GOVERNANCE

Recognizing the importance of ethical management and compliance, we operate a governance system centered on the board of directors to ensure effective responsiveness.

Annually, our Board of Directors reviews overall compliance activities, including the results of anti-bribery and compliance management ISO certification, risk management related to anti-corruption, plans for improving corruption risk management, and evaluates their effectiveness. The board has delegated authority to implement the Code of Ethics Guidelines through approved Code of Ethics and the Compliance Office has established practice guidelines in accordance with Article 26 of the Code of Ethics.

Linking to Compensation

We integrate the objective of enhancing compliance capabilities through compliance checks and training into the KPIs of executives responsible for legal compliance. We strengthen the ethical management system by aligning the performance evaluation criteria of the internal accounting management system with the KPIs of employees.

Compliance and Ethics Management Organizations

We have a compliance officer and compliance organization under the Board of Directors, conducting compliance inspections twice a year, with the Compliance Officer reporting the results to the board.

The Compliance Office has an ethical management office for each division to oversee compliance activities such as quarterly training and monthly compliance assessments.

Additionally, we've established an Internal Transaction Review Committee entirely composed of outside directors to ensure effective management of large-scale internal transactions. Aligned with the Fair Trade Act, we operate an Internal Transaction Review Committee comprised of executives and team leaders from departments such as management planning and legal affairs. This committee deliberates extensively on contract legitimacy, trading condition adequacy, and the legality of other agreements.

STRATEGY

Ethics and Compliance Certifications

We implement ethics and compliance management activities based on internal policies, which include compliance and anti-corruption policies, codes of conduct, and ethical practice guidelines. The Code of Ethics, focusing on fair trade and anti-unfair competition measures, has been revised and approved by the board.

Ethics and Compliance Policy

Code of Ethics		Compliance and Anti-Corruption	
Code of Ethics	Practice Guidelines	Policy	Code of Conduct
① Responsibilities and obligations to customers	① Selection of suppliers and practice guidelines related to fair trade	① Recognize the importance of compliance and anti-corruption management to ensure trust and transparency among employees and customers	① Compliance with Compliance and Anti-Corruption Laws
② Compliance with laws and respect the free market	② Guidelines for receiving bribes	② Comply with laws and company policy	② Compliance with compliance and anti-corruption related regulations
③ Pursuit of mutual growth with suppliers	③ Guidelines for the use of company assets	③ Prohibit corrupt acts such as bribery	③ Strict prohibition of corrupt practices
④ Basic ethics of employees	④ Guidelines for manipulation of documents and false reporting	④ Separate public and private matters and offer fair opportunity	④ Fair opportunities for all employees
⑤ Responsibilities to Employees	⑤ Environmental management practice guidelines	⑤ Establish compliance and anti-corruption corporate culture that considers conflicts of interest	⑤ Establishment of compliance and anti-corruption corporate culture
⑥ Responsibility to the nation and society	⑥ Guidelines related to fair trade and unfair competition prevention	⑥ Raise issues without fear of retaliation	
	⑦ Other basic ethics of employees	⑦ Ensure the authority and independence of the compliance officer	
	⑧ Compliance with practice guidelines		

Fair Trade Policy

Adhering to Fair Trade Principles to safeguard the rights and interests of stakeholders, we introduce the four fair trade practices and the Code of Ethics practice guidelines.

These documents define corrupt acts as promising, providing, or soliciting bribes, kickbacks, and engaging in unfair solicitations. Our Code of Ethics and Practice Guidelines also address conflicts of interest, outlining behavioral standards for employees and specifying permissible actions regarding money, entertainment, convenience, suppliers, and stakeholders.

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STRATEGY

Ethics and Compliance Implementation and Promotion Initiatives

Compliance Inspections

We conduct semiannual compliance inspections across all departments and divisions, led by the Compliance Officer through the Compliance Office, with results reported to the board. Each department's compliance inspectors also conduct self-inspections semiannually, covering four categories: general compliance, civil and commercial compliance, criminal compliance (including fair trade, unfair competition, licensing, and other areas). They submit response plans for non-compliance to the compliance office and monitor their implementation.

We evaluate our system's effectiveness annually through an external law firm. The 2023 evaluation confirmed that compliance control standards and inspection activities are operating effectively.

Classification	H1	H2
Date	08.24.2023-09.01.2023	01.12.2024-01.26.2024
Purpose	Reviewed internal work processes to promote compliance and confirmed the willingness to comply	
Target	All divisions	
Results and actions taken	<ul style="list-style-type: none"> Conducted departmental compliance checks based on checklist Submitted the results to the compliance office If any issues found, actions were taken by the compliance office Reported to the board 	

Ethics Consultation and Reporting System

We operate an ethical management HOT LINE where customers and suppliers can seek consultation and report damages resulting from violations of the Code of Ethics and unfair acts by employees. If an employee receives money, valuables, or entertainment from a stakeholder, they are required to complete a self-diagnosis form and report it to the Ethics Management Secretariat.

Upon confirmation of the reported facts by the secretariat, necessary measures are taken in accordance with laws and regulations. The identity of the reporter and the details of the report are strictly kept confidential in adherence to compliance control standards, and the reporter is guaranteed not to face any disadvantage due to the report.



Ethical Management HOT LINE

Internalizing Employee Ethics and Compliance

We enhance employees' awareness of ethics and compliance management through regular training sessions covering topics such as anti-corruption, ethics, disclosure policy, trade secret and technical data compliance, and the Subcontracting and Mutually Beneficial Cooperation Acts. We also issue a compliance letter every month to inform employees about regulatory trends essential for compliance. Twice a year, during holidays, we distribute ethics and compliance management letters to employees, customers, and suppliers. These initiatives are designed to ensure that employees grasp relevant matters fully and improve their compliance capabilities.

| 2023 Compliance Training Status |

Training	Details	Grand Prize
Customs and Foreign Exchange Law Training	Training for those in charge of related affairs such as purchasing, finance, legal affairs to prevent violations of laws and regulations	All employees
Construction Laws Training	Training for the employees of Insight Division running real estate development business on construction laws and regulations	Insight Division's business units, one manager and one member
Anti-corruption and Ethics Compliance Training	Introducing domestic anti-corruption laws and cases to all employees, raising anti-corruption awareness such as Fair Trade Commission investigation procedures	All employees
Fair Trade Act Training	Introduced major contents and cases of internal transaction and unfair joint practices	Strategy Division's employees
Training on Personal Information Protection Laws	Raising awareness of personal information and major precedents related to personal information leak	All employees
Training on Subcontracting and Win-Win Cooperation Act	Training on major regulations and trends, focusing on subcontracting and consignment transactions	Purchasing department employees
Training on Trade Secrets and Technical Data	Training on the concept of trade secrets and technical data and the need to protect them	All employees

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STRATEGY

Internal Accounting Management System

Improving the Management System

To strengthen our internal control system, we have enhanced our company-wide internal accounting management in collaboration with an external accounting agency, introduced an internal accounting management system, ICARUS, and established a dedicated internal accounting team. Through semiannual risk identification meetings, we assess internal and external changes that impact our management system and mitigate associated business risks.

We conducted a system operation project with an external accounting agency to establish a group's internal accounting management system. We have developed operational plans for our subsidiaries worldwide, reviewing procedures and expanding the evaluation scope to include distribution guidelines and monitoring progress on a consolidated basis. Furthermore, we have implemented Group-level controls such as ethics regulations and fraud prevention programs, ensuring the transparency and reliability of our financial statements.

Internal Accounting Management System Inspection

An annual audit of the internal accounting management system is conducted by the CEO and internal accounting manager. Using the operational system of the Internal Control over Financial Reporting (ICFR), we assess the effectiveness of our internal accounting management system and report the results to the Audit Committee, the Board of Directors, and the General Shareholders' Meeting.

The Audit Committee evaluates the internal accounting management system and its operational status based on exemplary reporting standards. We also collaborate with external auditors to review the adequacy of our audit plans and results.

Internal Transactions Management Activities

Strengthening Internal Transaction Management

We are currently conducting deliberations on internal transactions involving all domestic and overseas affiliates. The Internal Transactions Committee has been established to approve matters requiring the Board of Directors' approval under the law. All insider trading cases undergo review by the committee to ensure legality.

We conduct further internal deliberations during the internal contracting process to ensure both the legality and reasonableness of the contracts. Moreover, we hold meetings where other departments review the deliberations and incorporate them into the contract-signing process to mitigate the risk of unfair trade practices among affiliates.

Fair Trade Compliance Program

We have implemented a fair trade compliance program aimed at enhancing the credibility of our business practices. This program includes an internal compliance system that outlines basic standards and procedures for adhering to fair trade laws during business operations.

A Head of Compliance, appointed by the CEO, oversees the operation of the Fair Trade Compliance Program, and a dedicated compliance department is in place to supervise its implementation.

Activities to Ensure Regulatory Compliance

The identity of the reporter and the details of the report are strictly confidential, following compliance control standards, and reporters are assured they will not face any disadvantages as a result of their report.

Activities in Response to Environmental Regulations

Law	Response Activities
Fair Trade Act	· Distribute guidelines for reporting incorporation and exclusion of affiliates
Subcontracting Act	· Proceed with disclosure following legal review for law revisions, ensuring lawful disclosure including scope, target, and application period of the law · Review and distribute public tender selection and subcontractor selection notice of bid results
Win-Win Cooperation Act	· Distribute practice guidelines, provide contract standards · Review the legality of the entire process related to the delivery price interlocking system
Unfair Competition Prevention Act	· Inspect internal conditions and maintenance of related regulations

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RISK MANAGEMENT

Fair Trade Risk Assessment Results

To strengthen our commitment to fair trade and voluntary compliance, we manage risks in each division. After conducting risk assessments related to fair trade and establishing plans to mitigate them, we manage risks by evaluating the effectiveness of implementation measures.

Fair Trade Risk Assessment and Response Measures by Division

Division	Risk	Rating	Measures Taken	Future Plan	Effectiveness of Measures
All	[Operational Risk/Compliance] Risk due to violation of purchasing-related laws such as the Fair Trade Act and the Subcontracting Act	No level	<ul style="list-style-type: none"> Completed compliance check and result report for all teams in P&A room: Compliance inspections and results were implemented In January and September 2023 Completed internal compliance training organized by the Compliance Office: Customs, Foreign Exchange Training (Q1), Anti-Corruption Training (Q3), Construction-related Laws and Regulations Training (Q2, Insight Division) Training for P&A Office: Practical training on foreign capital purchase (Customs Law) (Q4) 	<ul style="list-style-type: none"> Scheduled compliance inspection Compliance Office-led internal compliance training scheduled for Q4 Training on delivery price interlocking system scheduled for P&A Office and Plant Purchasing Team In-person training for P&A Office and Plant Purchasing Team [Chemical (Ulsan, Yeosu), Qcells (Jincheon)] 	<ul style="list-style-type: none"> Heightened awareness of violations of the law due to regular compliance inspection Cultivate legal knowledge and raising awareness of compliance with the law among employees Reducing the risk of legal violations that may occur during work
Chemical	[Compliance] Risk of collusion between peers	No level	<ul style="list-style-type: none"> Conduct regular compliance training for salespeople (related to Fair Trade Act, etc.) 	<ul style="list-style-type: none"> Secure the effectiveness of risk reduction through the introduction of a compliance training result evaluation system 	<ul style="list-style-type: none"> The probability of collusion risk can be reduced through compliance training Management impact in risk assessment index reduced 4 points -> 3 points
	[Compliance] Risk of collusion between peers	No level (L)	<ul style="list-style-type: none"> Conducted regular company-wide training once/year 	<ul style="list-style-type: none"> Plan to manage throughout the year 	
Qcells	[Compliance] Risk of collusion between peers	No level (L)	<ul style="list-style-type: none"> Report semi-annual compliance inspection and results Implement thorough management of information sharing with customers and market stakeholders Monitor competitor trends through customers and agencies, etc. 	<ul style="list-style-type: none"> Continue monitoring of competitors 	<ul style="list-style-type: none"> Expect a decrease in the likelihood of occurrence from stage 2 (2 points) to stage 1 (1 point)
	[Compliance] Risks related to internal control over the selection of research equipment maintenance companies and the execution of costs and corporate ethics	No level (L)	<ul style="list-style-type: none"> Select designated companies through the vendor evaluation rubric Overview of annual maintenance services contracts <ul style="list-style-type: none"> - Period: 10.01.2023-09.30.2024 - Contractor: Syscon Technology - Details: 13 types of deposition facilities for PM and BM in Pangyo R&D Center 	<ul style="list-style-type: none"> Cross-check for cost adequacy of execution costs Write a statement of work quality 	
	[Compliance] Risk of violation of laws such as fair trade and anti-corruption: External agency contract process and legal compliance	No level (L)	<ul style="list-style-type: none"> Complied with the contractual process Adhered to the fair bidding process Established the scope of work through a thorough contract review and prevented issues during the project 	<ul style="list-style-type: none"> Adhere to the bidding process and provide business opportunities to more companies and win-win Ensure compliance with internal contracts and purchasing processes to prevent legal and public payment issues 	
Insight	[Compliance] Financial risk and failure to deliberate internal transactions	No level (L)	<ul style="list-style-type: none"> Informed those eligible for Internal transaction deliberation Implemented detailed review of the agenda subject to insider trading deliberation Conducted continuous monitoring of missing insider trading deliberations 	<ul style="list-style-type: none"> Develop an identification process for missing items 	<ul style="list-style-type: none"> Missing insider trading deliberations continue decline due to continuous monitoring Management impact in risk assessment index reduced 3 points → 2 points
	[Compliance] Fair trade risk	No level (under monitoring)	<ul style="list-style-type: none"> Established regulations of the Internal Transaction Review Committee and assessed risks (13 cases) 	<ul style="list-style-type: none"> Plan to manage continuously 	<ul style="list-style-type: none"> Internal transaction deliberation allows managing fair trade risks to be mitigated in advance
Insight	[Compliance] Risk of uncertainty such as unfair solicitation in the process of company selection, contract, and contract renewal	No level (under monitoring)	<ul style="list-style-type: none"> Completed construction of Unifier, outsourcing purchasing system 	<ul style="list-style-type: none"> Review and upgrade outsourcing purchasing system supplements 	<ul style="list-style-type: none"> Outsourcing purchasing system enables the prevention of related risks in advance

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RISK MANAGEMENT

Ethics and Compliance Certifications

We have acquired international standards ISO 37001 (anti-bribery management systems) and ISO 37301 (compliance management systems) to mitigate legal risks and establish robust anti-corruption management. In 2023, we maintained these certifications following post-audit and renewal audits, and we will continue to implement ethics and compliance management in line with relevant global standards.

| 2023 ISO Certification Renewal Audit Results |

Date and Scope	11.15.2023-11.17.2023/All divisions
Purpose	<ul style="list-style-type: none"> Assess compliance with audit standards, understanding, and effectiveness of policies and objectives. Evaluate management effectiveness and status. Verify the validity of corrective measures for non-conformities. Assess the organization's ability to meet legal, regulatory, and customer requirements. Identify potential improvements in the management system.
Results	No abnormalities (eight improvement recommendations)
Examples of improvement recommendations	<ul style="list-style-type: none"> Align compliance and anti-bribery policies with "Hanwha Spirit and Hanwha's Core Values" to integrate them into corporate culture. Ensure anti-corruption measures, such as obtaining a confirmation letter of ethical management, when contracting suppliers.

METRICS & TARGETS

To advance as a leading compliance company, we have established quantitative and specific goals related to fair trade, which are disclosed through our Code of Ethics Guidelines. Aiming for zero violations of fair competition laws, including those related to fair trade, trade secret infringement, and unfair competition, we monitor performance after implementing related activities.

| Activities to Promote Fair Competition |

Classification	Detail	2023 Performance
Compliance inspection	<ul style="list-style-type: none"> Conduct inspections for each department semiannually led by the Compliance Office 	<ul style="list-style-type: none"> Conducted two regular inspections
Risk management	<ul style="list-style-type: none"> Identify risks related to unfair trade and unfair competition in each department Quantify identified risks by assigning risk ratings Establish and implement an action plan to reduce risk 	<ul style="list-style-type: none"> Risks were identified and assigned ratings for each division, followed by the implementation of action plans. Effectiveness assessment resulted in risk improvement
Compliance training	<ul style="list-style-type: none"> Conduct training for related employees at least once a quarter Publish a compliance letter once a month 	<ul style="list-style-type: none"> Four quarterly trainings and other occasional trainings were completed Published 12 compliance letters
Board-level compliance and risk management	<ul style="list-style-type: none"> Conduct board-level discussions on annual compliance support activities and risk management reports Implement unfair trade and unfair competition prevention and mitigation measures at the board level 	<ul style="list-style-type: none"> Reported to the board three times in 2023 on compliance activities, risk management results, etc.

Part 2.

General Issue Performance

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Human Rights and Diversity	97
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Biodiversity Management Governance

Recognizing biodiversity management as a crucial factor in running a sustainable business, we have implemented a management system to minimize negative impacts on biodiversity and mitigate related risks.

Our ESG Committee reviews biodiversity conservation goals and detailed implementation plans, overseeing activities and performance as outlined in the regulations.

Biodiversity Management System

We have implemented a management system to safeguard the surrounding ecosystem by preventing soil contamination from production waste. Specific storage facilities have been established for managing soil-related substances, and primary protection measures like curb walls are actively in use. We also operate pollutant detection and alarm devices for secondary safety measures.

Furthermore, we have developed a roadmap for gradually aligning with TNFD standards to enhance our biodiversity management system, aiming to expand our biodiversity activities and set impactful goals for ecosystem resilience.

| Biodiversity Goals |



Biodiversity Conservation Activities

The **Chemical Division** prepares an inspection register for soil pollution prevention facilities and conducts regular soil contamination inspections to minimize the impact of business operations on the soil. In 2023, the division conducted a soil contamination test for VC at the Ulsan Production Site.

The **Insight Division** frequently inspects the company's soil contamination levels and takes immediate action in case of an accident.

CASE 1

Recognizing the critical issue of biodiversity loss, we engage in conservation efforts. In 2023, we removed 18,000 largemouth bass, which disrupt the ecosystem of Yongdong Reservoir in Gyeryongsan National Park—a habitat for endangered otters and pond turtles. At Gyeongju National Park, we participated in volunteer activities to remove four species of ecosystem-disturbing plants (maple leaf ragweed, ginseng vine, ragweed, and mowing) and planted 230 species of native plants such as mountain azalea. These efforts contribute significantly to biodiversity conservation, stabilization, and the expansion of national carbon sinks.

CASE 2

From 2022 to 2023, the **Qcells Division** actively participated in **Hanwha** Group's Solar Beehive project to protect endangered honey bees. Solar Beehive, utilizing smart technology within a honeycomb structure, provides an optimal environment for bee growth vulnerable to climate, temperature, and humidity changes. Managed in real-time via an app, this initiative supports bee growth and species conservation efforts. A pilot installation at Korea National University of Agriculture and Fisheries provided an optimal habitat for approximately 40,000 honey bees, with growth and activity data made freely available for research. Our company contributed by supplying solar module products to power Solar Beehive operations with renewable energy, thereby ensuring carbon-free emissions.

Biodiversity-Related Risk Management

Biodiversity-Related Risk Assessment

Based on the LEAP approach proposed in the 2023 Taskforce on Nature-related Financial Disclosures (TNFD), we conducted a natural status assessment of 29 global sites, encompassing 16 direct operations and upstream activities. We also analyzed the impact and dependence of four directly operated sites, evaluating risks and opportunities derived from this assessment.

LEAP Approach-Based Biodiversity-Related Risk Identification Process and Results

	Locate	Evaluate	Assess	Prepare
Analysis tool	<ul style="list-style-type: none"> Geographic Information System (GIS) 14 layers of nature-related data 	<ul style="list-style-type: none"> SBTN (Impact Screening) ENCORE (Impact and Dependence) 	<ul style="list-style-type: none"> WWF BRF Sensitive areas, impact, dependence results 	<ul style="list-style-type: none"> Analysis results of the previous stage Hanuha Solutions' internal data
Process	<ul style="list-style-type: none"> GIS analysis on 29 sites After analyzing a total of 14 layers, if one or more layers appear to be high or higher, it is identified as a sensitive area 	<ul style="list-style-type: none"> Among the business sites identified as sensitive areas or with high water-related risks, large-scale and located in Korea (Yeosu, Ulsan, Jincheon, etc.) are selected for impact and dependence assessment Use Encore to identify process-specific natural impacts and dependencies 	<ul style="list-style-type: none"> Identify risks using the results of the analysis of the natural status and the dependence of natural effects by process Identify opportunities in the risk mitigation process based on identified risks 	<ul style="list-style-type: none"> Analyze the status of information disclosure and the gap after identifying information disclosure requirements such as TNFD, SBTN, CSRD, CDP, etc., Establish response measures considering ESG governance, activities, future plans

Businesses located in sensitive areas by type

- Importance of biodiversity
 - Chemical Yeosu Hydrocarbon Resin
- Ecosystem integrity
 - Qcells Jincheon
- Physical water risk
 - Chemical Yeosu 1,2,3, Hydrocarbon Resin, TDI, Ulsan 1,2,3
- Importance of ecosystem services
 - Chemical Yeosu 1,2,3, Hydrocarbon Resin, TDI, Qcells Jincheon

ENCORE Impact and Dependence Assessment Results

ND: No impact data available

Division	Business site	Natural Impact			Reliance on Ecosystem Services			
		Very High	High	Medium	Very High	High	Medium	
Chemical	Yeosu1	GHG	- Use of water resources - Air, water, soil pollution and waste - Use of soil ecosystem	ND	ND	Groundwater Surface water	Protection from flooding and storms	
	Yeosu2	GHG	Pollution	- Air, water pollution, soil pollution and waste	ND	ND	Protection from flooding and storms	
	Yeosu3	Use of water resources	Comprehensive water and soil pollution	Air pollution	ND	ND	ND	
	Yeosu Hydrocarbon Resin	- GHG - Use of water resources - Use of soil ecosystems	Air, water, and soil pollution Waste	ND	ND	Groundwater Surface water	Protection from flooding and storms	
	Ulsan1	- GHG emissions - Use of water resources	- Air, water, and soil pollution - Waste - Use of soil ecosystems	ND	ND	Groundwater Surface water	Protection from flooding and storms	
	Ulsan2	Use of water resources	Comprehensive water and soil pollution	Air pollution	ND	ND	ND	
	Ulsan3	Use of water resources	Comprehensive water and soil pollution	Air pollution	ND	ND	ND	
	Qcells	Domestic plants (2 locations)	ND	Water and soil pollution	- Waste - Pollution	ND	ND	Groundwater Surface water

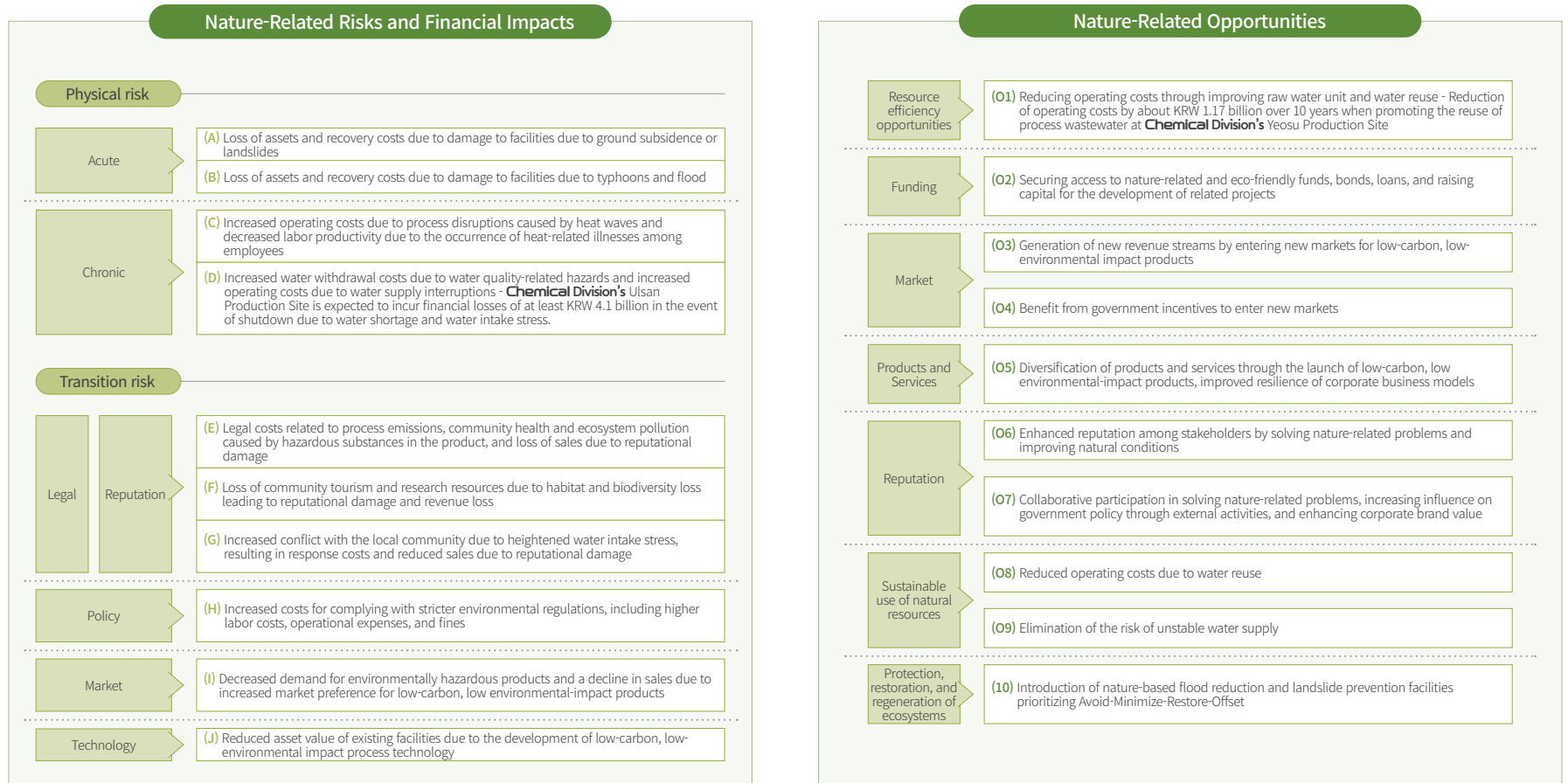
WWF BRF hazard identification results*

Legend: ■ : 4.0 or above, ■ : 3.0-3.9 points, ■ : 2.0-2.9 points, ■ : Less than 2.0

	Chemical							Qcells	
	Yeosu 1	Yeosu 2	Yeosu 3	Yeosu Hydrocarbon Resin	Yeosu TDI	Ulsan 1	Ulsan 2	Ulsan 3	Domestic plants (2 locations)
Tropical Cyclone	■	■	■	■	■	■	■	■	■
Contamination	■	■	■	■	■	■	■	■	■
Landslides and ground settlement	■	■	■	■	■	■	■	■	■
Media interest	■	■	■	■	■	■	■	■	■
Protected and conservation areas	■	■	■	■	■	■	■	■	■
Region of international interest	■	■	■	■	■	■	■	■	■
Labor and human rights	■	■	■	■	■	■	■	■	■
Water scarcity	■	■	■	■	■	■	■	■	■
Restriction on wildlife availability	■	■	■	■	■	■	■	■	■
Water quality	■	■	■	■	■	■	■	■	■
Fire hazard	■	■	■	■	■	■	■	■	■
Heat wave	■	■	■	■	■	■	■	■	■
Air quality	■	■	■	■	■	■	■	■	■
Species Crisis	■	■	■	■	■	■	■	■	■

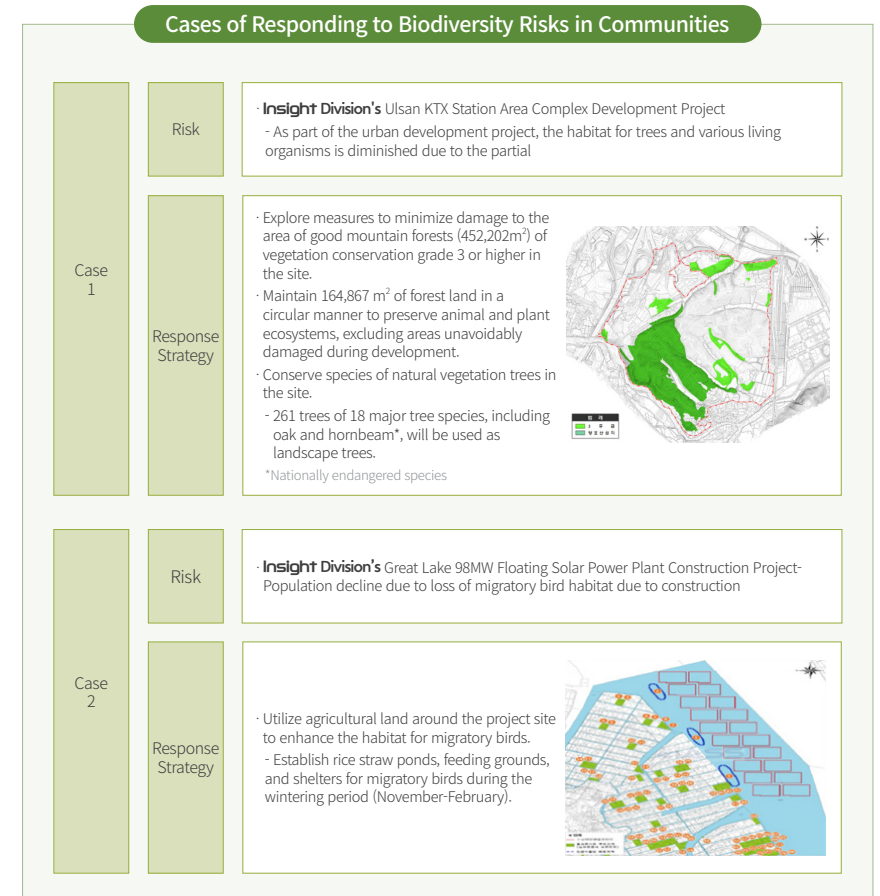
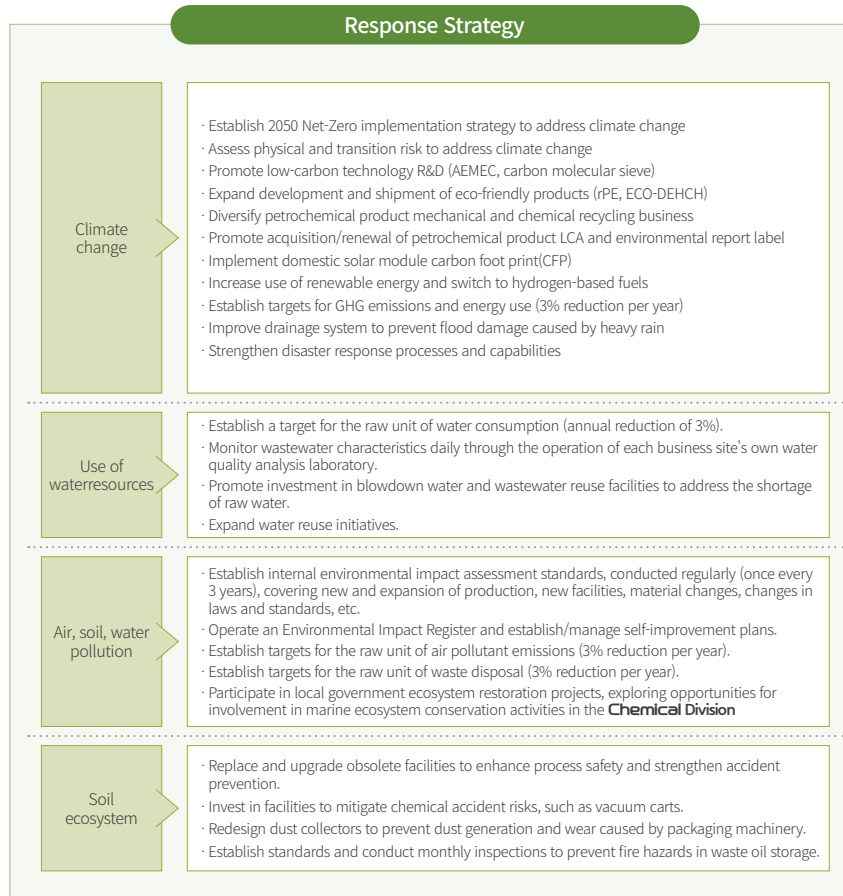
Identifying Biodiversity-Related Risks and Opportunities

By closely examining the risks identified through the LEAP approach, we identified key natural hazards and assessed potential financial impacts on our operations. These identified risks and their financial implications will inform our internal activities and strategic planning. Furthermore, we identified opportunity factors based on the risk assessment results from our four business sites and an analysis of TNFD nature-related opportunity types.



Responding to Biodiversity Risks and Opportunities

We have established response strategies based on the analysis of biodiversity-related risks and opportunities on our business activities. When developing these response measures, we take into account the status of ESG governance, ongoing improvement activities, and implementation plans. We aim to develop response strategies that effectively minimize negative impacts on biodiversity while maximizing positive contributions.

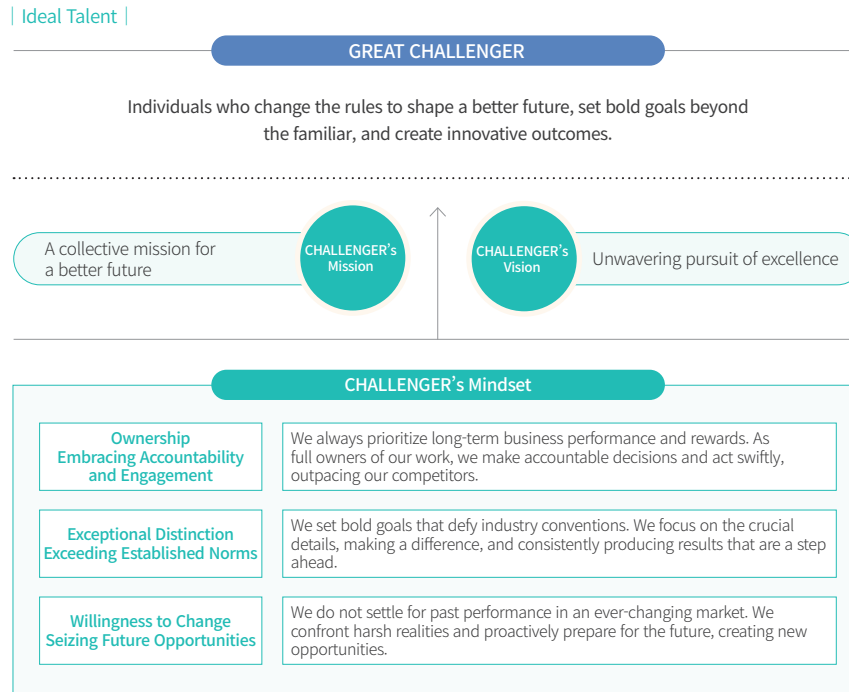


Talent Acquisition

Ideal Talent

We have introduced our new talent award, the Great Challenger, for 2023 as part of our efforts to emerge as a global champion. Our ideal talent embodies three key mindsets: a strong sense of ownership, a commitment to competitive differentiation, and a willingness to embrace change.

With the launch of the 2023 Talent Award Campaign, we are initiating training sessions and workshops to highlight the importance of these new talent qualifications. We are also focusing on cultivating in-house instructors who will play a crucial role in disseminating these ideals. Through ongoing initiatives like these, we aim to redefine our organizational culture and nurture talents who embody these desired qualities.

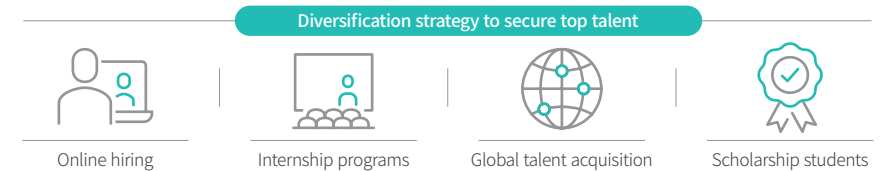


Talent Acquisition Strategy

We utilize various virtual platforms for recruiting top talent, including internships, co-ops, scholarship support, job counseling sessions via social media platforms like KakaoTalk open chat, and online interviews. To expand our global business and enhance our competitiveness, we continuously seek domestic and international experts with expertise in eco-friendly energy and materials.

Our recruitment strategy is based on competencies, incorporating a three-month internship program to identify individuals with practical expertise. The relevant department actively participates in the recruitment process to ensure thorough verification of applicants' competencies. Through this talent acquisition approach, we attract individuals who align with our objectives and tasks. The **Chemical Division** actively engages as a member of the Chemical & Bio Industrial Skills Council, contributing to the development of human resources by establishing standards for talent development in the chemical and bio industries and managing related information.

| Talent Acquisition Strategy |



New Employee Training and Retention Program

We implement a system to facilitate competency development and smooth onboarding for new employees. Through both Group-level and company-specific introductory training sessions, we aim to deepen students' understanding of the company and foster essential job competencies. Specialized training is provided for technical personnel in engineering and research roles. To further support new hires, we offer an eight-week mentoring program led by seasoned professionals, fostering both skill enhancement and camaraderie among mentors and mentees.

The **Qcells** and **Insight Divisions** offer various programs such as weekly and monthly on-the-job training (OJT) Reports, specialized lectures, and field trips to enrich employee development. Meanwhile, the **Chemical Division** emphasizes the importance of adaptation and integration by organizing training sessions for new employees to mark their first year of employment. These initiatives aim to strengthen communication skills and deepen understanding of the company among both new and experienced employees.

Talent Management

INTRODUCTION

OVERVIEW

PART 1. CORE ISSUE PERFORMANCE

PART 2. GENERAL ISSUE PERFORMANCE

Biodiversity Conservation

Talent Management

Human Rights and Diversity

Community Development and Shared Growth

Product Responsibility and Customer Satisfaction

Personal Information Protection and Cybersecurity

Risk Management

ESG FACTBOOK

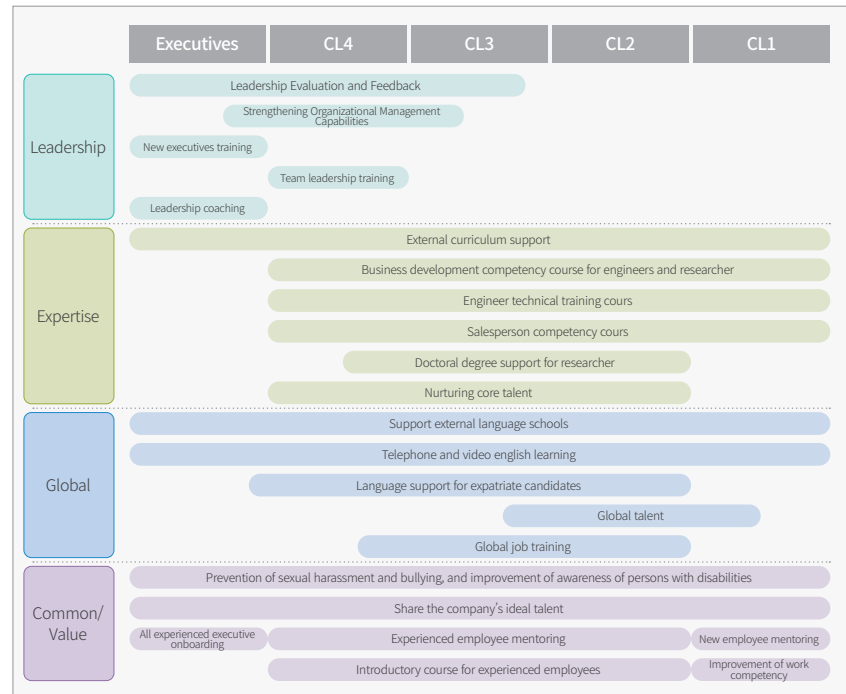
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Talent Development

Talent Development Strategy

We have developed a career development plan for all employees and are implementing a talent development strategy based on career level-specific talent development systems. We identify the types of skills required for future leaders, global experts, and job specialists, and design training initiatives accordingly. To assess the impact of training programs, we conduct competency assessments before and after training based on **Hanwha's** Ideal Talent qualifications, enabling us to measure the effectiveness of training and analyze individual results for future training and coaching purposes.

Company-Wide Training System



Nurturing Future Leaders

We conduct leadership training to empower employees to evolve into future leaders, emphasizing the cultivation of excellent leadership qualities. In the **Chemical Division**, a workshop focused on change management was organized for new project leaders (PLs) to enhance their leadership capabilities. Through lectures and discussions covering topics such as change management, relationship management, and conflict resolution, communication and interpersonal skills were strengthened among leaders.

The **Qcells Division** offers leadership training tailored for team managers, aiming to clarify the role of an effective leader and bolster core leadership skills essential for driving organizational success. This training program is designed to align with the current needs of the organization, providing foundational training to enhance basic leadership competencies in 2023. Moving forward, **Qcells Division** intends to develop and implement more advanced training modules to progressively nurture leadership qualities. In addition, the division plans to appoint and develop in-house instructors, focusing on key personnel, to internalize and advance the training program.

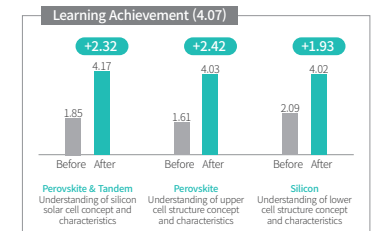
Nurturing Global Experts

As our business expand globally, we operate programs aimed at nurturing employees with global competencies. These initiatives include global job training and global BIZ competency training to enhance job-specific expertise. Additionally, we provide language support through one-on-one coaching and language courses for employees at all career levels. Through these efforts, we actively empower talented individuals to showcase their global capabilities when working abroad, positioning ourselves as leaders in overseas markets.

Nurturing Solar Cell Experts

The **Qcells Division** provided specialized training to enhance employees' understanding of perovskite and tandem solar cell structure, characteristics, and manufacturing processes to enhance their ability to perform their duties on site.

Name	Understanding Perovskite and Tandem Cells
Grand Prize	75 employees in domestic plants, 4 employees in head office
Detail	<ul style="list-style-type: none"> Overview of Perovskite & Tandem Cells Tandem Cell concept and background Understanding tandem cell pilot line and understanding perovskite & tandem cell structure and manufacturing process Understanding the perovskite upper cell structure, key manufacturing processes Understanding the silicon lower cell structure and the main manufacturing process Key issues of tandem cell



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Nurturing Digital Talent

We offer an in-house digital transformation training program designed to cultivate digital talents among our employees. All staff members undergo basic theoretical training to acquire essential data literacy, positioning them as Citizen Data Scientists (CDS). Upon completion of this foundational training, participants receive additional practical instruction covering AI principles, basic machine learning, and data analysis using tools such as Excel and AutoML.

Moreover, our DT Office successfully achieved its target of obtaining ADsP (Advanced Data Analytics Semi-Professional) certification for 70% of all employees in 2023, further enhancing their job competencies.

| Evaluation of the Effectiveness of the Digital Transformation Training Program |

Introduction to CDS

Overview	<ul style="list-style-type: none"> Training for data literacy for employees across the company 480 participants in 2023
Details	<ul style="list-style-type: none"> Digital transformation and data utilization Understanding a data-driven approach to problem solving Understanding and using data analytics

CDS Intermediate Training

Overview	<ul style="list-style-type: none"> Training to expand data analysis competencies, provided for those who have completed introductory training 144 participants in 2023
Details	<ul style="list-style-type: none"> Analysis of AI technology trends and business cases Learn how to use ChatGPT and prompt techniques Basic statistical training for machine learning Understanding the data analysis process and data literacy Data preprocessing and visualization practice using Excel and No Code Tool



1) Assessed participants' overall satisfaction with the training (5-point scale).

2) Evaluated whether enhanced data analysis skills improved participants' work performance or goal achievement (5-point scale).

*An individual who has not received formal education in programming or statistics, but has acquired data analytics skills through on-the-job training.

Career Management Program

We operate the Job Market career support program, facilitating optimal placement of human resources based on individual aptitude, interests, and developmental potential. The HR department conducts written and one-on-one interviews annually to assess employees' career development plans, addressing their concerns and needs. We prioritize enhancing job engagement and satisfaction by providing personalized feedback on individual performance evaluations and reputations, while supporting the design of career paths aligned with employees' competencies and aptitudes.

To further enhance management capabilities, we offer advanced management programs (AMP) tailored to CEOs and executives, equipping them with practical management knowledge to drive continuous improvement within the company. Additionally, we nurture future core talent through the general management program (GMP), enabling participants to gain a competitive edge on a global scale.

Engineer Job Training

We have implemented an engineer training roadmap under the guidance of the Technology Training Center to attract and retain talented engineers. This roadmap encompasses various fields such as production, quality, maintenance, relaying, facility inspection, environmental safety, digital skills, and job-specific competencies, providing tailored and effective training programs based on career levels and responsibilities.

Certification Acquisition Support System

At our Technology Training Center, we actively encourage employees to pursue job-related qualifications and licenses to enhance their expertise. We cover expenses including textbooks, tuition fees, and examination fees required for obtaining certifications, thereby facilitating their professional growth and development.

Retirement Training

We offer career design training and counseling programs for employees aged 50 and above who are considering re-entering the workforce or starting their own businesses post-retirement. This initiative aims to support employees in leading stable and fulfilling lives after retirement by enabling them to plan their future careers with a long-term perspective. As part of this effort, the **Chemical Division** conducted a two-day career training session for 14 employees scheduled to retire in 2023.

Evaluation and Rewards

Performance Evaluation System

We emphasize the process of achieving targets and operate a performance evaluation system based on forced ranking to enhance the fairness and acceptability of evaluations. In the first half of 2024, we introduced absolute evaluations and implemented a new Workday performance management system.

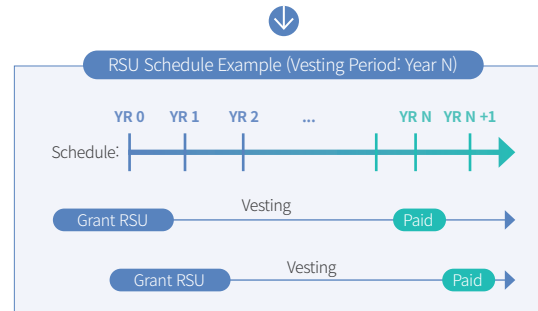
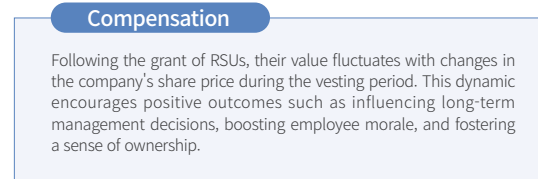
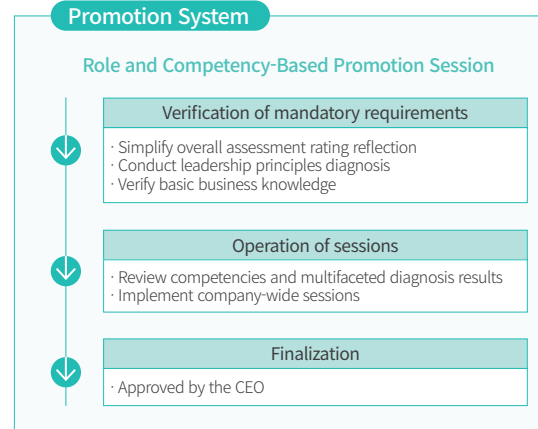
This system enables employees to freely request and obtain feedback from department heads and colleagues using the feedback function, thereby enhancing the fairness and reliability of performance management. It also facilitates efficient goal achievement by aligning individual goals with company objectives.

Promotion and Compensation System

We have introduced a flexible minimum length of stay for each position, enabling individuals to demonstrate their capabilities and grow, regardless of their position, age, or gender. We have implemented a Fast Track system and maintained a balanced ratio of evaluation grades to ensure accurate assessments. Moreover, we have established a role and competency-based comprehensive promotion session system.

To ensure long-term responsible management, in 2020 we eliminated the short-term performance-based incentive system for executives and introduced the Restricted Stock Unit (RSU) known as **Hanwha** RSU. This RSU has a long-term vesting period of up to 10 years, allowing employees to focus on the company's sustained growth, based on their sense of ownership, and achieve a mutually beneficial outcome for the company, employees, and shareholders.

| Promotion and Compensation System |



Benefits

We are committed to improving the welfare of our employees so that they can focus on their work during working hours and enjoy a fulfilling life outside of work. Operating various welfare programs, we aim to boost employee engagement, motivation, and create a pleasant, family-friendly work environment that promotes a better quality of life.

| Benefits |

Classification	Benefits and Welfare
Health	Medical expenses, health checkups, and in-house sports facilities
Stability	Shuttles, in-house cafeteria and company housing, housing loan support
Life events	Payment and leave for family events
Refresh and Leisure	Refresh leave, sabbatical, and support for in-house clubs
Maternity and Parenting	Mom's Package and reduced working hours, pregnancy support and time-off for prenatal screenings
	Miscarriage and stillbirth leave, childbirth congratulatory pay, pre and postmaternity leave, paid feeding time, maternity leave
Work-life balance	Congratulatory bonus for children's enrollment and tuition assistance
	Flextime, PC-OFF system

Employee Communication

Strengthening Internal Communication

Management Communication

Our management practices prioritize open communication and ensure seamless interaction with employees.

In the **Chemical Division**, the division fosters a culture of transparent communication by organizing meetings for each position and team, led by the CEOs in small groups of 10 or less. This allows management to directly address employee grievances and discuss practical solutions.

The **Insight Division** facilitates quarterly or semiannual meetings between executives and team members responsible for each business unit to enhance mutual understanding and support smooth communication.

Expanding Communication within the Organization

The **Chemical Division** operates an official YouTube channel and an in-house communication forum called Square. Additionally, the R&D Center hosts weekly tea time sessions for each position, providing a platform to address grievances, share concerns, and enhance mutual understanding.

The **Qcells Division** have implemented Q. CULTURE DAY to facilitate communication and interaction among employees. In 2023, the division organized a small busking-style concert to enrich the cultural literacy of its employees and inspire them to excel in their roles.

Building Labor Relations based on Trust

We comply with the Constitution and relevant laws to protect the rights of employees, such as the freedom of association, collective bargaining, and collective action. We pursue smooth communication and win-win relationships between labor and management, and builds trusting labor relations through active communication, such as wage and collective bargaining with labor unions, as well as conducting quarterly labor-management councils at the head office and each business site to collect employees' grievances and opinions.

The **Qcells Division** holds quarterly labor council meeting to strengthen communication and cooperation with workers. To promote the rights and interests of workers, the division operates labor-management communication channels such as the Q-Board for general employees, a discussion meeting for professionals, to listen to workers' opinions and discuss solutions.

The **Insight Division** also operates a labor council to promote the common interests of labor and management and to support active communication with workers.

Organizational Culture

Organizational Culture Assessment

Every year, we conduct a company-wide survey to gather feedback from employees and evaluate the organizational culture. This survey aims to promote an environment conducive to open expression of opinions and gain insights into employees' perspectives on leadership, values, behaviors, work atmosphere, and HR systems. Through this survey, we identify any potential issues or challenges within the organization and strive to enhance the organizational culture.

Horizontal Organizational Culture

To foster a horizontal organizational culture, we restructured the company's positions and titles, transitioning to four career levels from CL1 to CL4 and consolidating titles under the designation of "Pro."

Within the **Chemical Division**, a seat rotation system was implemented regardless of position levels. In 2023, the executive office was closed, establishing a shared workspace for all employees. This initiative enables employees from various levels to collaborate and communicate seamlessly, disregarding hierarchical distinctions.

The **Qcells Division** operates on a business responsibility system that transcends positional differences, fostering a horizontal work environment. This approach cultivates an organizational culture where all employees can work with a sense of ownership.

The **Insight Division** undertakes initiatives to promote a horizontal organizational culture. This includes conducting departmental meetings with executive participation and fostering an informal atmosphere among employees. The Division also removed the dress code to enhance work productivity and engagement.

Organizational Culture Improvement Activities

The **Qcells Division** operates the Global Culture Curator program to oversee organizational culture change management. In 2023, 47 Culture Curators were selected, workshops were conducted, and an action plan for organizational culture change was established. The division also prepares a monthly report to monitor the implementation status and share best practices through semiannual seminars.

The **Insight Division** selects and operates Great Workplace (GWP) leaders to enhance organizational culture. GWP leaders within each business unit gather members' feedback for improving organizational culture and implement improvement strategies through benchmarking.

Human Rights and Diversity

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Human Rights Management Governance

We operate a human rights management governance system to safeguard the human rights of all stakeholders affected by the company's management activities.

Our ESG Committee oversees the overall management of human rights within the company, establishing policy objectives, detailed implementation plans, and roles for managing and supervising human rights-related risks as outlined in regulations. In 2023, the Board of Directors and the ESG Committee deliberated the establishment of the Human Rights Management Charter and Human Rights Management Guidelines.

The ESG Committee receives annual reports on human rights risk impact assessments and measures to review the company's human rights management status.

Human Rights Management System

Human Rights Management Policy

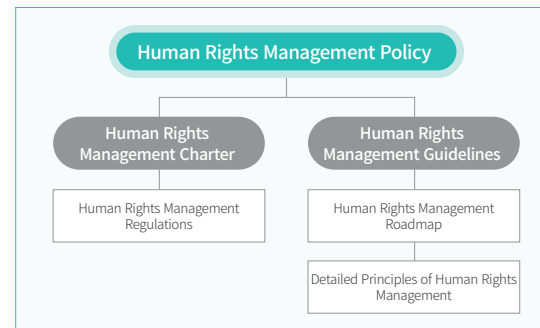
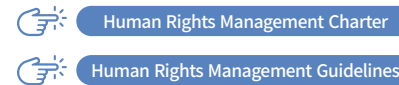
Human Rights Management Regulations

We uphold the fundamental rights of our stakeholders and apply our human rights management policy to all those affected by our business activities. Demonstrating our commitment to human rights, we endorse international standards such as the Ten principles of the UN Global Compact (UNGC) covering human rights, labor, environment, and anti-corruption, the Universal Declaration of Human Rights, the UN Guiding Principles on Business and Human Rights, and the International Labour Organization (ILO) Conventions.

Human Rights Management Guidelines

To effectively manage human rights and mitigate risks, we have established and adhered to detailed principles concerning non-discrimination in the working environment, ensuring the right to freedom of association and collective bargaining, prohibiting forced labor and child labor, ensuring industrial safety, preventing sexual harassment and workplace harassment, practicing responsible supply chain management, guaranteeing the human rights and environmental rights of residents, and safeguarding customers' human rights. We are in the process of developing a Human Rights Impact Assessment Process Policy to oversee these efforts (see next page).

Human Rights Management Policy and Management System



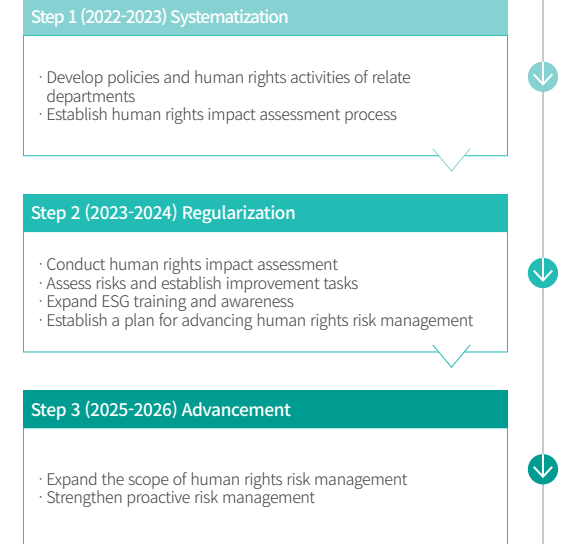
Human Rights Management Strategy

Human Rights Management Roadmap

We have created a mid to long-term roadmap for human rights management to enhance the implementation of these principles. We are currently conducting assessments to identify human rights risks and implementing improvement measures accordingly. Our plan is to internalize and advance human rights management by incorporating related tasks into our future operations.

In 2023, we conducted a comprehensive human rights impact assessment for all divisions, identified human rights risks, and implemented improvement measures to address each identified risk.

Human Rights Management Roadmap



Step 1 (2022-2023) Systematization

- Develop policies and human rights activities of relate departments
- Establish human rights impact assessment process

Step 2 (2023-2024) Regularization

- Conduct human rights impact assessment
- Assess risks and establish improvement tasks
- Expand ESG training and awareness
- Establish a plan for advancing human rights risk management

Step 3 (2025-2026) Advancement

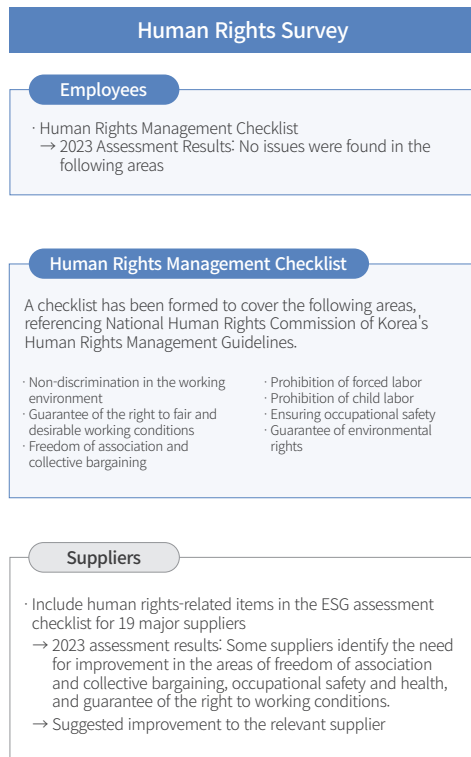
- Expand the scope of human rights risk management
- Strengthen proactive risk management

Human Rights Risk Management

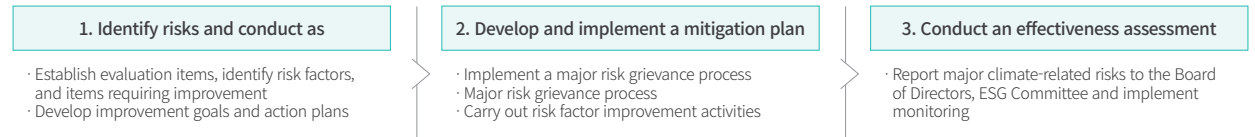
To effectively prevent human rights risks, we conduct human rights surveys and impact assessments for both our employees and suppliers. During evaluations, we consider stakeholders associated with our management activities, including employees and business suppliers. Through these assessments, we identify potential human rights risks, establish and implement improvement plans, and integrate them into our company's risk monitoring system. We annually report significant human rights risks to the board and human rights management activities, including impact assessments, to the ESG Committee.

Based on the 2023 human rights impact assessment, we implemented mitigation measures and evaluated their effectiveness for identified risk factors within each division. Moving forward, we aim to enhance human rights risk management by advancing our impact assessment system, including the development of indicators to assess the effectiveness of our human rights management efforts.

Human Rights Risk Management Process



Human Rights Impact Assessment Process Policy



Human Rights Impact Assessment Results

Area	Risk Factors	Risk Mitigation Measures	Effectiveness
Workplace bullying and sexual harassment prevention	Possibility of occurrence	Chemical <ul style="list-style-type: none"> Conduct regular workplace bullying and sexual harassment prevention training Operate management support office and counselors for each business site Workplace bullying and sexual harassment can be reported anonymously through hotline 	Prevent the possibility of workplace bullying and sexual harassment through regular prevention activities
		Qcells <ul style="list-style-type: none"> Conduct special workplace bullying and sexual harassment prevention training Designate a person in charge of workplace bullying and sexual harassment prevention and response in the HR office Ensure labor-management council members and managers are always available for emergency VOE related to ER issues 	Improve employee awareness of workplace bullying and sexual harassment to prevent labor issues Establish a response process for workplace bullying and sexual harassment issues (prompt resolution within four weeks of the incident)
		Insight <ul style="list-style-type: none"> Conduct regular training Implement a grievance process 	Prevention of the possibility of workplace bullying and sexual harassment through regular prevention activities
Ensuring occupational safety	e.g. Hazards caused by on-site work	Business site <ul style="list-style-type: none"> Employees are encouraged to identify risk factors on their own through activities like CTO¹⁾, Near Miss²⁾, Safety Proposal, Risk Assessment, and 5S activities 	Set and manage goals for CTO and Near Miss activities - CTO: 415 cases (target met) - Near Miss: 1301 identified (target exceeded)
	e.g. Health risks caused by exposure to pollutants generated in factories	Business site <ul style="list-style-type: none"> Install prevention facilities to reduce pollutants Regularly measure emission concentrations to confirm adequacy 	Compared to 2022, the basic unit of air pollutant emissions was reduced by 2.4%
Serious Accident Punishment Act and health and safety Management	The need to strengthen the enforcement of the Serious Accident Punishment Act and occupational safety and health measures	Suppliers <ul style="list-style-type: none"> Provide training, consulting, and improvement for sluggish items, followed by re-evaluation 	Improve the inferior rating in supplier safety and health management level evaluation (SH evaluation) - 3 companies with grade 6 → 1 company with grade 4, 2 companies with grade 5, 3 companies with grade 7 → 3 companies with grade 6 - Implement safety council and improve safety and health training system items

1) CTO : Risk assessment of on-site risk factors conducted by supervisors, operators, and workers

2) Near Miss: An unplanned event that did not result in personal or material loss, such as injury or damage to equipment, but could have been

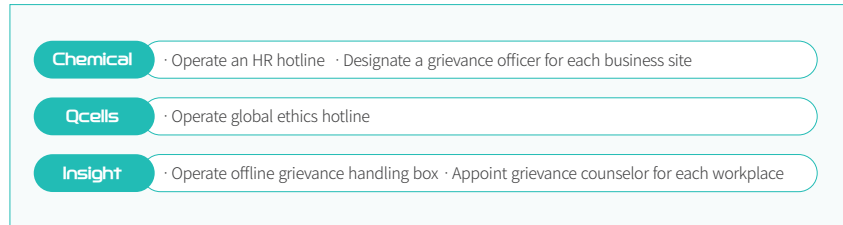
Human Rights Risk Management

Human Rights Grievance Counseling and Reporting System

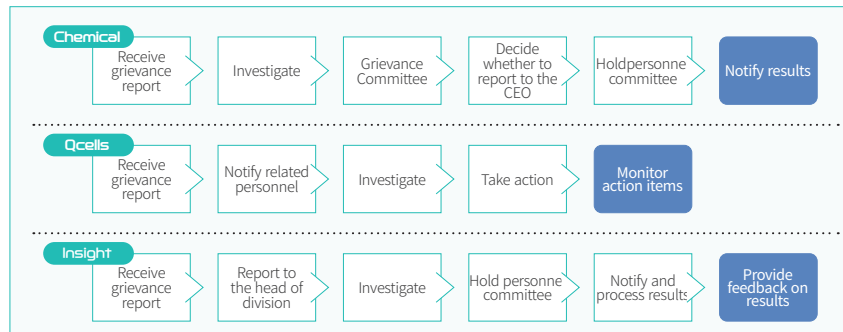
To protect the human rights of our employees, we operate various grievance reporting systems within each division, enabling employees to report human rights-related grievances and violations such as workplace bullying and sexual harassment. Additionally, we operate various grievance handling channels, including an ethical management HOT LINE, for our employees and various stakeholders.

Upon receiving reports of human rights violations, we conduct thorough investigations and prepare response plans. To ensure confidentiality and prevent unfair treatment of reporters or victims, we implement protective measures. In 2023, a total of 11 complaints were received through the grievance reporting channel, and protective measures were completed for all reported cases.

| Human Rights Grievance Counseling and Reporting Channel by Division |



| Grievance Process by Division |



Human Rights Management Activities

Training on Human Rights and Diversity

Every year, we conduct legally mandated training to raise awareness of human rights and improve human rights sensitivity among all employees, including contract employees, on workplace harassment prevention, sexual harassment prevention, personal information protection, and disability awareness improvement. Through the company's bulletin board, messages related to creating a healthy corporate culture are regularly shared with employees.

The **Qcells Division** includes diversity awareness and respectful communication skills in the mindset training for team leaders and provides workplace bullying and sexual harassment prevention training for new team leaders. Through this, the division strives to strengthen human rights leadership and raise awareness of human rights issues.

| 2023 Human Rights Training Status |

Division	Training Status			Topics
	Total training hours	Number of participants	Average hours per person	
Chemical	8,226	2,742	3	Prevention of bullying and sexual harassment, raising awareness of people with disabilities, preventing child abuse and reporters
Qcells	8,802	2,934	3	
Insight	960	290	3	

Enhancing Employee Diversity

We prohibit discrimination in hiring, placement, promotion, salary, and education based on gender, religion, political opinion, social status, nationality, and race. We continuously monitor diversity following ILO conventions and domestic labor laws.

We establish plans for each division to address structural discrimination that female employees may experience and operate family-friendly systems such as providing childbirth and childcare support and fostering a family-friendly work culture. In recognition of these efforts, the **Chemical Division** maintains family-friendly certification as of 2023.

Furthermore, we have established a fair recruitment system and conduct transparent recruitment without discrimination. We implement a certification system and training for interviewers to establish consistent evaluation criteria to ensure equal opportunities for all applicants. We strive to enhance diversity within the organization by granting additional points when hiring nationally registered persons with disabilities and national veterans.

Social Responsibility Governance

We collaborate with various stakeholders within local communities to identify and address local issues through communication and joint efforts. Donations exceeding a certain threshold are reported to the CEO and the ESG Committee and managed by the board. The regulations of the ESG Committee outline its role in reviewing community-related risks.

In the **Chemical Division**, regional councils are established for each business site to actively engage with residents, gather their opinions and needs, and undertake social responsibility initiatives. Additionally, a community advisory group consisting of representatives from the YMCA, environmental experts, and professors has been established to gather diverse perspectives and address environmental and social challenges for the advancement of local communities.

The **Qcells Division** maintains ongoing communication with stakeholders through dedicated departments for each business site, soliciting feedback from local stakeholders, identifying issues, and working collaboratively to find solutions.

Social Responsibility System

As part of fulfilling our corporate social responsibility, we establish social responsibility strategies and conduct related activities to address climate change and contribute to local communities. The Code of Ethics and Practice Guidelines outline specific social responsibility activities, including community participation, environmental protection, and biodiversity conservation in local communities. We are currently implementing initiatives with the aim of expanding programs to address the climate crisis and resolve local community issues by 2026. Through the development of effective social responsibility programs to achieve these objectives, we will strengthen communication and collaboration with local communities.

| Social Responsibility Strategy |

Going further together

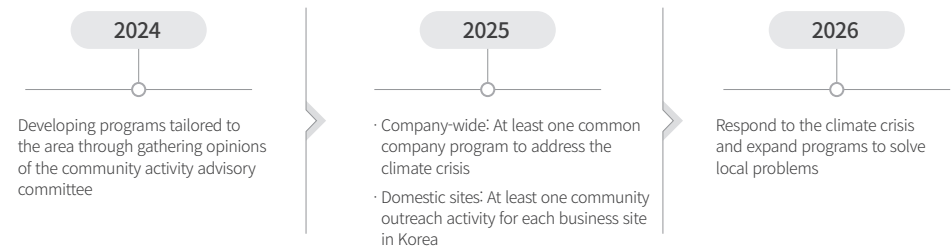
→ VISION

We are committed to discovering solutions for a better future for everyone.

→ STRATEGY



→ TARGET



Social Responsibility Activities

Addressing climate change

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Junior Campaigner Project, Go with GREENERS

Background and Key Issues

Hanwha Solutions: To promote energy conservation in the climate crisis era, we implemented the ChildFund Korea and Junior Campaigner Training Project. These initiatives conducted field activities for children in local centers nationwide and collaborated with environmental activists to produce merchandise featuring children's messages.

Expected Impact

Educated communities about the climate crisis and encourage their involvement in energy conservation efforts.

Indoor Green Wall Installation Volunteer Service

Background and Key Issues

Chemical Division: Recognizing the necessity of indoor air purification and fine dust reduction in children's facilities, the division delivered a donation of KRW 10 million to the Daejeon Regional Headquarters of the ChildFund Korea, to sponsor an indoor green wall project Eco-PoWall and carried out vertical garden planting volunteer activities.

Expected Impact

Reduced ultrafine dust levels by 50% in children's facilities and reduced energy consumption by 30% by regulating indoor temperatures during summer.

Solar Power Support Program for Energy-Vulnerable Groups

Background and Key Issues

Qcells Division: Acknowledging the challenges faced by energy-vulnerable groups due to energy shortages, the division signed an MOU with organizations, including the Korea Energy Agency. Under this agreement, the division provides a scale of 20 KW solar modules and power generation facilities free of charge to social welfare facilities in Busan.

Expected Impact

Lowered electricity expenses for welfare facilities and promote eco-friendly energy within local communities through the installation of solar power facilities. Decreased electricity expenses for welfare facilities by utilizing solar energy-generated electricity (solar power facility capacity 20 KW), resulting in a carbon reduction of 12 tCO₂ eq/year.

Solar Smart Farm

Background and Key Issues

Hanwha Solutions: To change farming methods amid the climate crisis, we established a production support center integrated with with low-carbon smart farms that incorporates agrivoltaic with the National Agricultural Cooperative Federation.

Expected Impact

- Minimized challenges in crop cultivation due to the climate crisis and contribute to stable crop supply and demand.
- Decreased electricity expenses for smart farms by utilizing electricity generated from eco-friendly sources (solar power capacity 64 KW), resulting in a carbon reduction of 39 tCO₂ eq/year.



Junior Campaigner Project, Go with GREENERS



Indoor Green Wall Installation Volunteer Service



Support for Solar Power Facilities for Energy-Vulnerable Groups



Solar Smart Farm

Community Development and Shared Growth

Social Responsibility Activities

Contributing to the community

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Supporting Cultural Life for Low-Income and Local Residents

Background and Key Issues

Chemical Division: Acknowledging that the attendance rate of cultural and artistic events among low-income groups was 23.1% according to a survey by the Ministry of Culture, Sports, and Tourism, which is lower than the average, the division provided cultural/dining vouchers and gift cards to families of children from vulnerable backgrounds in the Seoul area.

Qcells Division: The Jincheon Cultural Fund facilitated year-end and New Year's concerts, offering local residents the chance to experience culture and art.

Expected Impact

- Sponsored a project benefitting 1,408 vulnerable families in Seoul, providing about KRW 100,000 per person for cultural living expenses.
- Hosted a free concert for approximately 1,100 local residents, contributing KRW 50 million to offer high-quality cultural and artistic experience opportunities in Jincheon.

Supporting Low-Income and Local Residents for Life Stabilization

Background and Key Issues

Hanwha Solutions: Employees voluntarily contributed to the Brighter World Fund, which contributes a portion of their monthly salary to support neighbors in need.

Chemical Division: The division sponsored Village Olympics for residents of permanent rental apartments, along with Far Together, Island Love, and Local Love activities like home repair, electrical facility maintenance, and neighborhood environment enhancement for island residents.

Qcells Division: Recognizing the economic hardships of vulnerable households in Jincheon, the division donated home appliances and daily necessities to improve their living conditions.

Expected Impact

- Utilized KRW 400 million in employee funds annually to contribute to improving living and housing conditions for low-income households and communities.
- Donated home appliances and daily necessities worth approximately KRW 2 million to enhance the living conditions of vulnerable households in Jincheon.

Hanwha Qcells Para Sports Team

Background and Key Issues

Qcells Division: Through our para sports team with 40 athletes (as of the end of 2023), the Division supports the hiring and rewards of athletes with disabilities, training supplies, and participation in competitions. The division won a total of 104 medals since its inception and received commendation from the Minister of Culture and Sports in 2023 for contributing to the development of para sports.

Expected Impact

Created job opportunities for 40 persons with disabilities through direct employment of para-athletes, contributing to the revitalization of parasports in the area.

Providing Educational and Counseling Support for Vulnerable Groups

Background and Key Issues

Chemical Division: Science classes and hands-on learning experiences were conducted for elementary school students from vulnerable households, and therapy such as art, play, and language counseling was provided by professional counselors for children in crisis.

Expected Impact

Provided learning opportunities for children from vulnerable households, resulting in improved dyslexia, enhanced self-esteem, and overcoming emotional instability for over 90% of participating children, thereby strengthening their capabilities for work.

Building a Community Safety Net

Background and Key Issues

Chemical Division: Science classes and hands-on learning experiences were conducted for elementary school students from vulnerable households, and therapy such as art, play, and language counseling was provided by professional counselors for children in crisis.

Expected Impact

Provided learning opportunities for children from vulnerable families, fostering mental stability, and enhancing the employability of vulnerable groups.



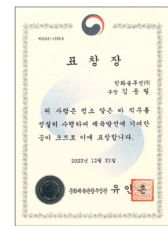
Far Together, Island Love, Local Love



Donations of Home Appliances and Essentials to Vulnerable Groups in Jincheon



Educational Donations and Support



Commendation from the Minister of Culture and Sports for the Para Sports Team

Quality Management Governance

We have established quality management governance to ensure rigorous quality control and foster a customer-oriented culture within the organization.

The CEOs of each division receive reports on the outcomes of quality inspections, improvements, performance, and customer complaints within the quality control system, and oversee quality-related issues.

The **Chemical Division** has dedicated quality control personnel and specialized organizations for each process, production stage, and product. It effectively manages customer complaints by establishing a separate organization to address customer needs.

The **Qcells Division** divides quality control into raw and subsidiary material quality, cell quality, module quality, and customer quality. It manages quality issues by product and stage.

The **Insight Division** maintains a quality management organization at each EPC site to oversee the quality of each project. Personnel responsible for improvement performance management and on-site quality support to ensure comprehensive project management.

Quality Management System

Quality Management Policy

To provide the best products and services, we conduct customized quality control based on the company-wide quality policy and specific policies for each business site.

Customer-Centered Quality Management System

We have implemented a customer-centered quality management system to drive business innovation that reflects customer needs.

The **Chemical Division** enhances customer management through Hello Orange, an activity involving customers, aimed at improving products. In 2023, the division conducted 23 activities, alongside initiatives such as developing a customer card CRM system and establishing a customer database. In 2024, the division plans to expand the number of activities.

The **Qcells Division** incorporates customer requirements throughout the process, from contract signing to the production stage, particularly for large-scale orders in the United States. During factory system audits, the division actively utilizes standardized audit scopes based on customer contract requirements. Following the contract conclusion, the division conducts reviews on a variety of customers and products.

The **Insight Division** advances its customer-centered approach by applying quality control standards tailored to customer characteristics during EPC projects. The division manages defects and claims arising during the customer's operational stage by integrating them into our Lessons Learned database. This information is shared with project teams when initiating new projects to comprehend issues from the customer's perspective and implement measures to prevent recurrence.

Quality Management Activities

Strengthening Quality Management

We implement effective quality control in each division throughout all stages of production to comply with product specification requirements and ensure high quality.

| Quality Management Activities by Division |

Chemical	<ul style="list-style-type: none"> · Implement total operation performance (TOP) activities · Conduct S&OP (Sales and Operation Planning) strategic meetings for each business unit · Establish data report based on QM key management items in MES System · Improve inspection reliability by updating PVC product analyzers and re-establishing management standards · Provide facility technical support through Before Service visits to customers in collaboration with the Tech Center (six times in 2023)
Qcells	<ul style="list-style-type: none"> · Introduce complete cell deep learning inspection to enhance module yield, reducing cell defect rate from 0.14% to 0.03% · Improve quality through regular evaluation of raw material suppliers, aiming to reduce raw material line defects by 30% · Implement deep learning inspection to enhance the quality of cell shipments and reinforce reliability shipment inspection · Introduce characteristic testing to enhance the quality of raw materials
Insight	<ul style="list-style-type: none"> · Establish EPC project quality control cost calculation standards and integrate them into new project estimates · Implement special quality requirements for subcontracting · Improve the supplier evaluation system by reviewing and assessing the actual project implementation plan and outcomes · Introduce quality participation process in technical evaluation and technical bid evaluation (TBE) for equipment supplier selection

Quality Management Activities

Strengthening Quality Capabilities

Nurturing Quality Talents

We offer job training and in-house expert training courses to enhance quality by bolstering the capabilities of our employees.

The **Chemical Division** has developed a quality textbook and conducted two quality training sessions in 2023. These sessions covered topics such as the implementation of quality management, the characteristics of base chemical products, and understanding quality control principles.

In the **Qcells Division**, the division supported employees in obtaining ISO auditor qualifications and provided training on Statistical Quality Control (SQC), FMEA-FTA failure analysis methods, and supplier quality control.

The Energy Solution department within the **Insight Division** conducts ISO9001 training for all employees and provides quality training for new employees, internal auditors, and on-site quality managers as needed. In the event of a Lessons Learned incident, the division shares and disseminates relevant technical documents with related project personnel.

Quality Risk Management

Quality Management Certification

As a result of such strict management, **Qcells Division** is recognized for its product quality and performance by various global organizations.

Quality Certification Status by Division |

Chemical	<ul style="list-style-type: none"> ISO 9001:2015 (quality management systems) certification PE, W&C, PVC, PSR, VC, CA Products India BIS Certification CA chlorine, hydrochloric acid, caustic soda products obtained KS certification of Korean Industrial Standard Japan Sanitation Resin Council Certification (JOHSPA) certification for additives (LLD3120, LLD4300N, LLD4300) used in PE products CA Caustic Soda, CPVC Resin Products Certified by the National Sanitation Foundation (NSF) CA Hypo Water Treatment System Hygiene and Safety Certification
Qcells	<ul style="list-style-type: none"> ISO 9001:2015 (quality management systems) certification TÜV Rheinland PV module quality inspection certification QCPV(Quality Controlled PV) obtained Global certification for solar module products (IEC, UL, KS, CFP)
Insight	<ul style="list-style-type: none"> ISO 9001:2015 (quality management systems) certification in the renewable energy plants

Enhancing Customer Communication

We communicate with customers through various channels and actively collect customers' opinions and suggestions in order to prevent quality-related risks in advance.

Voice of the Customer (VOC) Management System

We operate a VOC management system to respond to customer suggestions or complaints. By identifying the factors that cause claims and implementing preventive measures, we incorporate customer feedback into our quality improvement process.

Enhancing Customer Satisfaction

The **Chemical Division's** PVC department conducts customer satisfaction surveys every other year. In 2023, the division collaborated with Hankook Research to conduct a satisfaction survey involving 84 domestic and 73 overseas companies.

The **Qcells Division** adheres to quality inspection standards up to three times stricter than the International Electrotechnical Commission (IEC) standards. The division regularly evaluates the performance of STC power generation through certification testing institutes in Korea, such as YU, KCL, and Chungbuk TP. Our strict management practices have led to the recognition of our product quality achievements by various global organizations.

2023 Qcells Division's Product Quality Performance |

<p>PVEL 2023 Solar Module Reliability Assessment</p> <ul style="list-style-type: none"> Top Performer for eight consecutive years 	<p>Solar Top Brand of EUPD Research 2023</p> <ul style="list-style-type: none"> Selected in Europe for 10 consecutive years
<p>2023 German Consumer Goods Awards</p> <ul style="list-style-type: none"> Ranked 1st in the solar power sector for four consecutive years 	<p>Wood Mackenzie Solar Module Market Research 2023</p> <ul style="list-style-type: none"> Top residential modules for six consecutive years Ranked 1st in commercial modules for five consecutive years

The **Insight Division's** Energy Solution department gathers and addresses customer feedback with a focus on project performance. In 2023, the division expanded the scope of customer satisfaction surveys to include defective projects. The Urban Development Department conducts annual surveys on customer occupancy timing and utility usage in industrial complexes under construction. This helps ensure smooth customer occupancy and adequate utility supply for those establishing factories on allotted industrial facility land.

Information Security Governance

We have appointed a Chief Information Security Officer (CISO) with expertise in information security and cybersecurity. The CISO is an executive with over 10 years of experience in the field and does not hold any concurrent position other than information protection duties specified by relevant laws.

We operate an Information Security Committee that oversees information security and cybersecurity strategies. This committee includes the heads of information system operations, human resources, and support departments and is responsible for decisions on information security-related strategies and implementation directions. Through this structure, we prepare for security threats and respond quickly and actively to security incidents. The organization responsible for information security continuously invests in strengthening information security across the company, improving employee security awareness, and promoting information protection activities.

We have also appointed a person in charge of personal information protection to design and implement a company-wide privacy policy, ensuring that personal information management regulations are strictly adhered to, even at the business unit level.

Information Security System

Information Security Policy

We have established an internal privacy policy based on privacy principles and operate a security system within the company accordingly.

To protect personal information, we strictly comply with domestic laws and regulations and have established an internal management system and work guidelines for this purpose. We require the consent of the information subject for the collection and use of personal information and for its disclosure to third parties. We apply notation standards in accordance with the Personal Information Protection Act to ensure easier understanding

Personal Information Management Policy by Division |



Information Security Certifications

To establish an effective information security management system, we obtained ISMS (Information Security Management System) certification. This certification ensures that we operate a consistent and effective information security management system and transparently disclose the company's information protection status in accordance with the information security disclosure system.

Information Security Strategy

Information Security Goals

We have set company-wide information security goals for 2023 and are implementing various activities to achieve them. Each year, we plan to establish new security-related goals and continuously improve our information security management system by identifying improvement tasks.

Information Security Goals and Strategy |

Goal	Measures
Increased protection of information assets	<ul style="list-style-type: none"> Establish information security and personal information protection policy
Strengthen security vulnerability management activities	<ul style="list-style-type: none"> Conduct cyber threat penetration testing Improve vulnerabilities through security verification Develop information security maturity measurement models Establish procedures to control access to customers' personal information and reinforce authentication measures
Raise employee security awareness and promptly respond to abnormal symptoms	<ul style="list-style-type: none"> Provide information security training for employees and guidance at all times Train against malicious emails, such as ads and phishing emails containing malware

Information Security Core Management Areas

We have established four core management areas to effectively manage information protection and security. This approach helps us maintain a safe information protection environment and secure trust with our customers.

Four Core Management Areas of Information Security

1. Establish, implement, and improve information security plans
2. Identify and assess information security risks and establish information security measures
3. Conduct regular checks and improvement of information security status
4. Establish and implement information security training and drills

Information Security Activities

Responding to Information Security Incidents

Malicious e-mail and penetration scenario response drills

We are conducting response drills to prevent cybersecurity incidents. In 2023, we conducted penetration tests on cyber threats, such as attacks through internal network vulnerabilities, and improved our employees' competencies through training to respond to malicious emails.

To mitigate the risk of cyber attacks targeting overseas business sites, we inspect and renovate based on the Cybersecurity Performance Goals (CPG) of the Cybersecurity & Infrastructure Security Agency (CISA). Through this, we are strengthening the information protection management system of our overseas business sites.

Cyber Security Control Center

We operate an integrated security control center that remains operational at all times to effectively respond to ongoing cyber threats and security breaches. This center enables us to monitor network traffic in real time, allowing us to prepare for external hacking attacks and the presence of malicious code. We prioritize the protection of information by promptly detecting and blocking any malicious or suspicious traffic, especially when a certain threshold of data leakage to external sources is detected.

Raising Employees' Awareness of Information Security

We conduct online information security training for employees throughout the company to strengthen security awareness and provide information protection guidelines through bulletin boards at all times. Information security awareness training is also conducted for new employees to ensure all staff understand the importance of security and information protection.

Information Security Risk Management

Information Security Risk Management Activities

Diagnosing Infrastructure Vulnerabilities

Twice a year, we conduct the latest security verification activities of IT systems through infrastructure vulnerability diagnosis and improve any identified vulnerabilities. When introducing new assets and systems, we conduct security reviews by applying secure coding to support the development of a secure system by checking and addressing security vulnerabilities.

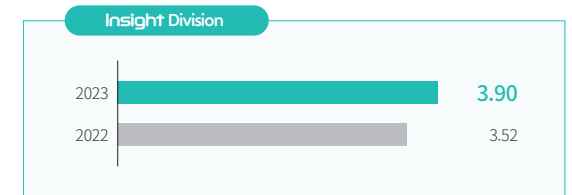
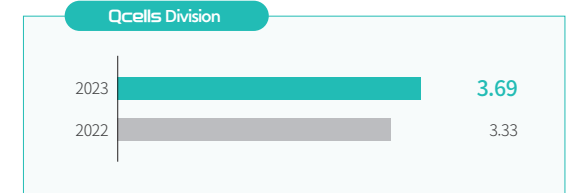
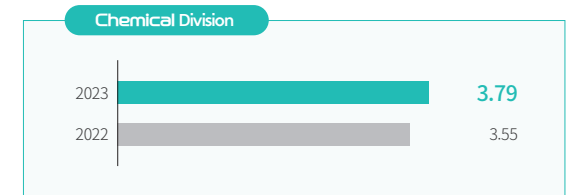
Customer Information Management

To safely manage customers' personal information, we ensure its appropriateness for the intended purpose and verify the suitability of authority when handling customer information. We establish access control procedures to prevent unauthorized external access, apply two or more secure authentication methods when accessing systems that contain customer information, obtain personal information protection compensation liability insurance, and conduct regular system inspections when processing personal information to protect the rights and interests of information subjects and actively ensure safe management.

Information Security Assessment

We have developed a measurement model called the Information Security Maturity Level, which encompasses four areas: management security, physical security, technical security, and personal information protection. Through this model, we implement improvements in each field to enhance employees' security awareness and prevent the external leakage of the company's proprietary technology.

| 2023 Information Security Maturity Level Assessment Results |



Supplier Information Security Risk Management

We strictly sign a security agreement with suppliers to prevent the leak of key information and personal information and check the security management of personal information upon termination.

Risk Management Governance

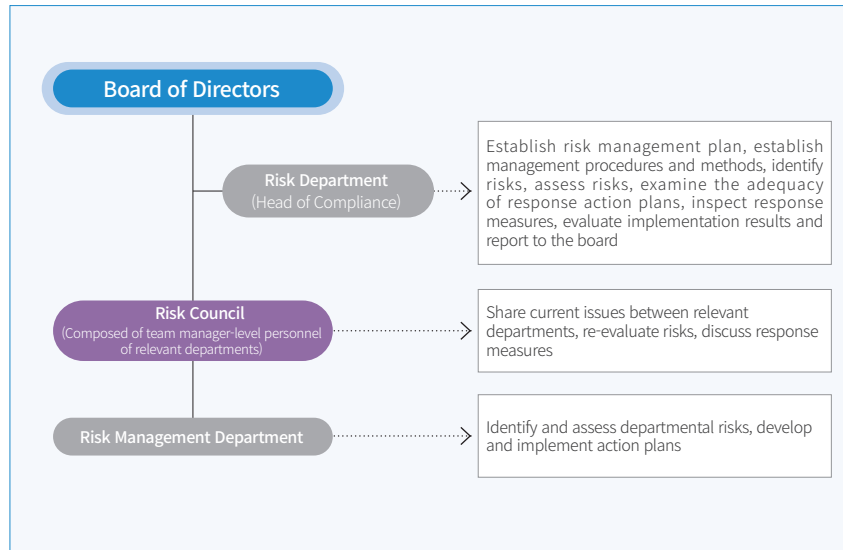
Strengthening Information Security Incident Response Capabilities

We report the results of identifying various risks across the group's management activities and response measures to the Board of Directors by the Head of Compliance, who oversees risk management. This allows management to discuss, manage, and oversee key risks.

In 2023, we specified the roles and scope of duties of departments involved in risk management, establishing the foundation for effective company-wide risk management tasks.

We operate a risk council under the Board of Directors, enabling related departments to discuss risk-related issues and carry out risk management at a company level. The Compliance Office oversees risk management, while the risk management department is responsible for carrying out risk management activities for each department, unit, office, and team within each division. Both supervisory and operational departments designate at least one person in charge of risk management.

Risk Management Promotion Organizations

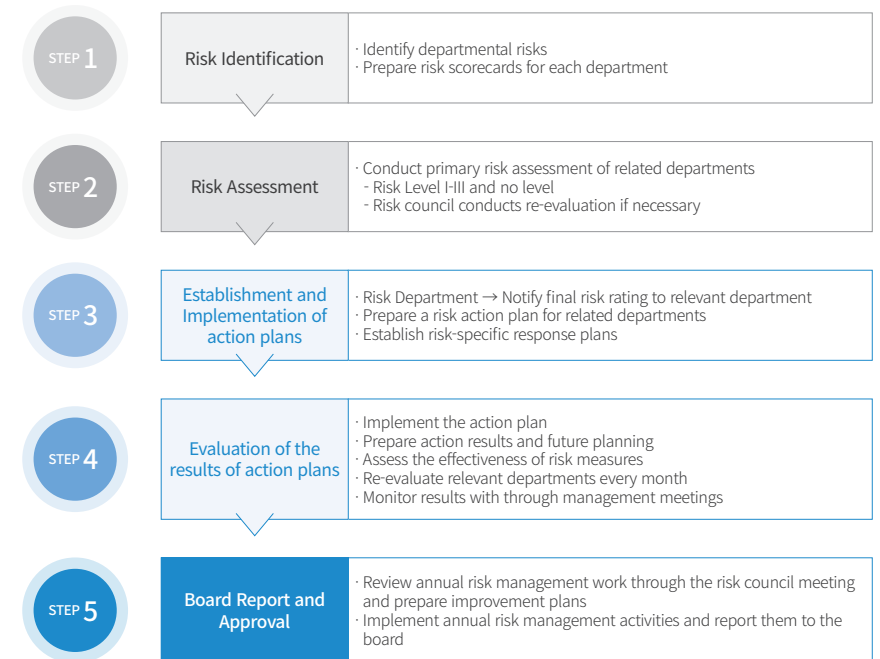


Risk Management System

Risk Management Process

We operate a risk management process to minimize risks in company-wide management activities. In 2023, we revised management regulations, specifying business procedures, establishing enforcement bylaws, and preparing grounds for risk management tips at the site level. Through these efforts, we have enhanced our risk management capabilities and established a more systematic process.

Our risk management process consists of five steps: risk identification, assessment, establishment and implementation of response action plans, evaluation of action results, and reporting to the board of directors. Regular evaluations occur annually in the first quarter, with frequent assessments conducted as needed. Each department conducts monthly reassessments of risks and monitors them accordingly.



Risk Management System

Risk Assessment and Management Plan

We evaluate the likelihood of occurrence and the impact of risk on the company based on weighted factors such as strategic importance, urgency, and management impact. Using the risk assessment, we calculate the likelihood of occurrence and impact score, then determine an overall score and assign a risk grade accordingly.

Relevant departments are required to establish response action plans for risks rated level I-III to prevent, reduce, and manage them. We evaluate the effectiveness of these measures and their results. The department in charge reviews these activities, and the Risk Council deliberates on the final results, which are then reported to the board.

| Response Measures by Risk Rating |

Classification	Risk Monitoring	Risk Management	Board Reporting
Level I	Monthly risk assessment for each department ↓ Notify the risk department in case a new risk occurs or the rating changes	Develop plans and manage at a company level utilizing company-wide meetings	Report the improvement results of each risk rating once a year
Level II		Develop plans and manage at a office/division level utilizing office meetings	
Level III		Create a plan and manage by team	
No level		Manage by team	

Non-financial Risk Management Plan

We manage non-financial risks, including operational and market conditions affecting business sustainability, to address uncertainties arising from rapid changes in the business environment. Within our risk management system, we identify non-financial risks that may emerge during our operational activities and develop and execute corresponding action plans. These measures include management and response strategies tailored to address non-financial risks associated with the company's significant ESG issues identified through materiality assessments.

Financial Risk Management Plan

Centering on the Finance Office, we continually monitor financial risk factors arising from the market, liquidity, and capital. Collaborating with relevant departments, the office establishes financial risk management policies, identifies, evaluates, and responds to risks, aiming to achieve sustainable business performance.

In line with the tax risk policy, we have established a management process to address various tax risks stemming from changes in the external environment, aiming to minimize these risks.

Tax-related matters are reported to management based on tax type and the significance of the amount. We consistently monitor and respond to revisions in domestic and foreign tax laws, regulations, precedents, and government policy trends. We also transparently disclose corporate tax-related information to all stakeholders.

| Consolidated Corporate Tax* Payment Status |

Classification	Tax Jurisdiction	Number of Branches	Amount	Currency Code
Europe	Netherlands	3	△ 805	EUR
	Germany	19	△ 9,811,349	
	Spain	63	10,413,213	
	UK	5	1,019,169	
	Portugal	14	△ 3,108,748	
North America	US	106	20,695,673	USD
Asia	Korea	28	421,306,162,703	KRW
	Malaysia	3	8,533,732	MYR
	India	1	2,030,415	INR
	Japan	4	5,952,946	JPY
	Thailand	2	17,068,222	THB
	Turkey	27	27,009,993	TRY
Oceania	Australia	1	1,456,526	AUD
Other	Cayman Islands	1	156,950	USD

* Corporate tax expenses for 2022 are determined based on the taxable income of each company and the applicable corporate tax rates of each country
 * In Korea, corporate tax is reported by the end of March for fiscal year-end. For some overseas forms, the filing deadline is the end of June, while for others, it's by mid-October at the latest. The corporate tax payment status is accurately calculated at the end of the following year. Therefore, the 2022 corporate tax payment status has been disclosed, as the 2023 corporate tax can be calculated by the end of 2024.

Risk Management Activities

Risk Identification and Management by Division

In 2023, we executed response action plans for identified major risks, evaluated their effectiveness, and reported the results to the Board of Directors.

Risk Status by Division

Classification	Risk	Measures Taken	Future Plan	Effectiveness of Measures
Strategy	(Level II) Transportation disruption due to logistics strikes such as freight solidarity and shipping unions	<ul style="list-style-type: none"> Established and monitored the cargo union strike response process based on plant to head office council Set up a delivery system through metropolitan area hub 	<ul style="list-style-type: none"> Improve the cargo union strike response process Discover the non-freight union companies 	<ul style="list-style-type: none"> Enhanced customer satisfaction through the use of non-affiliated cargo vehicles for urgent deliveries Established capability to respond to emergency quantity of PO and PVC cargo products to clients in the metropolitan area during cargo solidarity strikes
	(Level II) Information security risk	<ul style="list-style-type: none"> Conducted information security training for all employees Held quarterly training sessions on responding to malicious emails Inspected and improved security of new development system Developed security risk assessment indicators 	<ul style="list-style-type: none"> Conduct information security training for all employees Conduct system security checks, penetration testing, and malicious emails response training Apply and manage 2024 security risk assessment indicators 	<ul style="list-style-type: none"> Reduced risk of malicious mail (17.9% in Q3 2022 → 5.5% in Q3 2023)
	(Level II) Potential infringement of third-party intellectual property rights by our products	<ul style="list-style-type: none"> Conducted competitor IP analysis and third-party IP registration, licensing, or patent purchase Provided intellectual property training Constructed an IP portfolio 	<ul style="list-style-type: none"> Implement risk action plans tailored to each stage of R&D center development Regular IP training sessions for employees 	<ul style="list-style-type: none"> Confirmed the feasibility of conducting third-party IP analysis before product launch Mitigated infringement risks by preventing the registration of third-party IPs Enhanced patent protection with a strengthened patent portfolio Improved IP awareness through employee training
Chemical	(Level I) Increasing need for production of renewable energy products	<ul style="list-style-type: none"> Procured REC for Ulsan 3 Production Site Completed PPAs for Ulsan 2,3 Production Sited Purchased green premium in the H1 	<ul style="list-style-type: none"> Promote renewable energy procurement Continue monitoring of related regulations 	<ul style="list-style-type: none"> Reduced management impact through proactive measures
	(Level I) Rising costs of fossil fuels and fossil-based raw materials	<ul style="list-style-type: none"> Fuel and Raw Material: Blended by-product hydrogen through VC cracking and procured renewable energy (REC, PPA) for Ulsan 3 Production Site Raw material: Supplied bio-based raw materials for the base chemical PVC business 	<ul style="list-style-type: none"> Review renewable energy procurement and eco-friendly raw material supply 	<ul style="list-style-type: none"> Reduced management impact through proactive measures
	(Level I) Installation of water quality management process adsorption facility at Ulsan 2 Production Site	<ul style="list-style-type: none"> Normal operations resumed post-installation of water quality management process adsorption facility Completed construction 	<ul style="list-style-type: none"> Action completed 	<ul style="list-style-type: none"> Reduced the probability of risk to 0% by meeting the requirements for integrated environmental licensing (Risk Level 1 → No level)
Qcells	(Level II) Changes in production plans due to raw material supply issues	<ul style="list-style-type: none"> Secured spare inventory levels for raw materials Explored various transportation method options for short-term supply challenges Procured raw materials promptly to account for lead times 	<ul style="list-style-type: none"> Expand distribution channels through new supplier discovery and dualization 	<ul style="list-style-type: none"> Established flexibility in addressing fluctuations in raw material supply
	(Level II) Increased investment and operating costs due to changes in government subsidy policies, safety measures, and operational service policies	<ul style="list-style-type: none"> Participated in more than 10 public hearings and meetings to monitor policy trends and offer industry feedback Proactively identified and partnered with charger manufacturers eligible for government subsidies 	<ul style="list-style-type: none"> Track policy trends Provide feedback on government subsidies and policies in line with mid to long-term strategies 	<ul style="list-style-type: none"> Reduced the probability of risk by mitigating the investment fund increase risks through appropriate measures
	(Level II) Strengthening of regulations such as mandatory ESG disclosures	<ul style="list-style-type: none"> Monitored global ESG disclosure regulations and climate disclosure standards Attended seminars on climate disclosure standards Reviewed domestic and overseas disclosure standards Participated in an environmental information disclosure pilot project Improved the ESG performance management system 	<ul style="list-style-type: none"> Review the company status based on ISSB IFRS S2 standards Expand the scope of GHG emission management 	<ul style="list-style-type: none"> Expanded GHG emission management to minimize the risk related to mandatory ESG disclosure regulations
Insight	(Level III) Failure to achieve annual profit targets due to inexperienced KPI management	<ul style="list-style-type: none"> Prepared monthly profit reports Held sales performance meetings for each business units (27 meetings) 	<ul style="list-style-type: none"> Manage issues identified throughout 2024 	<ul style="list-style-type: none"> Reflected market status through semiannual updates of mid to long-term strategy, contributing to growth by sharing it at the company briefings
	(Level III) Delay in project schedules due to longer licensing intervals caused by revisions to domestic laws	<ul style="list-style-type: none"> Proposed improvements to the industrial complex regulatory system (1 case) 	<ul style="list-style-type: none"> Manage government networks and collaborating on outstanding licensing issues 	<ul style="list-style-type: none"> Conducted continuous monitoring changes to related laws, enabling proactive risk response capabilities

Risk Management Activities

Risk Management by Type

We manage risks by type in accordance with the results of the double materiality assessment. In 2023, we implemented response measures against significant financial and non-financial risks at the company-wide level, as stipulated by our risk management regulations. The outcomes of these measures were reported to the board.

Risk Measures and ESG Issues

Classification	Risk	Measures Taken	Material ESG Issues
Financial risk	Financial risk (Exchange rate fluctuations, liquidity risks, etc.)	<ul style="list-style-type: none"> Conducted continuous monitoring of exchange rate fluctuations Analyzed financial balance planning and performance daily, weekly, monthly, and quarterly 	<ul style="list-style-type: none"> Climate change response and Net Zero Sustainable product and technology development
	Risk of safety and environment accidents (Serious accidents such as fires and explosions, resulting in fatalities and environmental pollution)	<ul style="list-style-type: none"> Implemented health and safety measures in accordance with laws, including the implementation of health and safety plans, reporting to the board, and the establishment of safety and environmental work systems Achieved the conditions for approval of integrated environmental licensing at the Chemical Division's Ulsan Production Site through facility improvement and legal compliance 	<ul style="list-style-type: none"> Occupational health and safety management
	Market risk (Market uncertainties such as cost and product price fluctuations, changes in consumer behavior such as preference for eco-friendly and low-carbon)	<ul style="list-style-type: none"> Conducted monitoring of raw material and product prices trends and regular reporting Formula-based contracts Obtained eco-friendly certifications (ISCC+ and GRS) 	<ul style="list-style-type: none"> Sustainable products and technologies
Non-financial risk	Supply chain sustainability risk (Logistics, raw material supply and supplier risk management, raw material use risk in Xinjiang, China, etc.)	<ul style="list-style-type: none"> Completed the establishment of the strike response process Conducted shipping market monitoring and communication Established supplier management regulations and conducted due diligence Monitored inventory and supply status Established polysilicon supply chain with non-Xinjiang companies 	<ul style="list-style-type: none"> ESG management in the supply chain
	Risk of government policy changes and legal violations (Policy changes related to GHG, ESG disclosures, subsidies, and law changes related to fair trade, subcontracting, serious accidents, unfair competition, patents, etc.)	<ul style="list-style-type: none"> Identified policy trends (monitoring regulations and attending public hearings) Conducted training on related laws and regulations for related personnel and established pre-legal review process Operated internal transaction review by each division Implemented patent redundancy review and patent avoidance design 	<ul style="list-style-type: none"> Compliance and ethics management Climate change response and Net Zero
	Climate risk (Tightening of climate change-related regulations, changes in consumer behavior, abnormal climate, etc.)	<ul style="list-style-type: none"> Carried out mitigation activities to achieve Net Zero and procured renewable energy Introduced sustainable raw materials and establish circular economy Identified physical risks and enhanced management 	<ul style="list-style-type: none"> Climate change response and Net Zero
	Tax risk (Changes and uncertainties related to domestic and international tax laws)	<ul style="list-style-type: none"> Engaged in consultations with tax experts for authoritative interpretation by tax authorities Monitored tax law-related regulations, precedents, and government policy trends Implemented tax management policies Met corporate tax obligations and reported corporate taxes by country 	<ul style="list-style-type: none"> Compliance and Ethics Management

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Economic

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Social

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Classification	2021	2022	2023
Assets			
Current assets	6,073,960	8,573,295	8,704,888
Cash and cash equivalents	1,567,163	2,548,380	1,956,041
FVPL – financial assets	-	-	-
Other financial assets	229,553	339,937	250,319
Trade receivables and other receivables	1,631,759	2,195,999	2,403,264
Other current assets	331,309	373,671	756,995
Inventories	2,231,502	3,060,108	3,296,697
Current income tax assets	16,789	17,946	41,573
Non-current assets held for sale	65,885	37,254	-
Non-current assets	12,523,570	13,634,375	14,407,473
FVTPL – financial assets	33,629	94,922	185,957
FVOCI – financial assets	56,186	56,660	7,203
Other financial assets	209,559	300,440	151,410
Long-term sales receivables and other receivables	2,839	6,216	414,321
Investments in associates and joint ventures	3,438,403	3,744,628	4,077,354
Investment property	212,428	199,763	104,444
Tangible assets	6,451,599	6,879,452	7,046,371
Intangible assets	1,580,567	1,644,438	1,767,977
Right-to-use asset	381,096	405,921	225,877
Other non-current assets	35,938	100,646	224,002
Deferred tax assets	121,327	201,292	202,557
Financial business assets	1,410,098	1,624,214	1,380,548
Total Assets	20,007,628	23,831,884	24,492,909

Classification	2021	2022	2023
Assets			
Current liabilities	5,787,890	6,808,491	7,688,754
Purchase payables and other payables	2,441,733	2,388,214	2,108,399
Short-term borrowings	2,611,134	3,002,811	3,788,198
Other financial liabilities	292,209	537,937	982,481
Provisions	54,458	47,835	43,009
Other current liabilities	296,578	446,063	724,570
Current corporate tax liabilities	91,778	385,632	42,096
Non-current liabilities	4,774,478	5,685,432	6,598,031
Long-term trade payables and other payables	173,506	39,969	47,801
Long-term borrowings	3,263,693	4,205,363	5,561,746
Other financial liabilities	469,362	633,646	322,884
Net defined benefit liabilities	455,223	397,180	356,946
Long-term employee benefit liabilities	26,716	29,635	30,029
Provisions	112,193	127,509	133,869
Other non-current liabilities	5,880	22,412	3,204
Deferred tax liabilities	267,905	229,718	141,552
Financial business liabilities	1,244,013	1,441,049	1,195,579
Total liabilities	11,806,381	13,934,973	15,482,363
Assets			
Equity attributable to owners of the company	8,159,421	8,920,571	7,847,476
Capital stock	978,241	978,241	888,569
Capital surplus	2,003,249	2,320,051	1,497,100
Capital adjustment	(24,176)	(154,154)	(135,082)
Accumulated other comprehensive income	150,693	215,028	257,959
Retained earnings	5,051,414	5,561,405	5,338,930
Non-controlling interest	41,826	976,341	1,163,070
Total capital	8,201,247	9,896,912	9,010,546
Total liabilities and equity	20,007,628	23,831,884	24,492,909

Environmental¹⁾

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Classification		Unit	2021	2022	2023
Greenhouse Gas (GHG)					
Total GHG emissions (Scope 1+Scope 2)		Corporation ²⁾	2,478,650	2,435,021	2,478,253
		Consolidated ³⁾	N/A	N/A	2,796,470
Direct GHG emissions (Scope 1)	Corporation ²⁾		394,639	377,730	357,587
	Parent company		N/A	N/A	21,393
	Subsidiaries ⁴⁾		N/A	N/A	83,666
	Related and joint enterprises		Included in Scope 3 Category 15		
Indirect GHG emissions (Scope 2)	Corporation ²⁾		2,084,011	2,057,290	2,120,666
	Parent company		N/A	N/A	47,368
	Subsidiaries ⁴⁾		N/A	N/A	165,790
	Related and joint enterprises		Included in Scope 3 Category 15		
Subtotal			6,822,232	6,693,862	6,789,036
Other GHG emissions (Scope 3) ⁵⁾	By category	1. Purchased goods and service	4,570,230	4,505,426	4,836,043
		2. Capital goods	106	150	67
		3. Fuel and energy-related activities	160,917	158,149	161,967
		4. Upstream transportation and distribution	47,751	49,268	23,164
		5. Waste generated in operations	11,419	11,724	16,091
		6. Business commuting	685	2,935	3,676
		7. Employee commuting	8,175	8,541	7,140
		8. Upstream leased asset	0	0	0
		9. Downstream transportation and distribution	121,970	119,679	76,091
		10. Processing of sold products ⁶⁾	Not calculated	Not calculated	Not calculated
		11. Use of sold products	0	0	0
		12. End-of-life treatment of sold products	3,058	3,165	2,685
		13. Downstream leased assets	171	92	81
		14. Franchises	0	0	0
		15. Investments	1,897,749	1,834,733	1,662,031
Biogenic CO ₂ emissions ⁷⁾	tCO ₂ eq	0	0	63	
GHG emission intensity	tCO ₂ eq/KRW 100 million	38	28	34	
GHG reductions	Total reductions (Scope 1 + Scope 2)		58,426	27,298	20,697
	Scope 1 reductions	tCO ₂ eq	59	4,684	7,672
	Scope 2 reductions		58,367	22,614	13,025

Classification		Unit	2021	2022	2023	
Energy						
Total energy consumption			48,320,753	48,219,384	48,511,277	
Direct energy consumption	Subtotal	Gasoline	5,026,129	5,560,687	4,529,553	
		Diesel	7,894	9,689	9,410	
		Kerosene	17,668	25,315	26,255	
		LNG	41,126	7,773	8,236	
		LPG	3,159,516	2,006,305	2,363,771	
		Other	543,614	526,055	604,479	
	Consumption	Subtotal	Electricity	1,256,311	2,985,551	1,517,402
			Steam	43,284,563	42,648,787	43,966,306
			Electricity	37,836,880	37,025,800	37,794,132
			Steam	5,447,683	5,622,987	6,172,174
Indirect energy consumption	Internally Produced	Subtotal	10,061	9,910	15,418	
		Electricity	10,061	9,910	15,418	
		Air conditioning	0	0	0	
		Heating	0	0	0	
	Sold	Subtotal	Electricity	0	0	0
			Air conditioning	0	0	0
			Heating	0	0	0
			Steam	0	0	0
			Electricity	0	0	0
			Steam	0	0	0
Energy consumption intensity	GJ/KRW 100 million	733	555	667		
Non-organizational usage			0	0	0	
Energy consumption reductions	Subtotal	Gasoline	10,062	370,776	309,976	
		Diesel	N/A	N/A	52	
		Kerosene	N/A	N/A	0	
		LNG	N/A	N/A	153,488	
		LPG	N/A	N/A	0	
		Electricity	N/A	N/A	145,287	
		Air conditioning	N/A	N/A	0	
		Heating	N/A	N/A	0	
		Steam	N/A	N/A	11,148	
		Other	N/A	N/A	0	
Renewable energy consumption	MWh	12,545	71,163	92,150		
Renewable energy consumption rate	%	0.2	1.4	1.8		

* Environmental performance reporting scope: Domestic business sites including Seoul Head Office, Yeosu, Ulsan, and Jincheon Plants

1) 2021, 2022, and 2023 environmental data includes the **Chemical, Qcells, and Insight Divisions**.

2) Data for 2021 and 2022 were corrected based on the volume certified by the emissions trading system for the **Chemicals, Qcells, and Insight Divisions**. The 2023 data, submitted based on specifications, are subject to future changes (**Hanwha Galleria** before the split in 2023 Scope 1: 359,504 tCO₂eq, Scope 2: 2,127,076 tCO₂eq, Total: 2,486,566 tCO₂eq).

3) Corresponds to the sum of emissions of the corporation, parent company, and subsidiary companies.

4) Emissions from **Hanwha Advanced Materials, Hanwha Chemical (Ningbo), Hanwha Chemical (Thailand), Hanwha Compound, and Hanwha Cimarron LLC**, as well as emissions from other subsidiaries, are included in Scope 3 Category 15.

5) Scope 3 for the **Chemicals and Qcells Divisions** has been verified.

6) Not calculated (In case of the **Chemical Division**, Category 10 emissions are challenging to estimate accurately due to B2B sales of intermediate goods following GHG Protocol and WBCSD guidelines. Products sold by the **Qcells Division** are exempt from Category 10 calculations as they are considered finished products.)

7) Biogenic CO₂ emissions resulted from biomass used as raw material.

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Classification		Unit	2021	2022	2023
Water					
Water withdrawn	Total water withdrawn		16,512,150	16,922,003	15,798,153
	By type				
	Fresh water		N/A	N/A	N/A
	Other		N/A	N/A	N/A
	Surface water		0	0	0
	Groundwater		15,720	16,200	11,130
By source	Seawater		0	0	0
	Produced water		0	0	0
	Third-party water		16,496,430	16,905,803	15,787,023
	Water withdrawn from water-stressed areas ¹⁾		N/A	N/A	12,343,914
Water discharge (wastewater)	Total water discharged	ton	7,591,306	7,682,813	11,356,130
	By type ²⁾				
	Freshwater		N/A	N/A	35,655
	Others		N/A	N/A	9,309,110
	Surfacewater		N/A	N/A	317,610
	Groundwater		N/A	N/A	0
	Seawater		N/A	N/A	3,472,075
	제3자 기관을 통해 처리/방류		N/A	N/A	7,566,445
	Water discharged in water-stressed areas ¹⁾		N/A	N/A	5,812,928
	Total water consumed		8,920,844	9,239,190	4,442,023
Water consumption	Total water reused		859,474	856,220	686,250
	Reused water rate	%	9.6	9.3	15.4
Water pollutants					
Water pollutants	TOC		339	171	249
	BOD	ton	108	130	171
	SS		173	125	254
Air pollutants					
Air pollutants	Ozone Depleting Substances (ODS)	tCFC-eq	0	0	0
	NOx		173	231	205
	SOx	ton	3	11	10
	Dust		14	18	17
	Environmental certifications				
Percentage of ISO 14001-certified business sites			53	59	77
Certified business sites			9	10	10
Business sites subject to certification			17	17	13
Green businesses					
Eco-friendly products and services	Sales ³⁾	KRW 100 million	6,055	3,509	1,959
	Percentage of sales ⁴⁾	%	9.2	4.0	2.7
Eco-friendly R&D expenditure			KRW 100 million	228	391
Environmental Investments					
Green bonds and funds			KRW 100 million	1,000	2,750
Eco-friendly purchase					
Total purchase			KRW 100 million	N/A	N/A
Eco-friendly products and services purchase			KRW 100 million	N/A	N/A
Eco-friendly products and services purchase rate			%	N/A	N/A
Environmental training					
Training hours			Hour	17,365	25,716
Number of employees participated			Person	4,370	5,021

Classification		Unit	2021	2022	2023	
Waste						
Waste Generation	Total waste generated		78,300	87,803	101,232	
	Waste intensity		1.2	1.0	1.4	
	Hazardous waste		32,368	34,203	49,217	
	Non-hazardous waste		45,932	53,600	52,014	
	Total waste disposed		39,110	46,723	59,193	
Waste disposal	Subtotal		18,345	20,389	35,427	
	Hazardous waste	Landfill	228	206	249	
		By type	Incineration	3,362	3,989	5,045
		Others	14,755	16,195	30,132	
	By method	On-site	0	327	0	
		Off-site	18,345	20,062	35,427	
	Subtotal		20,765	26,334	23,766	
	Non-hazardous waste	By type	Landfill	16,839	23,174	21,227
			Incineration	3,925	3,160	2,538
		By method	On-site	0	0	0
Off-site			563	546	136	
Subtotal		20,202	25,788	23,630		
Total waste recycled			39,190	41,079	42,039	
Total waste recycling rate			50.1	46.8	41.5	
Subtotal		14,022	13,814	13,790		
Waste recycling	Hazardous waste	Pretreatment for reuse	0	0	0	
		By type	Recycle	14,022	13,814	13,790
		Recover	0	0	0	
	By method	On-site	0	0	79	
		Off-site	14,023	13,814	13,712	
Subtotal		25,168	27,266	28,248		
Non-hazardous waste	By type	Pretreatment for reuse	0	0	0	
		Recycle	25,168	27,266	28,248	
	By method	On-site	0	0	0	
		Off-site	0	0	0	
Subtotal		25,168	27,266	28,248		
Violations of environment-related laws and regulations						
Number of violations of environment-related laws and regulations			Cases	N/A	N/A	
Environmental fines			KRW 10 thousand	N/A	N/A	
					368	

1) Regions with high or extremely high baseline water stress are identified using the WRI Aqueduct Water Risk Atlas

2) Data from the Qcells Division are excluded due to the inability to classify water types

3, 4) Data changes in 2021 and 2022 due to changes in eco-friendly product classification standards (Chemical: GRS, ISCC+ related product sales, Qcells: CFP 1-3 grade solar module sales based on carbon emissions verified by Korea Energy Agency)

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Classification		Unit	2021				2022				2023			
			Yeosu	Ulsan	Others	Total	Yeosu	Ulsan	Others	Total	Yeosu	Ulsan	Others	Total
By business site			Yeosu	Ulsan	Others	Total	Yeosu	Ulsan	Others	Total	Yeosu	Ulsan	Others	Total
Water withdrawal	By source	Surface water	0	0	0	0	0	0	0	0	0	0	0	0
		Groundwater	0	0	15,720	15,720	0	0	16,200	16,200	0	0	11,130	11,130
		Seawater	0	0	0	0	0	0	0	0	0	0	0	0
		Produced water	0	0	0	0	0	0	0	0	0	0	0	0
		Third-party water	11,168,817	3,536,363	1,791,250	16,496,430	11,174,790	3,734,156	1,996,857	16,905,803	9,927,120	3,351,540	2,508,363	15,787,023
Water consumption	Total water consumed		7,041,398	1,459,661	419,784	8,920,844	7,007,550	1,712,033	519,607	9,239,190	2,411,140	1,264,650	766,233	4,442,023
	Total water reused		355,080	504,394	0	859,474	362,010	494,210	0	856,220	171,600	514,650	0	686,250

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Classification		Unit	2021	2022	2023
Employment					
Total number of employees (excluding registered and unregistered executives)			6,747	6,773	6,004 ²⁾
By gender	Male		5,650	5,659 ³⁾	5,250
	Female		1,097	1,114 ³⁾	754
By age	Ages under 30		1,744	1,802	1,653
	Ages 30 to 49		3,677	3,767	3,344
	Ages 50 and above		1,326	1,204	1,007
	Male executives		119	117	100
	Female executives		2	5	5
	Male managers		1,372 ³⁾	1,558	823
	Female managers		193	235	157
By position	Male (non-managers)		4,159	3,984	4,327
	Female (non-managers)		902	874	592
	Middle managers	person	N/A	N/A	301
	Staff		N/A	N/A	2,367
	Non-managers		N/A	N/A	2,251
	Management		121	103	107
	General		2,268	2,282	1,632
By occupation	Research		320	454	566
	Office		207	172	183
	Professional		3,609	3,555	3,325
	Contract		222	207	191
By region	Korea		6,747	6,773	5,987
	Overseas		157	132	20
	Subtotal		10	10	10
Registered executives	Male		N/A	N/A	9
	Female		N/A	N/A	1
Full-time	Full-time	person	6,524	6,579	5,791
	Percentage of full-time employees	%	96.7	97.1	96.5
	Male full-time employees		N/A	N/A	5,078
	Female full-time employees	person	N/A	N/A	713
Temporary	Temporary		223	194	213
	Percentage of contract employees	%	3.3	2.9	3.5
	Male contract employees		N/A	N/A	170
	Female contract employees	person	N/A	N/A	43
Non-affiliated workers	Male		1,221	1,708	1,292
	Female		222	650	196
Length of Service					
Average years of service		year	10.8	10.0	9.8

Classification		Unit	2021	2022	2023
Recruitment					
Total number of new hires			558	1,132	666
By gender	Male		433	931	540
	Female		125	201	126
By age	Under 30 years old		234	633	367
	30-49 years old	person	283	459	261
	Ages 50 and above		41	40	38
By employment type (experienced)	Full-time (entry-level)		235	452	205
	Full-time		162	460	244
	Temporary		161	220	217
Employment Diversity					
Female	Number of female employees		1,097	1,114	754
Female talent	Number of female managers (manager level and above)	person	195 ³⁾	240 ³⁾	162
	Percentage of female managers	%	11.6	12.5	14.9
	Persons with disabilities		159	117	54
Minorities	National veterans	person	158	144	113
	Foreigners		25	29	10
Turnover and Retirement ⁴⁾					
Total turnover ⁵⁾			474	601	632
By gender	Male		379	469	559
	Female		95	132	73
By age	Under 30 years old	person	169	184	245
	Ages 30-39		152	213	214
	Ages 40-49		59	107	83
	Ages 50 and above		94	97	90
Voluntary turnover rate		%	9.6	5.3	3.5
Voluntary turnover ⁶⁾	Subtotal	person	324	355	221
Labor Relations					
Labor Union	Employees eligible for membership	person	2,192	2,064	1,166
	Union members		1,602	1,521	1,166
	Membership rate	%	73.1	73.7	100
Labor Council	Number of agenda item	case	605	571	533
Benefits and Welfare					
Benefits ⁷⁾	Total benefit cost	KRW	72,933	110,494	107,730
	Benefit cost per person	million	11	16	18

1) 2021 and 2023 social data includes the **Chemical, Qcells, Insight, Advanced Materials**, and **Galleria Divisions**. 2023 social data includes the **Chemical, Qcells**, and **Insight Divisions** only due to the splitoff of **Advanced Materials** and the spinoff of **Galleria**.

2) Based on the business report.

3) Data corrected due to changes in data calculation standards.

4) 2021 and 2021 data corrected due to changes in data calculation standards.

5) Number of turnover and retirement including both full-time and contract employees.

6) Voluntary turnover refers to the number of people who resign, voluntarily leave the company, or take a leave of absence, while involuntary turnover refers to the number of retirement due to retirement age, early retirement, honorable retirement, dismissal, or completion of an internship.

7) Based on the amount of benefit expenses in the (separate) financial statements in the business report.

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Classification		Unit	2021	2022	2023	
Parental Leave						
Employees who used parental leave	Male	person	14 ¹⁾	23	25	
	Female		64	61	30	
Employees who plan to return from parental leave	Male		12	11	11	
	Female		44 ¹⁾	75 ¹⁾	29	
Employees who returned from parental leave	Male		12	11	11	
	Female		44 ¹⁾	74	27	
Return rate from parental leave	Male	%	100	100	100	
	Female		100	98.7 ¹⁾	93.1	
Safety and Health Management System						
Economic	Percentage of safety and health-certified business sites	%	95 ¹⁾	95 ¹⁾	88.0	
	Certified business sites	number	19	19	7	
Environmental	Business sites subject to certification	number	20 ¹⁾	20 ¹⁾	8	
Safety and Health Investments						
	Total		108,770	136,533	116,500	
	Repair fee		89,577	102,992	84,713	
	Inspection (diagnosis and consulting)		12,246	10,869	7,099	
Safety and Health investment cost	Education and training	KRW million	505	259	268	
	Safety and protective equipment		1,377	1,729	1,932	
	Workplace environment (health check-up)		1,836	2,107	2,202	
	Reward and campaigns		382	907	1,516	
	Other		2,847	17,669	18,770	
Occupational Safety and Health System						
Occupational Health and Safety	Number of workers	person	N/A	N/A	7,311	
	Number of employees (company)		N/A	N/A	5,707	
	Employee (company) ratio		%	N/A	N/A	78.1
	Number of employees of suppliers	person	N/A	N/A	1,604	
Occupational accidents						
	Total number of business site	number	21	25	26	
	Business sites with work-related accidents		8	7	5	
	Ratio of business sites	%	38.1	28.0	19.2	
Number of occupational accidents	Employees (company)	case	4 ¹⁾	5	8	
	Suppliers		8	4	9	
Number of serious accidents (excluding casualties)	Employees (company)		0	0	0	
	Suppliers		0	0	0	
Rate of occupational accidents	Employees (company)		%	0.1 ¹⁾	0.1 ¹⁾	0.1
	Suppliers			0.6 ¹⁾	0.3 ¹⁾	0.6
Rate of serious accidents (excluding casualties)	Employees (company)	%	0	0	0	
	Suppliers		0	0	0	

Classification		Unit	2021	2022	2023	
Casualties	Employees (company)	person	0	0	0	
	Suppliers		0	0	0	
Fatality rate			0	0	0	
Occupational illness frequency rate (OIFR)	Employees (company)	%	0.1 ¹⁾	0	0	
	Suppliers		0	0	0	
Total working hours	Employees (company)	hour	N/A	N/A	12,728,100	
	Suppliers		N/A	N/A	4,364,321	
Injury Frequency Rate (IFR)	Employees (company)	%	0.5	0.5	0.6	
	Suppliers		1.4	0.6	2.1	
Occupational illnesses						
Business sites with work-related illnesses	Number of business sites	number	1	0	0	
	Ratio of business sites	%	12.5	0	0	
Number of occupational illnesses	Employees (company)	cases	1	0	0	
	Suppliers		0	0	0	
Employee training and career management						
Training hours	Training hours per employee	hour/person	8.9	16.9	14.1	
	Total training hours	hour	58,041	111,288	84,817	
By gender	male	Total training hour	hour	26,854	94,382	75,570
		Average training hour per person	hour/person	4.7	16.0	14.9
	female	Total training hour	hour	7,032	16,905	9,246
		Average training hour per person	hour/person	6.6	15.0	13.0
By employment type	Full-time	Total training hour	hour	33,620	105,410	50,564
		Average training hour per person	hour/person	5.2	16.0	8.7
	Contract	Total training hour	hour	266	5,877	34,253
		Average training hour per person	hour/person	1.5	30.3	160.8
Performance Evaluation						
Number of employees subject to performance evaluation	Subtotal			4,296	4,668	4,167
	By gender	male		N/A	N/A	3,491
		female		N/A	N/A	676
	By position	Managers		N/A	N/A	325
		Staff		N/A	N/A	3,842
	Subtotal		person		4,296	4,668
Employees who received regular performance evaluations	By gender	male		N/A	N/A	3,491
		female		N/A	N/A	676
	By position	Managers		N/A	N/A	325
		Staff		N/A	N/A	3,842
Percentage of employees who received regular performance evaluations		%	100	100	100	

1) Data corrected due to changes in data calculation standards

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Classification		Unit	2021	2022	2023	
Equal Opportunity						
Ratio of female-to-male salary		%	57.1	55.2	67.6	
Average salary per person	male	KRW million	65	82	99	
	female	KRW million	37	45	67	
Customer Satisfaction						
VOC status	Number of complaints received		1,709	785	527	
	Number of complaints processed		1,709	785	525	
	Processing rate of customer complaints		%	100	100	99.6
Customer Privacy						
Number of customer privacy breaches	Number of personal information leakages		0	0	0	
	Number proven customer privacy violations and loss of customer information		0	0	0	
	Total monetary losses incurred as a result of information security breaches or cybersecurity incidents		KRW million	0	0	0
Corporate social responsibility (CSR)						
Donated amount	Total donation amount		4,389 ¹⁾	7,073	9,806	
	Social welfare		515	1,466	3,874	
	Education scholarship		KRW million	2,438	3,162	3,200
	Environment and culture		566	1,330	2,617	
	others		870	1,114	116	
Win-Win Cooperation						
Supplier status	Total number of suppliers		number	5,670	5,110	1,915
	Number of newly registered suppliers		number	1,294	983	431
	Total supplier purchases		KRW million	7,225,997	6,932,605	4,075,894
Supplier support	Financial assistance	Total budget	KRW million	81,000	71,000	71,000
		Total financed	KRW million	24,465	23,500	19,928
Processing supplier grievances	Number of grievances filed		case	N/A	N/A	20
	Number of grievances processed		case	N/A	N/A	20
	Grievance processing rate		%	N/A	N/A	100

Classification		Unit	2021	2022	2023		
Supply Chain ESG Management							
New supplier selection	Number of new suppliers screened for environmental standards		number	N/A	N/A	71	
	Percentage of new suppliers screened for environmental standards		%	N/A	N/A	16.5	
	Number of new suppliers screened for social standards		number	N/A	N/A	71	
	Percentage of new suppliers screened for social standards		%	N/A	N/A	16.5	
Supplier Assessments	Number of suppliers that underwent environmental impact assessments			N/A	N/A	13	
	Subtotal		number	N/A	N/A	3	
	Number of suppliers confirmed to have a negative impact on the environment	Number of suppliers who developed improvement plans based on assessment results			N/A	N/A	3
		Percentage of suppliers who developed improvement plans based on assessment results		%	N/A	N/A	100
		Number of suppliers whose contracts were terminated due to assessment results		number	N/A	N/A	0
		Percentage of suppliers whose contracts were terminated due to assessment results		%	N/A	N/A	0
	Number of suppliers that underwent social impact assessments			N/A	N/A	150	
	Subtotal		number	N/A	N/A	11	
	Number of suppliers confirmed to have a negative impact on the society	Number of suppliers who developed improvement plans based on assessment results			N/A	N/A	11
		Percentage of suppliers who developed improvement plans based on assessment results		%	N/A	N/A	100
Number of suppliers whose contracts were terminated due to assessment results		number	N/A	N/A	0		
Percentage of suppliers whose contracts were terminated due to assessment results		%	N/A	N/A	0		

1) Data corrected due to calculation errors in the past

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Classification		Unit	2021	2022	2023	
Board of Directors and Committees						
Board of Directors	Total		10	10	10	
	Inside director	person	4	4	3	
	Outside director(non-executive)	Number of outside directors		6	6	6
		Percentage of outside directors	%	60	60	60
	Non-executive directors	person	N/A	N/A	1	
	Female directors	Number of female directors		1	1	1
		Percentage of female directors	%	10	10	10
	Attendance rate	Inside director		100	98 ²⁾	95
		Outside director(non-executive)	%	96	95	95
		Non-executive directors		N/A	N/A	88
	Number of meetings held	number	10	14	14	
	Average term of office	months	23	35	40	
Agenda	Number of agendas		0	119	111	
	Number of agendas with objections from outside directors	case	0	0	0	
Audit Committee	Ratio of outside directors	%	100	100	100	
	Number of meetings held	number	6	6	8	
	Attendance rate	%	N/A	N/A	100	
	Ratio of female directors	%	0	0	0	
	Ratio of outside directors	%	N/A	N/A	100	
	Number of meetings held	number	N/A	N/A	11	
Internal Transactions Committee	Attendance rate	%	N/A	N/A	93	
	Ratio of female directors	%	N/A	N/A	0	
	Ratio of outside directors	%	100	100	100	
Outside Director Nomination Committee	Number of meetings held	number	1	1	1	
	Attendance rate	%	N/A	N/A	100	
	Ratio of female directors	%	0	0	0	
ESG Committee	Ratio of outside directors	%	100	100	100	
	Number of meetings held	number	3	6	6	
	Attendance rate	%	N/A	N/A	100	
	Ratio of female directors	%	0	0	0	
Remuneration	Highest remuneration	KRW million	2,700	3,600	3,601	
	Employees (excluding the highest paid person)	Average annual salary per person	KRW million	72	86	95
Ethics & Compliance						
Anti-corruption risk assessment	Business sites that conducted the anti-corruption assessment	number	21	15	11	
	Total number of business sites	number	21	21	11	
	Percentage of business sites that underwent anti-corruption risk assessments	%	100	71	100	

Classification		Unit	2021	2022	2023
Anti-corruption Communication and Training					
Anti-corruption (ethics) training	Ethics training hours	hour	4,496	3,060	1,280
	Number of participants	person	4,496	2,344	764
	Number of executives who completed ethics training	person	18	14	28
	Percentage of executives who completed ethics training	%	15.5	11.5	26.7
	Number of employees who completed ethics training	person	4,478	2,330	736
	Percentage of employees who completed ethics training	%	66.7	34.4	12.3
Anti-corruption policy (code of ethics)	Number of suppliers who signed the code of ethics	number	N/A	N/A	0
	Number of employees who signed the code of ethics	person	1,230	913	0
Anti-corruption and ethics violations disciplines	Number of ethics violations		0	5	9
	Employee	case	0	5	2
	Termination of contract (supplier)		0	0	0
	Number of people who completed the training	person	501	738	88
Fair trade training	Number of training sessions	Employees	4	2	1
		Suppliers	0	0	0
	Training hour	hour	683	1,160	132
Internal compliance reporting	Total number of reports		3	0	3
	Number of reports resolved	case	3	0	3
Anti-competitive Practices					
Legal actions due to anti-competitive behavior	case	0	0	0	
Violation of Laws and Regulations					
Number of compliance violations	Subtotal		3	4	4
	Monetary sanctions	case	2	4	4
	Non-monetary sanctions		1	0	0
Penalties	Occurrences in the current reporting period	KRW million	0	2,519	4.6
	Occurrences in the previous reporting period	KRW million	5	0	374

1) 2021 and 2023 governance data includes the **Chemical, Qcells, Insight, Advanced Materials,** and **Galleria Divisions.** 2023 governance data includes the **Chemicals, Qcells,** and **Insight Divisions** only due to the splitoff of **Advanced Materials** and the spinoff of **Galleria.**
 2) Data corrected due to calculation errors in the past

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Sustainability Commitments

UN SDGs Commitment Hanuha Solutions promotes ESG management activities based on the detailed goals of SDGs and aims to contribute to the achievement of the UN Sustainable Development Goals (SDGs).

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UN SDGs	Response Objectives	Detailed Objectives	Our Activities
	Ensure healthy lives and promote well-being for all at all ages	<p>3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all</p> <p>3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination</p>	<ul style="list-style-type: none"> Set goals for creating accident-free and disaster-free workplaces Strengthen safety leadership and respond effectively to serious accidents Identify vulnerabilities and establish improvement plans through safety atmosphere diagnosis Implement employee health promotion programs, including company-wide walking programs Enforce Right of Work Suspension to ensure worker safety during operations
	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	<p>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</p>	<ul style="list-style-type: none"> Operate the Hanuha Qcells Para Sports Team Provide education and therapy for elementary school students from vulnerable households Establish the Brighter World Fund
	Ensure access to affordable, reliable, sustainable and modern energy for all	<p>7.2 By 2030, increase substantially the share of renewable energy in the global energy mix</p> <p>7.3 By 2030, double the global rate of improvement in energy efficiency</p>	<ul style="list-style-type: none"> Establish a solar power total value chain in Georgia, US Develop AEMEC technology for the commercialization of green hydrogen
	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	<p>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</p>	<ul style="list-style-type: none"> Enhance supplier ESG and SH evaluation systems and provide consulting Expand the pool of great suppliers through an open sourcing system Support suppliers by creating a Win-Win Fund
	Ensure sustainable consumption and production patterns	<p>12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse</p>	<ul style="list-style-type: none"> Diversify the application of recycled raw material rPE Research eco-friendly synthetic gas production technology based on waste plastic Develop bi-directional polyethylene film to improve recycling of flexible packaging films
	Take urgent action to combat climate change and its impacts	<p>13.2 Integrate climate change measures into national policies, strategies and planning</p> <p>13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</p>	<ul style="list-style-type: none"> Reduce GHG and expand the use of renewable energy to achieve 2050 Net Zero Support climate change-related initiatives such as TCFD and K-RE100 Achieve a grade A- from CDP Climate change
	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	<p>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</p>	<ul style="list-style-type: none"> Identify workplace biodiversity risks and opportunities using the LEAP approach Establish biodiversity goals by 2026 Conduct environmental impact assessments at workplaces and carry out environmental cleanup activities in local communities
	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	<p>16.5 Substantially reduce corruption and bribery in all their forms</p> <p>16.6 Develop effective, accountable and transparent institutions at all levels</p>	<ul style="list-style-type: none"> Establish the company's risk management regulations Obtain ISO 37301 (compliance management systems) and ISO 37001 (anti-bribery management systems) certifications for all divisions Operate a fair trade compliance program

Sustainability Commitments

UNGC Commitment Hanwha Solutions supports the 10 principles of the UN Global Compact (UNGC) on human rights, labor, environment, and anti-corruption. These principles are integrated into all aspects of our corporate activities.

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	UNGC Ten Principles	Our Activities
Human Rights	Principle 1. Businesses should support and respect the protection of internationally proclaimed human rights; and	We adhere to the conventions of the International Labour Organization (ILO) as well as global labor laws and regulations. We incorporate provisions regarding the respect and protection of human rights into its Code of Ethics and actively conducts human rights education to enhance awareness and promote the advancement of human rights.
	Principle 2. make sure that they are not complicit in human rights abuses.	
	Principle 3. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;	We comply with the Constitution and relevant laws to protect the right of employees that must be respected fundamentally, such as the freedom of association, bargain collectively, and act collectively, and promotes win-win cooperation by holding quarterly labor-management councils.
	Principle 4. the elimination of all forms of forced and compulsory labour;	We exclude all forms of forced labor.
	Principle 5. the effective abolition of child labour; and	We prohibit the employment of minors and child labor.
Environment	Principle 6. the elimination of discrimination in respect of employment and occupation.	We guarantee equal opportunities to all applicants, operate a fair recruitment system, and do not discriminate in hiring, placement, promotion, salary, or education based on gender, religion, political opinion, social status, nationality, or race.
	Principle 7. Businesses should support a precautionary approach to environmental challenges;	To actively respond to the climate crisis, we declared 2050 Net Zero in November 2021 and are promoting various environmental impact reduction activities, such as improving VC reduction facilities, to become a global environmental management company. Our business sites have acquired ISO 14001 (environmental management systems) and are maintaining ISO 45001 (health and safety management systems) certification for the sustainable operation of the SHE management system.
	Principle 8. undertake initiatives to promote greater environmental responsibility; and	We have declared our support for the TCFD and disclose information in accordance with TCFD recommendations. By participating in climate change-related initiatives such as the Carbon Disclosure Project (CDP) and K-RE100, we prioritize ESG management activities and minimize environmental impacts for sustainable growth.
Anti-corruption	Principle 9. encourage the development and diffusion of environmentally friendly technologies.	We are committed to expanding our support and investment in the development of eco-friendly technologies, including hydrogen and solar power. We aim to contribute to the creation of a sustainable environment by actively seeking and discovering eco-friendly business models.
	Principle 10. Businesses should work against corruption in all its forms, including extortion and bribery.	We have successfully maintained international standard certifications for ISO 37301 (compliance management systems) and ISO 37001 (anti-bribery management systems), implementing transparent corporate management activities on a global scale.

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Hanwha Solutions defines customers, shareholders, investors, executives, employees, suppliers, local communities, and governments as our stakeholders with a direct or indirect impact on corporate management activities. We operate various communication channels to create value and listen to stakeholder opinions, actively collecting and striving to reflect these in our decision-making process.

Stakeholders	Communication Channels	Interests	Our Activities
Customers	<ul style="list-style-type: none"> Official website and social media channels (year-round) Seminars (year-round) VOC channel (year-round) Customer satisfaction survey (yearly) Business report and sustainability report 	<ul style="list-style-type: none"> Personal information leak prevention Product and service quality assurance Sustainable eco-friendly products 	<ul style="list-style-type: none"> Develop products and services that meet customer needs Establish CRM system and create customer company database Implement LCA in the Chemical and Qcells Divisions Enhance customer satisfaction through surveys and feedback analysis <ul style="list-style-type: none"> Achieved 100% VOC handling rate in 2023
Shareholders and Investors	<ul style="list-style-type: none"> General meeting of shareholders (yearly) Extraordinary general meeting of shareholders (as needed) NDR and IR meeting (quarterly) Corporate briefing session (quarterly) Business report, audit report, corporate governance report, sustainability report 	<ul style="list-style-type: none"> Management strategy to enhance corporate value Risk management activities Shareholder-friendly management Swift and accurate communication 	<ul style="list-style-type: none"> Implement corporate governance charter Adopt mid to long-term shareholder return policy Disclose transparent information through business reports, corporate governance reports, sustainability reports, etc.
Employees	<ul style="list-style-type: none"> Grievance handling channel (year-round) Intranet bulletin board (year-round) Employee meetings and workshops (year-round) Organizational culture survey (yearly) Labor-Management Council (quarterly) 	<ul style="list-style-type: none"> Work-life balance Employee health and safety Talent development and career management Fair performance evaluation and compensation 	<ul style="list-style-type: none"> Enhance employee competency through training programs Operate various welfare and benefit systems Promote a culture of respect for human rights Maintain a fair and equitable performance compensation system Create a safe and pleasant work environment
Suppliers	<ul style="list-style-type: none"> Grievance handling channel (year-round) Meetings with partner company representatives (as needed) Training for suppliers (year-round) 	<ul style="list-style-type: none"> Fair cooperative relationships Win-win management and ESG activities Fair trade 	<ul style="list-style-type: none"> Establish code of conduct for suppliers Improve ESG capabilities and safety and health evaluation system for suppliers Operate a win-win fund Expand supplier pool through open sourcing system
Local communities	<ul style="list-style-type: none"> Local council activities (year-round) CSR activities (year-round) 	<ul style="list-style-type: none"> Community development and revitalization Creation of community value Environmental preservation activities 	<ul style="list-style-type: none"> Assess environmental impacts on local communities and identify biodiversity risks and opportunities Conduct social contribution activities for vulnerable groups Foster a transparent donation culture such as the Brighter World Fund
Government	<ul style="list-style-type: none"> Association membership and activities (year-round) Cooperation with public institutions and government ministries (year-round) 	<ul style="list-style-type: none"> Compliance with laws and regulations Industry-related policies Public-private cooperation partnerships 	<ul style="list-style-type: none"> Ensure faithful tax payment Create jobs Implement cooperation projects with government and public institutions

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Table 1. Sustainability Disclosure Topics & Accounting Metrics			Hanwha Solutions' Response	
Topic	Code	Accounting Metric	2022 ¹⁾	2023
Greenhouse Gas emissions	RT-CH-110a.1	Global gross Scope 1 emissions	377,730tCO ₂ eq(domestic sites)	441,252tCO ₂ eq ²⁾
		Percentage covered under emissions-limiting regulations	100%	83.3%
	RT-CH-110a.2	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 17, 51, 52	page 27, 28, 35
Air Quality	RT-CH-120a.1	Air emissions of the following pollutants: (1) NO _x (excluding N ₂ O)	233ton	204.9ton
		(2) SO _x	10.8ton	10.1ton
		(3) Volatile Organic Compounds (VOCs) ³⁾	12.6ton	Not calculated
		(4) Hazardous Air Pollutants(HAPs) ⁴⁾	3.7ton	Not calculated
Energy Management	RT-CH-130a.1 RR-ST-130a.1	(1) Total energy consumed	48,219,384GJ	48,511,277GJ
		(2) Percentage green electricity	76.8%	77.9%
		(3) Percentage renewable	1.4%	1.8%
		(4) Total self-generated energy	9,910GJ	15,418GJ
Water Management	RT-CH-140a.1 RR-ST-140a.1	(1) Total water withdrawn	16,922,003m ³	15,798,153m ³
		(2) Total water consumed, Percentage of each in regions with High or Extremely High Baseline	7,472,422m ³ , 80.9%	3,134,811m ³ , 70.6%
	RT-CH-140a.2	Water Stress No worksites with 'High Risk' water stress ⁵⁾	No violations	No violations
	RT-CH-140a.3 RR-ST-140a.2	Number of incidents of non-compliance associated with water quality permits, standards, and regulations	page 64, 65	page 41, 42
Hazardous Waste Management	RT-CH-150a.1 RR-ST-150a.1	Amount of hazardous waste generated	34,503ton	49,217ton
		Percentage recycled	40.0%	28.0%
Community Relations	RT-CH-210a.1	Discussion of engagement processes to manage risks and opportunities associated with community interests	page 60, 67, 89, 90	page 102
Workforce Health and Safety	RT-CH-320a.1	Total recordable incident rate (TRIR) for (a) direct employees and (b) contract employees (Total Recordable Incident Rate, TRIR)	Employees: 0.51 Suppliers: 0.62	Employees: 0.63 Suppliers: 1.41
		Fatality rate for (a) direct employees and (b) contract employees	0%	0%
	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 29, 33	page 62, 63, 66, 67
Product Design for Use-phase Efficiency	RT-CH-410a.1	Revenue from products designed for use-phase resource efficiency	page 68,70	-

1) Please refer to the specified pages for certain metrics in the 2023 Sustainability Report.

2) Sum of emissions of the company and some subsidiaries.

3) 4) Not calculated this year.

5) Data corrected due to changes in data calculation standards.

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Table 1. Sustainability Disclosure Topics & Accounting Metrics			Hanwha Solutions' Response	
Topic	Code	Accounting Metric	2022 ¹⁾	2023
Safety and 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	page 63	-
		(2) Percentage of such products that have undergone a hazard assessment	100%	100%
	RT-CH-410b.2	(1) Discussion of strategy to manage chemicals of concern	page 33, 63	page 40
		(2) Discussion of strategy to develop alternatives with reduced human or environmental impact	page 20, 22, 60, 69	page 40
Genetically Modified Organisms	RT-CH-410c.1	Percentage of products by revenue that contain genetically modified organisms (GMOs)	Not applicable	Not applicable
Management of the Legal and Regulatory Environment	RT-CH-530a.1	Discussion of corporate positions related to government regulations or policy proposals that address environmental and social factors affecting the industry	page 58, 59, 61	page 45
Operational Safety, Emergency Preparedness and Response	RT-CH-540a.1	Process Safety Incidents Count, PSIC	0	0
		Process Safety Total Incident Rate, PSTIR	0	0
		Process Safety Incident Severity Rate, PSISR	0	0
	RT-CH-540a.2	Number of transport incidents	0	0

Sector : Solar Technology & Project Developers

Table 1. Sustainability Disclosure Topics & Accounting Metrics			Hanwha Solutions' Response	
Topic	Code	Accounting Metric	2022	2023
Hazardous Waste Management	RR-ST-150a.2	Number and aggregate quantity of reportable spills, quantity recovered	Not applicable	Not applicable
Ecological Impacts of Project Development	RR-ST-160a.1	Number and duration of project delays related to ecological impacts	Not applicable	Not applicable
	RR-ST-160a.2	Description of efforts in solar energy system project development to address community and ecological impacts	page 19, 23, 90	page 28, 35, 50, 101
Management of Energy Infrastructure Integration & Related Regulations	RR-ST-410a.1	Description of risks associated with integration of solar energy into existing energy infrastructure and discussion of efforts to manage those risks	page 43-46	page 20-25
	RR-ST-410a.2	Description of risks and opportunities associated with energy policy and its impact on the integration of solar energy into existing energy infrastructure		
Product End-of-life Management	RR-ST-410b.2	Weight of end-of-life material recovered, percentage recycled	No products have reached their end-of-life (domestic manufacturing plant completed after 2015)	No products have reached their end-of-life (domestic manufacturing plant completed after 2015)
	RR-ST-410b.4	Description of approach and strategies to design products for high-value recycling	page 20, 22, 66, 68, 70	page 51
Materials Sourcing	RR-ST-440a.1	Description of the management of risks associated with the use of critical materials	page 23, 86	page 55
	RR-ST-440a.2	Description of the management of environmental risks associated with the polysilicon supply chain		page 50, 55

1) Please refer to the specified pages for certain metrics in the 2023 Sustainability Report.

ESG Policy

Code of Ethics

Hanuha Solutions established a code of ethics to guide actions and value judgments regarding the environment, fair trade, unfair competition, and community participation, along with practice guidelines outlining behavioral standards for the company and its employees. The Board of Directors approved the suspension of the Code of Ethics on August 11, 2020, under Article 28. Since then, the authority to establish the practice guidelines for the code of ethics was delegated to the ethics management department, and the Compliance Office then formulated the Code of Ethics Practice Guidelines in accordance with Article 26 of the Code of Ethics.

<Policies Related to Fair Trade and Unfair Competition>

[Code of Ethics]

Chapter 3 Compliance with laws and free market economy

Article 8 (Compliance with laws and commercial customs)

- ① We comply with all applicable laws and regulations in all regions where we operate and conduct business by respecting commercial customs.
- ② We do not engage in any acts that violate domestic and international fair trade laws.
- ③ Employees stationed overseas shall be familiar with the laws and commercial customs of the region and avoid violating them.

Article 9 (Free market economy)

- ① We support market competition in all regions under the principle of free competition.
- ② We practice fair competition with competitors based on mutual respect and do not infringe on their interests or unfairly exploit their weaknesses.
- ③ We do not slander competitors or make groundless comparisons through advertisements.
- ④ We obtain and utilize information in compliance with laws and commercial customs.

[Code of Ethics Practice Guidelines]

VI. Practice guidelines related to fair trade and unfair competition prevention

Basic guidelines and goals

- 1) In all of the company's relationships with stakeholders, we recognize and comply with regulations prohibiting the abuse of market dominance, unfair collaborative actions, unfair trade practices, resale price maintenance practices, and special practices, ensuring no violation of fair trade laws.
- 2) In all relationships involving others' trade secrets, ideas, and intellectual property rights—such as during recruitment, research and development, and business-related negotiations and discussions with third parties—we ensure compliance with the Unfair Competition Prevention and Trade Secret Protection Act (hereinafter referred to as the Unfair Competition Prevention Law).
- 3) By implementing the basic guidelines above and the measures outlined below, we aim for zero violations of fair trade laws, including the abuse of superior position in transactions, and zero violations of unfair competition prevention laws, such as trade secret infringement and unfair competition.

<Community Participation Policy>

[Code of Ethics Practice Guidelines]

V. Environmental Management Practice Guidelines

Behavioral Guidelines

- 4) Conservation of biodiversity A. We conduct purification activities to protect the environment in cooperation with local communities and actively engage in social responsibility efforts to restore natural ecosystems and preserve biodiversity.
 - B. Recognizing the importance of restoring natural ecosystems and preserving biodiversity, we strive to minimize side effects by investigating the potential impact of our management activities on local biodiversity.

ESG Policy

Safety, Health, and Environment (SHE) Policy

We have established SHE policies and regulations based on ISO 45001 (health and safety management systems) and ISO 14001 (environmental management systems), approved by the head of each division. These policies are enforced among all company employees and communicated to stakeholders, including local residents.

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< Chemical Division's SHE Policy >

Safety, Health, and Environment (SHE) Policy

Goal: Achieve zero accidents and Net Zero.

We place safety, health, and environment as top priorities in corporate management. To build a safe and clean business site, we implement the following:

1. Under an advanced SHE management system, we cultivate a robust safety culture where all employees willingly adhere to safety protocols.
2. To achieve an accident-free workplace, we eliminate potential risk factors, create safe working environments, and continuously promote the health of our personnel.
3. To contribute to Net Zero, we promote a circular economy of resources, optimize energy use across all processes, and persistently reduce pollutants to establish an eco-friendly facility.
4. We strengthen our SHE cooperation framework through active engagement and communication with stakeholders, including employees, suppliers, customers, and residents.

< Qcells Division's ESH Policy >

Environment, Safety, and Health (ESH) Policy

Goal: Achieve zero accidents and Net Zero.

Hanwha Solutions/Qcells Division prioritize environmental sustainability, safety, and health as core values in corporate management. We implement the following initiatives to foster an environmentally friendly workplace.

1. We strictly adhere to ESH regulations and cultivate a safety culture where employees actively engage.
2. We ensure a safe and healthy workplace through accident prevention activities focused on risk assessments and adherence to the 10 Safety Principles.
3. To achieve Net Zero, we promote circular economy practices, optimize energy use across all R&D, production, and service operations, and continue efforts to reduce pollutants to establish an eco-friendly workplace.
4. We enhance our ESH cooperation framework through active communication and collaboration with stakeholders, including employees and suppliers.

< Insight Division's Safety and Health Management Policy >

Safety and Health Management Policy and Goal

The Insight Division establishes a prevention-focused system for safety and health management by identifying predictable high-risk accident types to prepare for industrial incidents that are growing larger and more complex due to socio-environmental changes.

Safety and Health Management Policy Internalizing a safety culture in daily operations

- Comply with safety and health laws and company regulations
- Secure a smooth communication system and ensure stakeholder participation
- Increase management's active participation in safety and health activities

Safety and Health Management Goals Zero Serious Accidents

Energy Solution	Urban Development	Premium Lifestyle
<p>Guarantee the right to suspend work for high-risk activities</p> <ul style="list-style-type: none"> - Reduce occupational accidents by 10% - Identify near-misses (submit at least twice a year) 	<p>Expand mutually beneficial safety management with construction companies</p> <ul style="list-style-type: none"> - Conduct joint inspections with clients at least once a quarter - Ensure appointment of Safety and Health Coordinators 	<p>Enhance safety, health, and hygiene management activities</p> <ul style="list-style-type: none"> - Achieve zero hygiene accidents - Reduce customer accidents by 10% - Conduct joint inspections with clients at least once a quarter

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Greenhouse Gas Verification Statement (Scope 1, 2)



GREENHOUSE GAS VERIFICATION OPINION HANWHA SOLUTIONS CORPORATION

Introduction

DNV Business Assurance Korea Ltd. (“DNV”) was commissioned by Corporation (“**Hanwha Solutions**”) to verify the **Hanwha Solutions**’ Greenhouse Gas Inventory Report for the calendar year 2023 (“the report”) based upon a reasonable level of assurance. **Hanwha Solutions** is responsible for the preparation of the GHG emissions data on the basis set out within the guidelines on the operation of GHG emission trading scheme (“ETS”) (Notification No. 2023-221 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 data covered by our examination comprise Direct emissions (Scope 1) and Energy indirect emissions (Scope 2) from **Hanwha Solutions** boundary of the report;

- GHG emissions under verification: GHG emissions from 2023
- Organizational boundary for reporting: **Hanwha Solutions** Corporation (in Korea)

Verification Approach

The verification has been conducted by DNV on February to March 2024 and performed in accordance with the verification principles and tasks outlined in the guidelines on the operation of GHG ETS (Notification No.2023-221, Korean Ministry of Environment) and the verification guideline for GHG ETS (Notification No. 2021-112, 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 report for the calendar year 2023
- We have reviewed and verified the process to generate, aggregate and report the emissions

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 set out in **Hanwha Solutions**’ report are not fairly stated. The GHG emissions of **Hanwha Solutions** for the year 2023 were confirmed as below;

| Greenhouse Gas Emissions and Energy Consumption of **Hanwha Solutions** for Year 2023 |

Hanwha Solutions	Greenhouse Gas Emissions (tCO ₂ e)			Energy Consumption (TJ)
	Direct emission (Scope 1)	Indirect emission (Scope 2)	Total emissions	
Emissions for the preceding three based on years 4th commitment period	402,205.095	2,181,386.825	2,583,579	48,414
Emissions for surrender of emissions permits	359,504.186	2,127,076.134	2,486,566	

※ Total emissions = Direct emissions(Scope 1) + Energy indirect emissions(Scope 2)
 ※ In order to report the GHG emissions as an integer, the rounded number on the statement might be different from the number on the system with ± 1 tCO₂e

April 2024
Seoul, Korea

Jang-Sub Lee
 Country Representative
 DNV Business Assurance Korea

This Assurance Statement is valid as of the date of the issuance April 2024. 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

Greenhouse Gas Verification Statement (Scope 3)



LRQA Independent Assurance Statement Relating to Hanwha Solutions Corporation's Greenhouse Gas (GHG) Emissions Inventory for the calendar year 2023

This Assurance Statement has been prepared for **Hanwha Solutions** Corporation in accordance with our contract.

Terms of engagement

LRQA was commissioned by **Hanwha Solutions** Corporation (**Hanwha Solutions**) to provide independent assurance on its GHG emissions inventory for the calendar year 2023 (here after referred to as "the report") against the assurance criteria below to a limited level of assurance and materiality of 5% using ISO 14064-3:2019, 'Specification with guidance for validation and verification of greenhouse gas assertions'.

Our assurance engagement covered domestic operations and activities of **Hanwha Solutions' Chemical and Qcells Division**, and specifically the following requirements:

- Evaluating conformance with Corporate Value Chain (Scope 3) Accounting and Reporting Standard 1
- Evaluating the accuracy and reliability of data and information for other indirect GHG emissions (Scope 3).

The main activities of **Hanwha Solutions** include manufacturing of petrochemical products and solar modules, and the GHG emissions have been consolidated using an operational control approach.

LRQA's responsibility is only to **Hanwha Solutions**. LRQA disclaims any liability or responsibility to others as explained in the end footnote. **Hanwha Solutions'** responsibility is for collecting, aggregating, analysing and presenting all the data and information within the report and for maintaining effective internal controls over the systems from which the report is derived. Ultimately, the report has been approved by, and remains the responsibility of **Hanwha Solutions**.

LRQA's Opinion

Based on LRQA's approach nothing has come to our attention that would cause us to believe that **Hanwha Solutions** has not, in all material respects:

- Met the requirements above; and
- Disclosed accurate and reliable data and information as summarized in Table 1 below.

The opinion expressed is formed on the basis of a limited level of assurance and at the materiality of 5%.

Note: The extent of evidence-gathering for a limited assurance engagement is less than for a reasonable assurance engagement. Limited assurance engagements focus on aggregated data rather than physically checking source data at sites. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed.

1) <https://www.ghgprotocol.org>

LRQA's approach

LRQA's assurance engagements are carried out in accordance with our verification procedure. The following tasks though were undertaken as part of the evidence gathering process for this assurance engagement:

- Interviewing key people of the organization responsible for managing GHG emissions data and records;
- Reviewing processes related to the control of GHG emissions data and records;
- Reviewing whether GHG emissions have been calculated with parameters from recognized sources;
- Visiting **Hanwha Solutions'** headquarters and Jincheon plant, and reviewing additional evidence made available by **Hanwha Solutions**; and
- Verifying historical GHG emissions data and records at an aggregated level for the calendar year 2023.

LRQA's standards, competence and independence

LRQA implements and maintains a comprehensive management system that meets accreditation requirements for ISO 14065 Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition and ISO/IEC 17021 Conformity assessment – Requirements for bodies providing audit and certification of management systems that are at least as demanding as the requirements of the International Standard on Quality Control 1 and comply with the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants.

LRQA ensures the selection of appropriately qualified individuals based on their qualifications, training and experience. The outcome of all verification and certification assessments is then internally reviewed by senior management to ensure that the approach applied is rigorous and transparent.

LRQA is **Hanwha Solutions'** verification body for CDP report. The verification is the only work undertaken by LRQA for **Hanwha Solutions** and as such does not compromise our independence or impartiality.

Dated: 12 May 2024

Byung-Gil Lim
 LRQA Lead Verifier
 On behalf of LRQA Limited
 2nd Floor, T Tower, 30, Sowol-ro 2-gil, Jung-gu, Seoul, Republic of Korea
 LRQA reference: SEO00001527, SEO00001528

Greenhouse Gas Verification Statement (Scope 3)

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| Table 1. Summary of **Hanuha Solutions Chemical** and **Qcells Division** (domestic), GHG Emissions Inventory 2023 |

Scope of GHG emissions Tonnes	tCO ₂ eq
Other Indirect GHG emissions (Scope 3)	
· Purchased goods & services – production of raw material purchased	4,835,505
· Capital goods - production of electronic devices and home appliances purchased	58
· Fuel and energy related activities – upstream emissions of fuel and electricity purchased	161,844
· Upstream transportation and distribution – transportation of raw material purchased	23,164
· Waste generated in operations – treatment of waste generated from operations	16,089
· Business travel	3,280
· Employee commuting	7,050
· Upstream leased assets	0
· Downstream transportation and distribution – transportation of sold products	76,091
· Use of sold products*	0
· End-of-life treatment of sold products – treatment of packaging materials for sold products	2,679
· Downstream leased assets - operation of building leased by Hanuha Solutions	81
· Franchises	0
· Investments – Scope 1 and 2 emissions of affiliated companies, joint ventures, and subsidiaries	1,662,031
* The quantity of GHG emissions for the 'use of sold products' category may not be zero if the assumptions applied change.	

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To readers of **Hanwha Solutions** Sustainability Report 2024

Introduction

Korea Management Registrar (KMR) was commissioned by **Hanwha Solutions** to conduct an independent assurance of its Sustainability Report 2024 (the “Report”). The data and its presentation in the Report is the sole responsibility of the management of **Hanwha Solutions**. KMR’s responsibility is to perform an assurance engagement as agreed upon in our agreement with **Hanwha Solutions** and issue an assurance statement.

Scope and Standards

Hanwha Solutions described its sustainability performance and activities in the Report. Our Assurance Team carried out an assurance engagement in accordance with the AA1000AS v3 and KMR’s assurance standard SRV1000. We are providing a Type 2, moderate level assurance. We evaluated the adherence to the AA1000AP (2018) principles of inclusivity, materiality, responsiveness and impact, and the reliability of the information and data provided using the Global Reporting Initiative (GRI) Index provided below. The opinion expressed in the Assurance Statement has been formed at the materiality of the professional judgment of our Assurance Team.

Confirmation that the Report was prepared in accordance with GRI standards 2021 was included in the scope of the assurance. We have reviewed the topic-specific disclosures of standards which were identified in the materiality assessment process.

- **GRI Sustainability Reporting Standards 2021**
- **Universal standards**
- **Topic specific standards**
 - GRI 205 : Anti-corruption
 - GRI 302 : Energy
 - GRI 303 : Water and Effluents
 - GRI 305 : Emissions
 - GRI 306 : Waste
 - GRI 308 : Supplier Environmental Assessment
 - GRI 403 : Occupational Health and Safety
 - GRI 414 : Supplier Social Assessment

As for the reporting boundary, the engagement excludes the data and information of **Hanwha Solutions’** partners, suppliers and any third parties.

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KMR's Approach

To perform an assurance engagement within an agreed scope of assessment using the standards outlined above, our Assurance Team undertook the following activities as part of the engagement:

- reviewed the overall Report;
- reviewed materiality assessment methodology and the assessment report;
- evaluated sustainability strategies, performance data management system, and processes;
- interviewed people in charge of preparing the Report;
- reviewed the reliability of the Report's performance data and conducted data sampling;
- assessed the reliability of information using independent external sources such as Financial Supervisory Service's DART and public databases.

Limitations and Recommendations

KMR's assurance engagement is based on the assumption that the data and information provided by **Hanwha Solutions** to us as part of our review are provided in good faith. Limited depth of evidence gathering including inquiry and analytical procedures and limited sampling at lower levels in the organization were applied. To address this, we referred to independent external sources such as DART and National Greenhouse Gas Management System (NGMS) and public databases to challenge the quality and reliability of the information provided.

Conclusion and Opinion

Based on the document reviews and interviews, we had several discussions with **Hanwha Solutions** on the revision of the Report. We reviewed the Report's final version in order to make sure that our recommendations for improvement and revision have been reflected. Based on the work performed, it is our opinion that the Report applied the GRI Standards. Nothing comes to our attention to suggest that the Report was not prepared in accordance with the AA1000AP (2018) principles.

Inclusivity

Hanwha Solutions has developed and maintained different stakeholder communication channels at all levels to announce and fulfill its responsibilities to the stakeholders. Nothing comes to our attention to suggest that there is a key stakeholder group left out in the process. The organization makes efforts to properly reflect opinions and expectations into its strategies.

Materiality

Hanwha Solutions has a unique materiality assessment process to decide the impact of issues identified on its sustainability performance. We have not found any material topics left out in the process.

Responsiveness

Hanwha Solutions prioritized material issues to provide a comprehensive, balanced report of performance, responses, and future plans regarding them. We did not find anything to suggest that data and information disclosed in the Report do not give a fair representation of **Hanwha Solutions'** actions.

Impact

Hanwha Solutions identifies and monitors the direct and indirect impacts of material topics found through the materiality assessment, and quantifies such impacts as much as possible.

Reliability of Specific Sustainability Performance Information

In addition to the adherence to AA1000AP (2018) principles, we have assessed the reliability of economic, environmental, and social performance data related to sustainability performance. We interviewed the in-charge persons and reviewed information on a sampling basis and supporting documents as well as external sources and public databases to confirm that the disclosed data is reliable. Any intentional error or misstatement is not noted from the data and information disclosed in the Report.

Competence and Independence

KMR maintains a comprehensive system of quality control including documented policies and procedures in accordance with ISO/IEC 17021:2015 - Requirements for bodies providing audit and certification of management systems. This engagement was carried out by an independent team of sustainability assurance professionals. KMR has no other contract with **Hanwha Solutions** and did not provide any services to **Hanwha Solutions** that could compromise the independence of our work.

May 2024 Seoul, Korea



CEO E. J. Hwang

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Awards (January 2023-June 2024)

Division	Award	Awarding Organization
Company-wide	Carbon Management Honors Club at Carbon Disclosure Project (CDP) Korea	CDP Korea
	Honors in the Carbon Management sector of the CDP Korea	CDP Korea
	CDP Korea Excellence Award for Water Security	CDP Korea
Chemical	2023 Prime Minister's Award for Volunteer Service - Ulsan Production Site	Ulsan Metropolitan City
	Fire Administration Commissioner's Award in the 22nd Excellent Safe Korea Company	National Fire Agency
	2023 Top Brand PV for 10 consecutive years	EUPD Research
Qcells	1st place in the US residential solar module market for six consecutive years and in the commercial solar module market for five consecutive years	Wood Mackenzie
	1st place in the solar energy sector at the 2023 Life and Living Awards for four consecutive years	Das Deutsche Institut für Service-Qualität (DISQ) n-tv
	Top Performer in 2023 PV Module Reliability Scorecard for eight consecutive years	PVEL
	Main Award in Brand Communication Category in iF Design Award 2023	my iF

Memberships

Construction Guarantee	Construction Association of Korea	Korea Chamber of Commerce and Industry
Korea Housing Construction Association	Korea Developer Association	Hydrogen Convergence Alliance (H2KOREA)
Energy Transition Forum Korea	The Federation of Korean Industries	Electric Contractors' Financial Cooperative
Korea Emissions Market Association	Korea International Trade Association	Korea Construction Engineers Association
Korea Industrial Technology Association	Korea Golf Course Business Association	Korea Fair Competition Federation
Korea Vinyl Environmental Council	Korea Electric Engineers Association	Korea Listed Companies Association
Korea Petrochemical Industry Association	Korea Plastic Industry Cooperative	Korean Society for Safety
Korea Electrical Contractors Association	International Isocyanate Institute	Korea Chlor Alkali Industry Association
Korea Photovoltaic Industry Association	Korea Fire Facility Association	Korea Chemical Industry Council
Korea Smart Grid Association	The American Chamber of Commerce in Korea	Fire Industry Guarantee Union
Korea Business Council for Sustainable Development	The Korean Society for New and Renewable Energy	Korea-U.S. Economic Council
CF Alliance		

2024 Hanwha Solutions Sustainability Report

Sustainable Solutions For All