

LG Chem
2021 Sustainability Report



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2021 Sustainability Report

Cover Story RE:ACT TO ZERO

RE:ACT TO ZERO, LG Chem's sustainability slogan, shows the company's will to keep up with current events and achieve zero carbon emissions and environmental impact in line with the company's objectives. All employees must work toward the same goals for attaining sustainability within the organization. Let's hear from some of those who are fulfilling their roles in each field.

The RE:ACT TO ZERO TF members Felix, Solar, and Ben, who contemplated the direction of LG Chem's sustainability in the previous report, paid a visit to several business sites practicing sustainability.



The leadership and will to devise goals and strategies are as important as the sense of duty and responsibility of employees who implement them. Get to know the LG Chem employees who are fully invested in their respective fields.





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The 2021 Sustainability Report also lays out in detail how our actions in implementing the company's goals and strategies are contributing to sustainability.





About this report

Following the formulation of our sustainability strategy in 2020, LG Chem was the first chemical company to declare carbon-neutral growth by 2050. Since then, we have established detailed, company-wide objectives and strategies based on our strong will and have undertaken various activities to reduce carbon emissions. As a result, we have set a higher target for reducing carbon emissions, “2050 Net-Zero,” in early 2022.

The most imperative principle in writing a Sustainability Report is transparency. To this end, we are disclosing three-year data based on our achievements aligned with 20 key indicators from an ESG perspective. We seek to enhance data visibility and reliability through transparent disclosure of quantitative data while actively communicating with various stakeholders.

Our 2021 Sustainability Report demonstrates LG Chem’s approach, goal, strategy, and actions in the areas of environmental, social, and governance. The report also covers interviews with members who are actively performing their roles in fulfilling the company’s sustainability goals. Marking the sixteenth report this year, we intend to share LG Chem’s objectives, initiatives, advancements, and plans with our stakeholders.

Reporting scope
This report covers all business sites and supply chains in Korea and abroad, including the headquarters and sales offices, 35 domestic and global production sites, and R&D campuses. Data from LG Energy Solution and FarmHannong has been excluded from the report since 2019. Financial data has been prepared in accordance with the consolidated Korean International Financial Reporting Standards (K-IFRS). Statements with different reporting scopes have been expressly stated otherwise.

Reporting period
The reporting period is from January 1, 2021 to December 31, 2021. For significant performances occurring outside the reporting period, activities up to the first half of 2022 were included in this report. The quantitative performances of the past three years (2019 to 2021) are presented for data comparability.

Reporting cycle
Annual (most recent report published in June 2021)

Report assurance
LRQA, an independent verification agency, has conducted a third-party assurance to ensure reliability in the process of writing and publishing this report. The assurance standards comply with ISAE 3000 and ISAE 3410.

More information
LG Chem website
<https://www.lgchem.com/2021-Sustainability-Report>
[lgchem.com/sustainability/react-to-zero](https://www.lgchem.com/sustainability/react-to-zero)



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Overview

RE:ACT



Hak-cheol Shin, CEO of LG Chem

Please share some of LG Chem's highlighted achievements in 2021 and your reflection.

2021 is my third year in this office, yet it seemed to me that three decades have gone by. Perhaps it's because we had to go through too many significant crises and transformations in such a short period. The COVID-19 and climate regulations are causing disruptions in logistics and supply chains along with skyrocketing raw material prices, which further brought uncertainty of the business environment. Nevertheless, it was the year when we began to generate meaningful results by increasing sales and operating profits through our differentiated business portfolio and competitive products.

LG Chem was the only chemical company that demonstrated performance enhancement among the top 10 players, in which the company jumped up five notches to 7th place from the previous year.

Our achievements were made possible thanks to the passion and commitment of our employees, and the trust and support of our customers, partners, local communities, and shareholders of LG Chem. In retrospect, we have always been driving towards change. Back in 2019, we organized a task force to develop our sustainability strategies, while in July 2020, we declared 2050 carbon-neutral growth as the first Korean chemical company. In 2021, we shifted the focus of our business portfolio to green businesses. All these endeavors illustrate the combined efforts of our employees in increasing corporate value. Now, it is time to set our eyes on creating values for the customers once again. To overcome crises and advance further, we will take a closer look into customers' experiences and values to better understand the expectations of our customers.

LG Chem declared in February 2022 that it will accelerate the goal of carbon-neutral growth by 20 years and reach net-zero by 2050. What efforts should be made to achieve this new target?

We are deploying a full range of tactics to achieve our ambitious target. We reduce direct carbon emissions by introducing innovative processes and converting to green fuels and sustainable materials, avoid indirect emissions by expanding the use of renewable energy and compensate for all unavoidable emissions. Our plan also includes active interactions with the customers and society by conducting a life cycle assessment (LCA) that quantitatively evaluates a product's environmental impacts throughout its entire supply chain, from raw material sourcing to product development.

It seems like such reforms are in compliance with LG Chem's intention to overcome the limitations of simply being a chemical company.

That's right. LG Chem will continue its transformation to become a leading science company built on sustainability powered by the next growth engines. We plan to invest KRW 10 trillion in our sustainability businesses by 2025. A company's sustainability beyond sales and profits is considered a major competitive factor in the future business environment. LG Chem has selected green materials, battery materials, and globally innovative medicines as the three next growth engine for maximizing the growth potential of its existing businesses under sustainability.

It is quite a challenging move to develop a business portfolio encompass sustainability. Where do you get your confidence from and how do you seize the opportunities?

TO ZERO

“LG Chem is moving forward to become a leading science company with next growth engine by maximizing the growth potential of its existing businesses under sustainability.”

In May 2022, I attended the Davos Forum, where 2,500 global leaders gathered under the theme of “History at a Turning Point.” I had the opportunity to participate as a panelist at the “Winning the Race to Net-Zero” session to highlight importance of carbon reduction, which is the key strategy that underpins LG Chem's sustainability. The participants paid close attention to LG Chem employing the LCA system for reducing not only Scope 1 and 2 emissions but also Scope 3 emissions from our plants. Global companies currently require their suppliers to use renewable energy and reduce their carbon footprint. Customers now favor low-carbon products that are derived from biomaterials or bio-fuels over existing products. We believe that our preemptive execution of LCA will be well-received result in the near future when we take into account the needs and challenges of our customers. What we manufacture falls within Scope 3 of our customer's business. We will not only increase the carbon competitiveness of our products but also help our customers to meet their carbon reduction goals.

Aside from the business model, are there any new changes made in the way the employees work? What do we need to focus on, especially after the pandemic?

I think Digital Transformation (DX) is vital. To that end, we are adopting “Ontact” communication system and expanding customer touchpoints by strengthening our digital marketing capabilities. In May 2021, we opened “LG CHEM ON”, a digital CRM (Customer Relationship Management) system, which analyzed VOC collected from more than 500 customers so we can focus on accessibility to their technical information. More plants and facilities are beginning to implement smart factories to ensure stable operation. In terms of environment and safety, we use AI

risk detection technologies to monitor high-risk facilities in real-time. We also develop and apply DX analysis models that can contribute to zero environmental safety risk by predicting risks in advance. LG Chem will transform from a traditional B2B company to a digital innovator so that we can identify the stakeholder's needs in advance to create business value.

What is LG Chem's efforts in terms of Sustainability for social and governance?

We consider our employees as one of our critical stakeholders. Their development is necessary for promoting sustainable growth in rapidly changing managerial environments. We are operating and investing in various employee development programs. We are holding the “Speak-up Table” to hear from employees' with 74 sessions spanning 111 hours with 1,500 employees over the past three years and we demonstrated our efforts to innovate the way of working, workplace culture, and employees' welfare. In addition, we are making improvements to corporate cultures, working environments, and leadership systems to make sure that our employees operate in a workplace where environment and safety are prioritized. We also endeavor to uphold and enhance diversity, equality, and inclusion for both our local communities and employees across the world. At the same time, we guarantee transparency in our raw material supply chains and observe strict management and supervision standards so as to minimize potential risks arising from various issues. In terms of governance, we engage in responsible management by centralizing board of directors to implement sustainable management, promote continuous ESG risk management, and expand opportunities based on transparent communication with stakeholders.

Our Approach

Since its foundation in 1947, LG Chem has grown into a leading chemicals company in Korea through constant innovation. “Science” means not only the knowledge system in all fields surrounding us, but also all the knowledge, technologies and solutions that we can accumulate and create in the future. Through “Science,” we have made many dreams come true: Making an unbreakable cosmetics lid, setting up the world’s best chemicals plant, developing unprecedented highest-quality batteries, enhancing the screen quality to make it closer to real life, and making humanity healthier.

Now, we want to make new future dreams come true by going beyond “chemistry” and entering the boundaries of “science”. “Science” has a meaning when it is “connected” to a better life. From numerous plastic products that we use every day to various display panels, car batteries, and pharmaceutical products, our technologies are in connection with products that are essential to enrich human life.

As a global company that influences human life and industry as a whole, we will play a leading role in creating a sustainable future. We will actively take the lead in creating a “better future” by pursuing sustainable and innovative technologies for customers as well as a high level of sustainability that takes into account the environment and human rights throughout the value chain.

Our Target

Aimed at offering innovative and distinguished sustainable solutions for the environment and society, LG Chem selected five key sustainability tasks: Climate action, Renewable energy transition, Circular economy, Environmental protection, and Responsible supply chain.

[LG Chem’s five key sustainability tasks]

- | | |
|-------------------------------|---|
| · Climate action | – Declare 2030 Carbon-neutral Growth and 2050 Net-Zero |
| | – Expand the transition to green/low-carbon fuels, develop and introduce CCU technology, increase energy efficiency in processes and facilities, etc. |
| · Renewable energy transition | – Use 100% renewable energy by 2030 for overseas businesses sites and by 2050 for business sites in Korea |
| · Circular economy | – Promote mechanical-chemical recycling and develop bio-degradable plastics made up of renewable materials |
| | – Increase the recycling of waste plastics and end-of-life batteries |
| · Environmental protection | – Promote zero waste to landfill in all business sites |
| · Responsible supply chain | – Conduct risk assessments and due diligence for improving raw material suppliers of cathodes, including cobalt |
| | – Bolster value chain transparency and traceability |

Towards 2050 Net-Zero

LG Chem anticipates that more of our products will emit greater greenhouse gas (GHG) emissions in line with the expansion and growth of our businesses and production activities. We have agonized over our sustainable survival and growth as a company engaged in petrochemicals, advanced materials including engineering materials and battery materials, and life sciences. We have come to a conclusion that new and changing market conditions, such as sustainability and the environmental, social and governance (ESG) category, will provide us with new business opportunities. We take aggressive measures in adapting ourselves from the standpoint of customers and the market instead of merely adjusting to new trends and changes in a passive manner.

In 2020, LG Chem was the first in the Korean chemical industry to announce a sustainability-centered “2050 Carbon-neutral growth” strategy, aimed at providing innovative, differentiated, and sustainable solutions for customers, society, and the environment. We have been moving a step closer to our goal for the past two years through both internal and external efforts to reduce our carbon footprint. We have also witnessed changes in our business conditions in the process, motivating us to attain our goal sooner than expected. For us to keep up with our sustainable growth as a global science company, we advanced our carbon-neutral growth goal by 20 years and announced a new target of “2050 Net-Zero.”

Achieving the revised target requires a total reduction of 20 million tons of carbon emissions compared to the 2050 business as usual. We focus on actively adopting new processes, converting to green materials and fuels, and increasing the use of renewable energy. Since we are aware that global carbon neutrality cannot be achieved only with individual efforts, we are expanding the ecosystem of sustainable industries in cooperation with our partners.

2021-2022

41 bio-balanced products

To enhance the competitive edge of our green products, we acquired International Sustainability and Carbon Certification (ISCC) PLUS certifications for the first time in Korea for a total of 41 “bio-balanced” products that are made up of bio materials.

KRW 2.6 trillion

As part of our goal to invest a total of KRW 2.6 trillion by 2028, we are committed to developing a PBAT production unit with an annual capacity of 50,000 tons and building a total of 10 plants, including a POE plant for solar films.

KRW 10 trillion



To transition our business portfolio toward sustainable growth, we plan to invest KRW 10 trillion by 2025 in our three next growth engines—sustainable & eco-friendly materials, battery materials, innovative new drugs

20,000 tons

To advance into the chemical recycling business for the construction of a plastic circulation system, we plan to complete the construction of a supercritical pyrolysis plant with an annual capacity of 20,000 tons by 2024, which allows us to recycle more than 80% of raw materials input.

75,000 tons

In partnership with the Archer-Daniels-Midland Company, a global grain processing corporation, we aim to devise an integrated production system, from lactic acids (LA; the raw material) to polylactic acids (PLA; bioplastics), by building a PLA production plant with an annual capacity of 75,000 tons.

20 million tons



To meet our new, raised goal of achieving net-zero by 2050 as declared at 2022 Investor Day, we must reduce 20 million tons of total carbon emissions from BAU in 2050.

Highlights

100%



Shift to renewable energy is one of the key strategies to attain net-zero. We successfully transitioned all battery materials plant in China to 100% renewable energy through direct power purchase agreements (PPAs).

KRW 292.7 billion

To strengthen environment, health and safety (EH&S), we invested KRW 292.7 billion in 2021, a 62.3% rise YoY.

20,000 tons of nickel

Together with LG Energy Solution, our subsidiary, we signed a ten-year contract with Li-Cycle, North America’s largest lithium-ion battery recycling company, for scraps and nickel supply starting in 2023. We have secured 20,000 tons of nickel enough to manufacture 300,000 high-performance electric vehicles (EVs).

180GWh

LG Chem is the first in Korea to sign a 20-year contract to purchase renewable energy certificates (RECs). By 2041, we will have secured an average of 9 GWh of renewable energy per year, totaling 180 GWh.

29% of BOD



LG Chem operates BOD-centered management system. We launched the ESG Committee in 2021, and appointed two female outside directors the following year, reaching 29% of a female presentation on the BOD. We intend to continuously expand board diversity in our future operations.



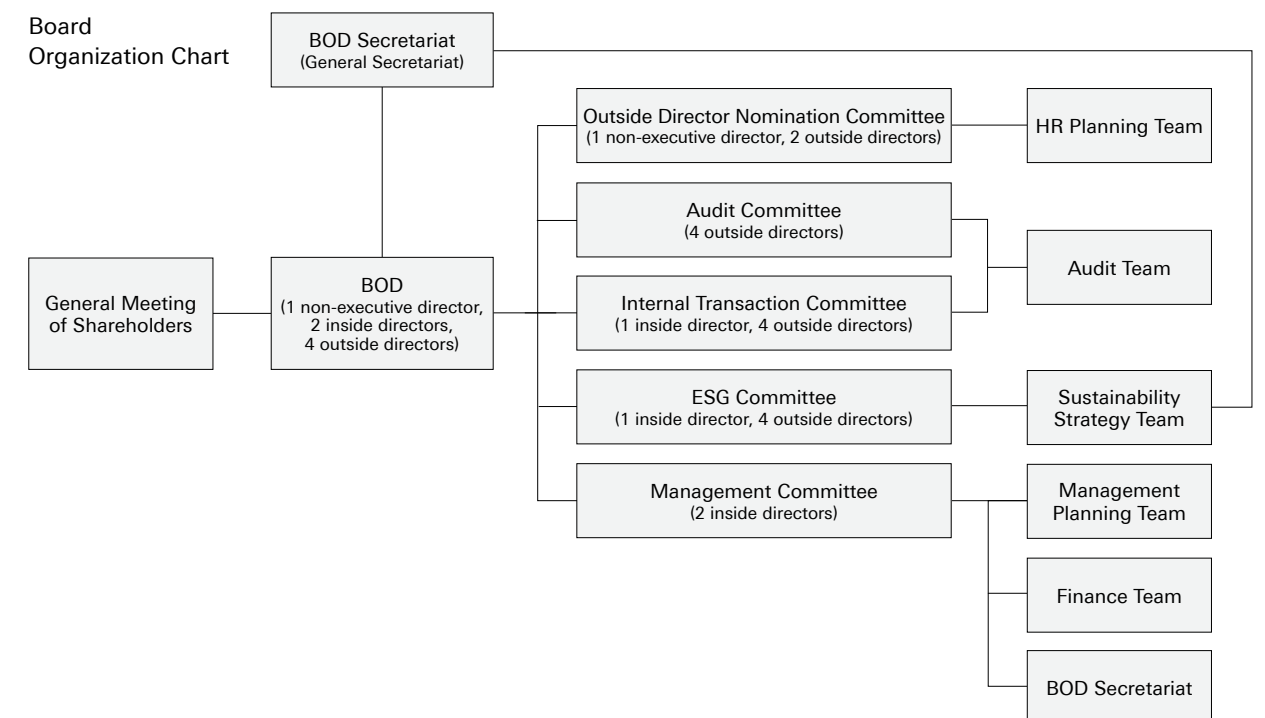
Explore

Board of Directors

LG Chem, as a major change agent for sustainability, is outfitted with a world-class governance system and practices responsible management centering on the power and roles of the Board of Directors (BOD). The BOD supervises climate-related risks and opportunities and makes sure the company is in full compliance with the policies and regulations. In other words, the BOD's activities and responsibilities cover overall corporate policies and performance.

We safeguard the core values of the board operation, including expertise, independence, and transparency, through committees under the BOD and a director appointment process. To ensure transparent governance, we disclose the complete text of all corporate rules pertaining to corporate governance, including the Articles of Incorporation, the Board Regulations, the Audit Committee Regulations, and the Management Committee Regulations, on our website. The establishment and operation of corporate governance are handled in accordance with the principles and procedures outlined in corporate bylaws, which are also disclosed on our website.

The BOD consists of two inside directors, one non-executive director, and four outside directors, and operates the Audit Committee, Outside Director Nomination Committee, Management Committee, Internal Transaction Committee, and ESG Committee.



Composition of the BOD

- BOD centered on outside directors**
LG Chem’s outside directors account for over a half of the BOD. This is meant to strengthen the checks and balances on management through outside directors with verified independence, and increase board efficiency by incorporating outside personnel with diverse expertise and backgrounds into the BOD. In particular, the Audit Committee, which is responsible for internal control, consists entirely of outside directors.
- Board composition**
As of the publication date of this report, June 30, 2022, LG Chem’s BOD consists of Bong-seok Kwon, Hak-cheol Shin, Dong-seok Cha, Dong-min Jung, Mun-su Kim, Hwa-sun Cho, and Hyun-joo Lee. Details are as below.

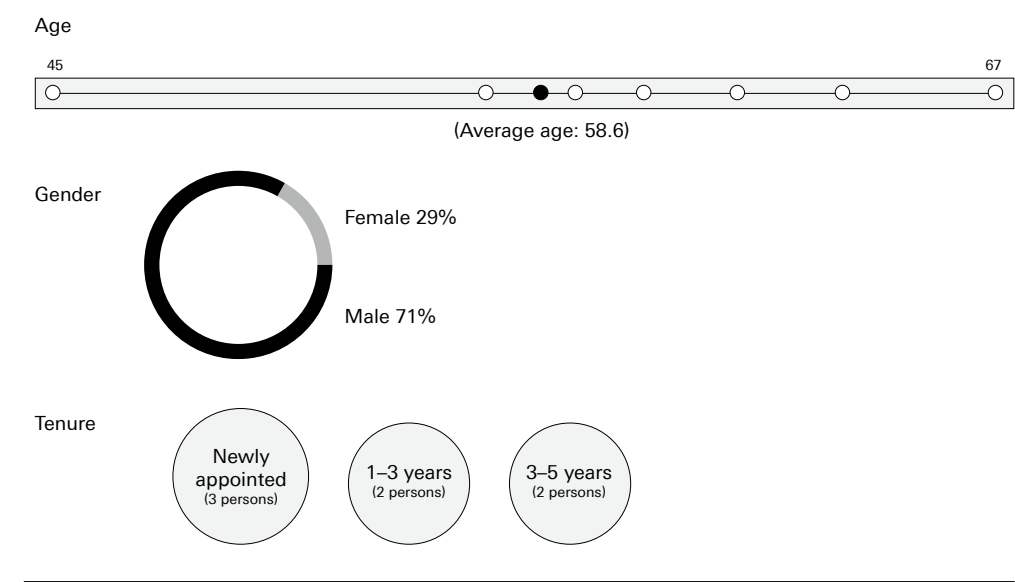
Type	Name	Gender (Age)	Position	Date of appointment ¹⁾	Expected expiry date of the term	Area of expertise	Career background
Non-executive director	Bong-seok Kwon	Male (58)	Outside Director Nomination Committee member	Mar. 23, 2022	Until the AGM in March 2025	Business administration in general	CEO of LG Electronics
CEO	Hak-cheol Shin	Male (64)	BOD Chairman Management Committee Chairman, ESG Committee member	Mar. 15, 2019	Until the AGM in March 2025	Business administration in general	Vice Chairman and Executive Vice President of 3M
Inside director	Dong-seok Cha	Male (59)	Management Committee member Internal Transaction Committee member	Mar. 20, 2020	Until the AGM in March 2024	Business administration in general	CFO of Serveone
Outside director	Dong-min Jung	Male (61)	Audit Committee member, Internal Transaction Committee member, ESG Committee member	Mar. 17, 2017	Until the AGM in March 2023	Legal affairs (lawyer)	Chief Prosecutor of Seoul Western District Prosecutor's Office
Outside director	Mun-su Kim	Male (67)	Audit Committee Chairman Internal Transaction Committee member, Outside Director Nomination Committee member, ESG Committee member	Mar. 23, 2018	Until the AGM in March 2024	Accounting/ taxation	Vice Commissioner of National Tax Service
Outside director	Hwa-sun Cho	Female (56)	Audit Committee member, Internal Transaction Committee member, Outside Director Nomination Committee member, ESG Committee	Mar. 23, 2022	Until the AGM in March 2025	Politics/ economy/ society	Professor, Department of Political Science and International Studies, Yonsei University
Outside director	Hyun-joo Lee	Female (45)	Audit Committee member, ESG Committee Chairman	Mar. 23, 2022	Until the AGM in March 2025	Chemistry	Professor, Department of Chemical and Biomolecular Engineering, KAIST

*As of June 30, 2022
1) The initial appointment date for reappointed directors.
2) Hak-cheol Shin was reappointed as an inside director at the General Meeting of Shareholders on March 23, 2022. Bong-seok Kwon, Hwa-sun Cho, and Hyun-joo Lee are newly appointed directors.

	2021	2022
Newly appointed	-	Bong-seok Kwon, Hwa-sun Cho, and Hyun-joo Lee
Resigned	Young-su Kwon	Young-ho Ahn and Kuk-heon Cha

*As of June 2022

Board diversity

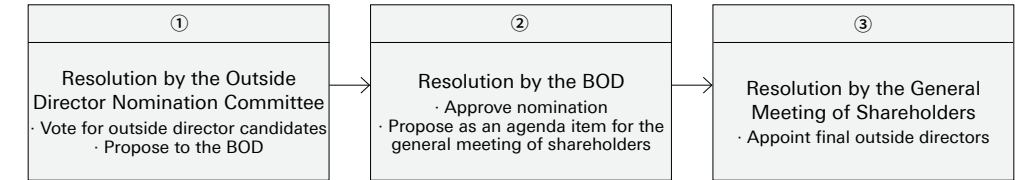


- Strengthening outside directors’ expertise**
Outside directors consist of experts in industrial technology, financial and accounting, law, and management consulting. The candidates for outside directors are nominated according to strict standards through a pre-verification process and interviews with relevant divisions. We provide outside directors with information for making decisions, and help them examine crucial issues and come up with a rational decision through a pre-reporting process. Additionally, the BOD receives statements on significant business issues every quarter, while newly appointed outside directors attend a seminar each year.

BOD skill matrix

	Bong-seok Kwon	Hak-cheol Shin	Dong-seok Cha	Dong-min Jung	Mun-su Kim	Hwa-sun Cho	Hyun-joo Lee
Business administration	O	O	O				
Legal affairs				O			
Accounting/ taxation					O		
Politics/ economy/ society						O	
Chemicals							O

How outside directors are appointed



Operations of the BOD

In principle, the BOD convenes a meeting every quarter. They report relevant matters and hold a Q&A session one to seven days prior to a meeting. An ad-hoc board meeting may be held whenever necessary, such as when it is difficult to adhere to the regular board meeting schedule. LG Chem held a total of 10 board meetings in 2021 and a total of four board meetings in 2022 up until the date of submitting this report. The BOD has addressed 84 items in total (57 approved, 27 reported) between 2021 and the submission date of this report. The average attendance rate of directors during this period was 100% in 2021 until the date of this report.

• **BOD meetings in 2021** (Unit: sessions, cases)

	Number of meetings held	Agenda items
BOD	10	55(40 resolved, 15 reported)

- **Board committee-centered operations**
There are currently five committees in operation under the BOD: the Audit Committee, which is responsible for internal control and the approval and reporting of legal obligations; the Internal Transaction Committee, which enhances fairness in transactions and the corporate management transparency by strengthening internal transaction control; the ESG Committee, which is responsible for sustainable growth; the Management Committee, which takes care of issues requiring swift decision-making by management; and lastly, the Outside Director Nomination Committee. LG Chem is committed to enhancing the committees’ expertise, independence, and efficiency by specifying their authority through each committee regulation.

• **Functions by committee**

Outside Director Nomination Committee	Management Committee	ESG Committee	Internal Transaction Committee	Audit Committee
Outside Director Nomination Committee: Recommends and screens candidates for an outside director position in accordance with the Commercial Act and other relevant acts	Improves the efficiency of board operation by delegating general management affairs and financial affairs smaller than a certain scale	Reinforces ESG management to ensure sustainable growth	Enhances fairness in transactions and management transparency by strengthening internal transaction control	Takes charge of corporate affairs, conducts audits on areas like accounting, and reviews the independence of external audits

• **Board committee meetings held in 2021**

Committee	Number of meetings held	Agenda
Outside Director Nomination Committee	2	2 (1 resolved, 1 reported)
Management Committee	6	6 (6 resolved)
ESG Committee	1	2 (1 resolved, 1 reported)
Internal Transaction Committee	3	12 (8 resolved, 4 reported)
Audit Committee	7	20 (4 resolved, 16 reported)



ESG Committee

Perspectives of a wide range of stakeholders, including shareholders, are involved in seeking social values as well as creating economic values. LG Chem formed the ESG Committee in April 2021, aimed at serving “sustainability,” a concept of encompassing both financial value (growth) and non-financial value (ESG), as well as a root for achieving our core values for corporate growth.

The ESG Committee holds a meeting participated in by at least three members twice a year and may hold a special meeting if necessary. More than two-thirds of the committee consist of outside directors that meet the “principle of diversity” and do not represent common backgrounds or interests. Two female outside directors were newly appointed at the general meeting of shareholders in 2022 to enhance sustainable competitiveness and diversity. In addition, the committee collects opinion about sustainability, deliberates major management agendas, and strengthen the ESG management system by carrying out diverse activities for net-zero, one of the key tasks of LG Chem.

Audit Committee

The relevant statutes stipulate that an audit committee shall consist of at least three directors, with outside directors accounting for at least two-thirds of the total number of committee members, and there should be at least one accounting or financial expert. Our Audit Committee audits accounting and other key management affairs, evaluates the operation of the internal accounting management system, and monitors the operation of the internal supervisory monitoring system. The committee also oversees directors and management on whether they can make rational judgments. The Audit Committee has set its own regulations (available on the LG Chem website) to maintain objectivity as an independent body from business execution groups.

Evaluation and Compensation of the BOD

LG Chem conducts a general evaluation on every outside director at the end of his/her term. The BOD Secretariat and the HR division comprehensively evaluate a director’s attendance at board meetings; whether he/she thoroughly reviewed the meeting agendas, voiced out his/her opinions, and made effective remarks; whether he/she gave appropriate advice on management’s decision-making process as an expert; and his/her contribution to internal control and surveillance of corporate financial risks as an audit member. The Outside Director Nomination Committee refers to these evaluation results to decide a director’s reappointment by recommending candidates to the BOD and thus enhance the fairness of evaluation in the entire process.

Our outside directors are paid the industry’s average, within compensation limits approved at a general meeting of shareholders. This compensation does not include bonuses that are granted according to their performance evaluation, stock options, and other expenses such as work activity expenses, transportation expenses, and meeting allowances.

Management

LG Chem alligns ESG-related indicators with management’s key performance indicators from 2021 to actively practice sustainability management. By aligning the company’s sustainability performance with management’s evaluation and compensation, we are urging the transition to a low-carbon economy and expanding eco-friendly business opportunities. We established a new executive position of Chief Sustainability Officer (CSO) following a corporate restructuring in December 2021. As the control tower of LG Chem’s sustainability, the CSO is responsible for accelerating sustainability management, actively communicating with stakeholders, and creating practical solutions based on science and technology. LG Chem’s management plans to continue sharing the direction of sustainability that LG Chem should take and leading harmonization with employees.

Sustainability Specialty Organization

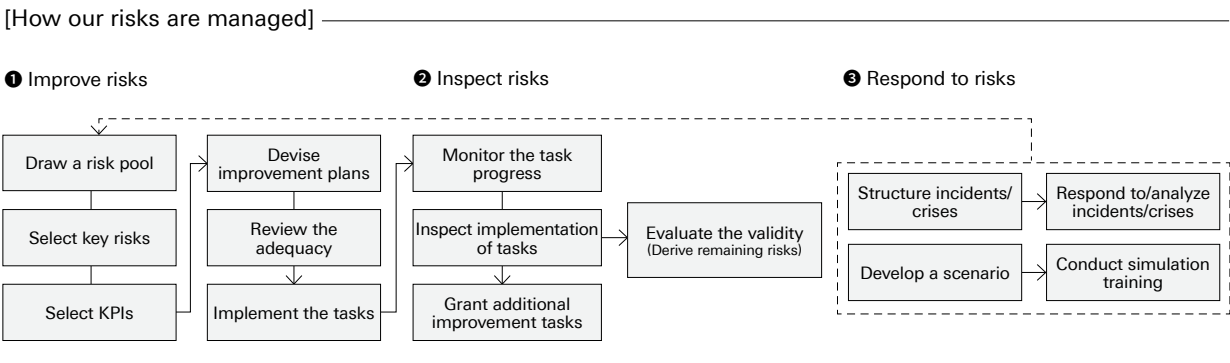
LG Chem turned “sustainability” into a new business opportunity by proactively responding to ESG trends, and we are now accelerating to generate business outcomes in earnest. We aim at building an organic structure of cooperation between all organizations to accelerate sustainability and push for yielding results through efficient implementation. **The Sustainability Strategy Team under the CSO takes charge of sustainability management affairs.** The team discovers and manages ESG improvement tasks promoted by all relevant departments through regulatory response and market intelligence activities. They present the agenda to the ESG Committee based on the management progress. The team also finds and suggests crucial agendas for ESG Committee meetings and monthly management meetings participated in by C-level executives.

LG Chem creates practical solutions based on science and technology to achieve sustainability. By appointing the Chief Technology Officer (CTO) as the CSO, we are expanding the depth of sustainability practice by preemptively investing and applying prior technologies to reduce carbon emissions, as well as ensuring company-wide organic cooperation and support to expand the depth of sustainability practices.

Risk Management Process

In May 2021, LG Chem formed a risk management body and determined eight tasks for building an integrated risk management system in order to identify in advance potential risk factors and events that may affect management and devise a plan for thorough management and countermeasures.

We launched eight departments in the fields of environment and safety, quality, information security, compliance, labor-management, logistics/trade tariff, purchase, and finance. We derived the risk categories, types, and elements for each department, and selected key risk factors by analyzing their likelihood and impact. Our risk management system ensures that risks are managed and prevented in everyday business activities. We secure consistency in risk management by effectively identifying and responding to various risks. In addition, **we hold regular Risk Management Committee meetings chaired by the Chief Risk Officer (CRO) to enhance the effectiveness of risk management based on enterprise-wide communication.**

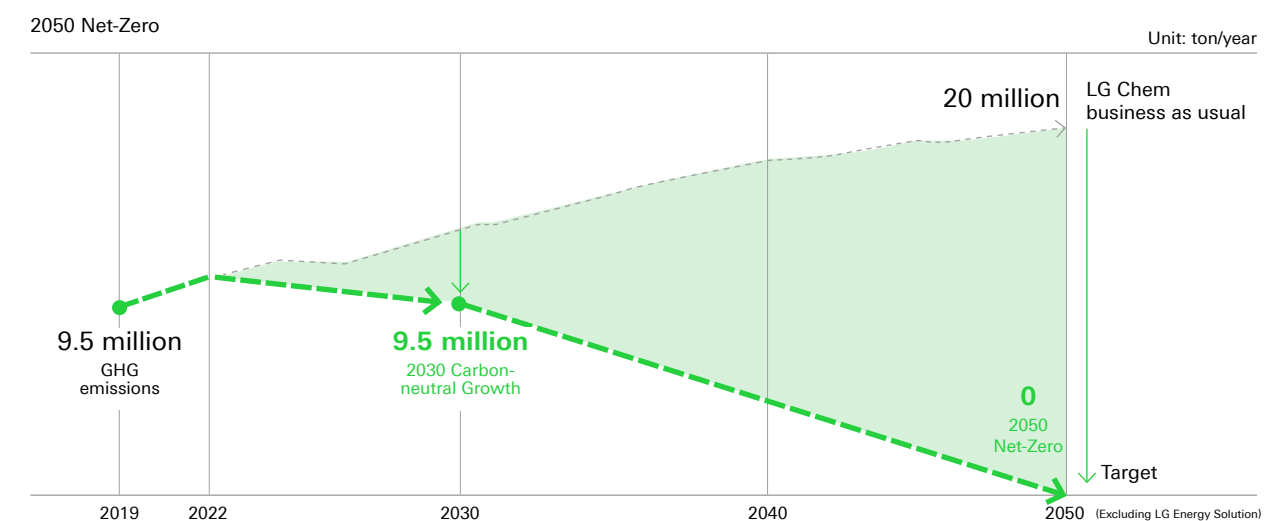


Based on our scenarios that ensure practical response to different crises, we verify the adequacy of every scenario through simulation training, as well as monitor the implementation of tasks and compliance with our reporting system.

Managing GHG Emissions

LG Chem sees carbon emissions as an opportunity for growth rather than a risk. We make efforts to proactively respond to the sustainability trend, and we identify business opportunities based on three strategies for bio materials, recycling, and carbon neutrality. Moreover, we have identified 20 key indicators and have actively incorporated ESG into our management system up to the relevant departments. These indicators which include our response to climate change through a reduction in GHG emissions will serve as the basis of the management's decision-making process. We seek various reduction measures for the entire value chain and translate them into action.

We intend to achieve net-zero by 2050 according to our strategy of Reduce (direct emissions), Avoid (indirect emissions), and Compensate (carbon offset).



Reduce (Direct emissions)

LG Chem is making efforts to reduce direct emissions (Scope 1) from our business sites, as well as adopt innovative processes and switch to low-carbon fuels and raw materials.

• Cutting carbon through innovation

- 1) **Green fuel transition:** With regulations on carbon and air pollutant emissions becoming stricter, a growing risk of operating facilities for coals and a high-carbon fuel, is emphasizing the need for a transition to low-carbon fuels. Carbon phase-out of converting coals into high-carbon emission coefficient per unit has been accelerated in the market by closing existing facilities and making the switch to low-carbon fuels. At the same time, a rapid transition to low-carbon fuel is underway to boost the competitive edge of green products. In order to cut emissions of not only carbon but also air pollutants, including nitrogen oxides (NOx) and sulfur oxides (SOx), the international community has tightened regulations on coal power, and global investors are also taking a coal phase-out stance on investment as part of their ESG management initiatives.

In response to stakeholder demands, LG Chem has been reducing the use of fossil fuels in fossil fuel-based furnaces (facilities producing raw materials of petrochemical by cracking naphtha at high temperatures) at the Naphtha Cracking Center (NCC), which produces the most carbon emissions. We are replacing naphtha with biofuels, and developing a technology that will convert the conventional furnace into an electrical furnace (e-furnace).

Biomass: LG Chem signed a set of heads of agreement (HOA) for cooperation in biomass based green energy business with GS EPS in June 2022. Biomass, in particular, which reuses waste wood that would otherwise be burned for dumped is recognized as sustainable biomass in the EU, where strict environmental regulations are observed. Additionally, it is the most cost-effective choice for companies that demand steam and is the only renewable energy source capable of mass-producing thermal energy (steam). GHG emissions can also be reduced by nearly 99% when compared to coal. LG Chem intends to employ biomass options to produce steam (heat source) demanded by petrochemical plants and complexes by jointly establishing an industrial steam and electricity-generating biomass plant using renewable energy fuel made from wood waste collected from households and industrial sites in the form of woodchips. It is estimated to reduce annual carbon emissions by around 40,000 tons, the equivalent of planting 2.8 million pine trees.

Hydrogen: As part of our effort to reduce carbon emissions from petrochemical processes, we plan to construct the industry's first hydrogen production plant that will begin in the first half of 2023 and be completed in the second quarter of 2024. The petrochemical industry produces basic chemicals such as ethylene, propylene and butadiene which are made by breaking down naphtha at high temperatures. Methane is commonly used as a heat source for the NCC process which makes up the majority of carbon emission. The new hydrogen production plant will employ the byproduct methane, which is generated in the NCC process, and the hydrogen produced is once again used as a fuel through NCC pyrolysis. Hydrogen produced from methane, which is generated in the NCC process, is once again used as a fuel for NCC pyrolysis. When the hydrogen production plant is at its full operation, it is expected to cut carbon emissions by about 140,000 tons per year, the same as offsetting carbons by planting around 1 million pine trees. Our objective is to expand the use of green fuels in the NCC process by up to 70% by 2025, as well as to actively employ hydrogen in producing renewable bio feedstock. We intend to review expanding the construction of a hydrogen production plant taking its productivity verification and carbon emissions reduction effect into account.

Furthermore, we are committed to creating a value chain in which carbon dioxide (CO₂) produced during the hydrogen production process is recycled to provide essential resources. More than 90% of hydrogen in the Korean market is produced through steam methane reforming that extracts hydrogen from methane, which is composed of carbon monoxide (CO) and hydrogen. The resulting CO₂ off-gas has for long been viewed as an unwanted byproduct. We plan to employ CO₂ generated during hydrogen production as the raw material of dry ice through our partnership with Taekyung Chemical, Korea's largest carbonic acid gas manufacturer.

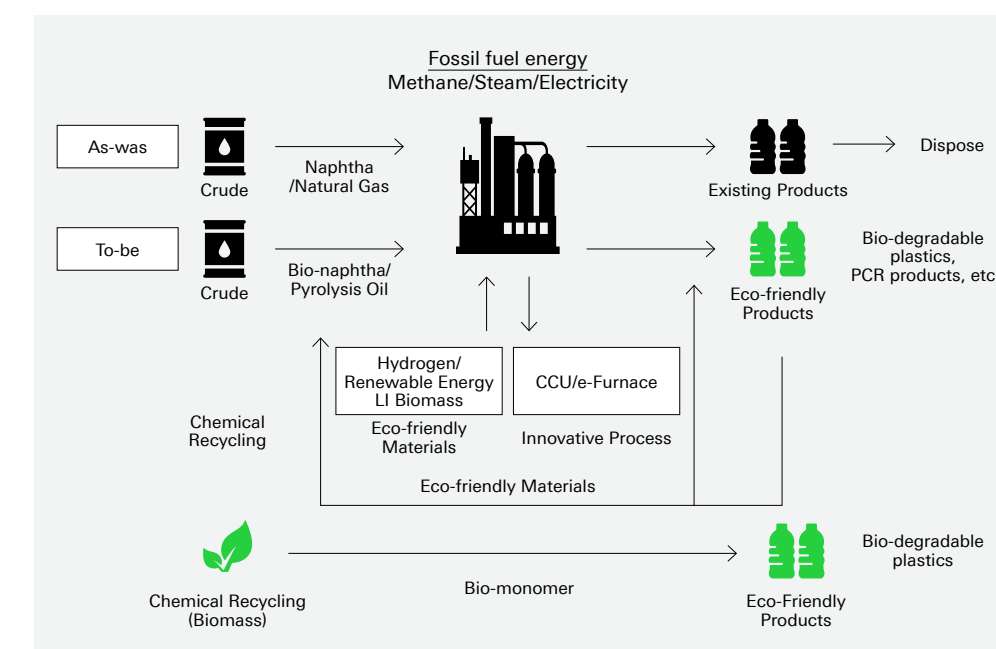
Refer to the interview on p. 36

- 2) **Carbon capture and utilization (CCU):** A technology that captures CO₂ emitted during industrial processes to transform it into chemical products like CO, syngas, acrylic acid (AA), and naphtha. At LG Chem, research is underway to develop an electrochemical conversion technology that uses catalytic conversion and chemical reactions generated by green electricity. Catalytic conversion, in particular, is a core technology that contributes to petrochemical firms' carbon reduction and enhanced competitiveness by converting carbon into materials used for making products related our petrochemical business areas.
- 3) **International cooperation for carbon-neutral technology commercialization:** LG Chem signed an MOU for joint technology research and development in April 2021 with the Korea Institute of Science and Technology (KIST), an organization that has been leading the research field in carbon neutrality and green hydrogen. We focus on promoting all-round cooperation by concluding technology transfer contracts for two prospective commercialization technologies, participating in joint projects, and launching talent development programs. In October 2021, we signed another agreement with Ulsan National Institute of Science and Technology (UNIST) to accelerate the development of patented technology with the goal of achieving carbon neutrality. We also offer talent development programs until present.

• A transition to low-carbon materials

Reusing and recycling fossil fuel-based products and switching to recycled and renewable raw materials are essential elements in transforming LG Chem's businesses into a more sustainable model. We added low-carbon product lines in our plants by inputting recycled materials and renewable bio feedstocks in the process.

- 1) **Recycled materials:** LG Chem is committed to developing plastic recycling technologies from various aspects, such as chemical recycling technology for retrieving pure materials by breaking the molecular structure of plastics and post-consumer recycled (PCR) materials following a mechanical disassembly of petrochemical products, including acrylonitrile butadiene styrene (ABS), polycarbonate (PC), polyethylene (PE), and polypropylene (PP). We are also devoted to implementing our commercialization plan and securing stable sources of raw materials.
- 2) **Bio materials:** Bio materials are effective in reducing carbon emissions since they can replace fossil fuel-based production. They are acknowledged as carbon-neutral materials since no carbon emissions are emitted throughout their life cycle. LG Chem is preparing for the commercialization of bio materials through cooperation with partners, to produce a range of products using bio materials extracted from bio-based renewable materials. We aim to be the market leader in the fast-growing bio-degradable plastics market based on our continuous engagement in developing products and expanding our production capacity.





Do you want to know more about CCU?

Tae-geun Noh, Project Leader, Electrochemical Conversion Technology PJT

Won-hee Kim, Professional, Carbon Neutralization Research TFT.Platform Technology

Here is an interview with two researchers who sometimes are seen as heroes and sometimes, scientists.

The two of you are engaged in developing technologies to utilize captured carbon dioxide (CO₂). Could you please briefly explain your roles?

Won-hee: I'm in charge of developing inorganic catalysts for CO₂ conversion at the Carbon Neutralization Research TFT.

Tae-geun: I focus on researching technologies that convert CO₂ into platform chemicals, such as carbon monoxide, syngas, and ethylene through electrochemical conversion.

Could you please elaborate on inorganic catalysts and electrochemical conversion?

Won-hee: To convert the stable structure of CO₂ to something else, we need to break the molecular binding first. Organic catalysts, which are required in this process, convert CO₂ into higher value-added products, such as acrylic acid. Inorganic catalysts, on the other hand, convert CO₂ into naphtha, the most basic ingredient, and contribute to reducing carbon emissions in the petrochemical industry.

Tae-geun: Although most of the chemical reaction occurs under high pressure and high temperatures, our research approach is to break down the CO₂ structure at room pressure and temperature using electricity. I am also working on developing technologies for electrode catalysts and membrane separation required for electrochemical conversion, as well as high-efficiency cell-stack production systems.

Do you, by any chance, think of each other as good competitor? (Chuckles)

Won-hee: Technologies vary depending on the scale of production and the range and purpose of application. It is hard to say which one is better or not. We are just seeking more suitable ways to make advancements.

Tae-geun: He's right. For instance, we use inorganic catalysts for large-scale CO₂ conversion. We use electrochemical conversion approaches, which require a large amount of energy to break the stabilized CO₂ structure, for substances with simple molecular structures, like those with one or two carbon elements.

It is obvious that your relationship is mutually complementary. The two of you joined the TFT in 2021 to study CCU in earnest. As LG Chem members for more than 15 years, what does this team mean to you?

Won-hee: CCU research requires a long-term plan to attain a sustainable future. It's quite challenging, which means that it is hard to expect immediate results. CCU catalysts are in their early stage, and that's why we need innovation more than ever. Still, I have a sense of duty as one of the pioneers. It's true that I sometimes feel anxious, worrying about failures, but I also anticipate that our team can build competitiveness by facing new challenges. I'm sure that all of our team members would agree on this.

Tae-geun: We do have goals, but they're too far off, and this sometimes makes me anxious. Yet, I try to focus on our interim progress with achievements which makes me excited, rather than feel uneasy thinking about failures. There are people who recognize the importance of our roles and support us.

How do you keep yourself motivated when you are working on something vague and cannot see the results right away?

Won-hee: I segregate mid- to long-term goals to set short-term objectives. It's like making a step forward one by one. I try to find accomplishments and rewards at each phase.

Is it true that CCU technologies require exchanges with external parties as well as internal efforts?

Tae-geun: It's true. We don't work alone here. We need connections to receive various information. And this is how we get quicker outcomes. We signed an MOU with KIST in April 2021 and two technology transfer contracts for candidate technologies for commercialization, and have been operating a joint research center since April 2022. We are receiving enough supports and interests. In May 2022, we joined a government project of "developing an ethylene production system using CO₂ electrochemical conversion," in which we aim at creating a small-scale ethylene production system through CO₂ conversion. We are still far from the commercialization phase, but we intend to develop a pilot system first, and if it shows satisfying results, we may be able to experience CCU from A to Z. We are hoping to make a small-pilot system next to our plant and produce different chemicals through CO₂ conversion.

It sounds like that the project will also contribute to reducing the development time.

Tae-geun: This kind of partnership is essential at the early stage of development. We exchange information not only within our company, but also with other companies and research institutes. It is because we need to make a consensus in the same-level playing field that sustainability is crucial. This is how we get an answer and move on to the next step.

Won-hee: Our research on catalyst has begun a little bit later than electrochemical conversion, so our infrastructure is not fully organized compared to other research institutes or universities. We, of course, conduct joint research projects using our existing infrastructure but we also engage in external projects to secure technologies and accelerate developments. We reduce errors and risks as much as possible by referring to the expertise of our strategic partners, including Ulsan National Institute of Science and Technology (UNIST) and KIST, which both excel at catalyst technology.

How far did LG Chem's CCU technologies go from a global perspective?

Won-hee: Some global companies are at the forefront of the catalyst industry. Academic circles in Korea are conducting relevant research, and we also have our own goal of reaching a world-class level. Ultimately, it is important to make a product reach the commercialization stage. LG Chem has outstanding core technologies required to develop CO₂ conversion catalysts. CO₂ conversion technology is new, but we have a strong track record in core technologies, such as catalysts, surface treatment, and separation and purification. Integrating our strengths and creating synergy is a shortcut to accomplishing our goal.

Why are CCU technologies critical in ESG management? Please share with us your opinion before we end this interview.

Won-hee: Restrictions on CO₂ emissions may become more stringent in the future, leaving no choices to many companies. If we develop and secure technologies like CCU ahead of time, they will be our powerful tool in terms of business competitiveness. They will serve as core technologies for sustainability management.

Tae-geun: Whenever I hear about CCU on the news, I get the impression that it is a mega trend in the industry. The industry's interest should not end here, but rather become a vital field that we should lead with a strong will.

Avoid (Indirect emissions)

LG Chem has analyzed the most effective way to reduce carbon emissions on our business sites across the world, and we came up with the decision that the move to renewable energy can make this happen. In July 2020, for the first Korean chemical company, **we declared our commitment to source 100% renewable energy such as wind and solar power by 2050. We are striving to shift the energy of our global business sites toward renewable energy.**

- Renewable energy procurement
- Refer to the interview on p. 36

1) Green Pricing: A scheme of charging a premium on electric bills to cover the use of electricity powered by renewable energy resources. LG Chem has completed the conversion to the renewable energy at our Yeosu nitrile butadiene rubber (NBR) plant and Osan Tech Center through the Green Pricing.

KEPCO Electricity Premium Payment Corporate

2) Renewable energy certificates (RECs): We accomplished 100% renewable energy at the LGES battery plant in Michigan by acquiring RECs and adopting a mechanism that allows us to gain credit for using renewable energy while using general electricity through REC purchases.

Electricity Generator Trading Platform Corporate

3) Power purchase agreement (PPA): A PPA is a contract in which a business agrees to purchase electricity and a certificate directly from a renewable energy provider. Through PPA, our battery plants in Wuxi (Jiangsu province) and Quzhou (Zhejiang province) have achieved renewable energy 100%.

Electricity Generator Contract Grid Operator Contract Corporate

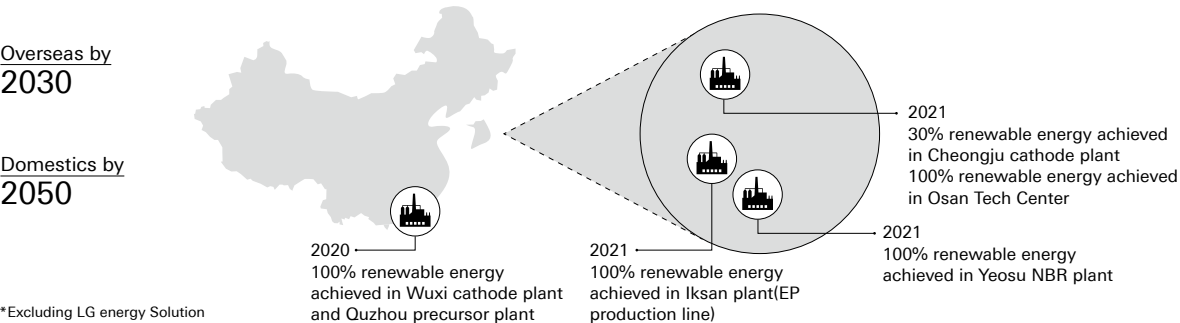
4) Directly generating renewable energy and investing in equities: LG Chem is considering the equity investment in renewable energy businesses in partnership with Korean and overseas renewable energy providers. We signed an MOU for the “joint response to accomplish 100% renewable energy” with Korea South-East Power Co. (KOEN).

Corporate Equity Investment/ Direct Installation Electricity Generator

LG Chem is the first Korean company in China to achieve a 100% transition to renewable energy through a local PPA. Implementing renewable energy 100% was challenging for Korean companies due to absence of renewable energy policies in China. However, we found that a number of our Chinese partners have achieved renewable energy 100% through PPAs and, after a three-month coordination with local managers, we concluded a contract with a Chinese renewable energy supplier. This plant in Wuxi annually produces 140 GWh of renewable energy, which is enough to power nearly 80,000 four-person families for a year. It can reduce 10,000 tons of carbon emissions when compared to the same amount electricity used in general industries. This use of renewable energy cuts carbon emissions in the same way that planting 1.7 million pine trees each year does. Moreover, the Quzhou Plant in China purchased renewable energy worth an annual capacity of 50 Gwh and reduced 35,000 tons of carbon emissions, equivalent to CO₂ emitted by 14,000 combustion car engines a year. We proposed that the government expand renewable energy infrastructure and incentives to contribute to increasing the use of renewable energy not only in Korea but also internationally.

Not to mention, we propose the expansion of renewable energy infrastructure and incentives to the government, and we look into ways to secure a cost-competitive edge from a mid-to-long-term perspective by investing in renewable energy businesses with Korean and overseas providers. We are accelerating our efforts and actions to switch to 100% renewable energy. LG Chem aims at sourcing 100% renewable energy in all of its business sites around the world by 2050. This is to expand and spread the renewable energy PPA model to other business sites in operation in China. In addition, we hope to form a mid-to-long-term contract with local partners capable of supplying renewable energy stably. The cost of renewable energy is still high in Korea. Nevertheless, there is an advantage in that society acknowledges the use of renewable energy as an action to reduce carbon emissions. In this sense, our primary goal is to develop a tool for the economic evaluation of renewable energy that takes into account the relative costs between carbon credits and the unit price of renewable energy, in which will contribute to our decision-making process in terms of renewable energy.

Path toward Renewable Energy 100%



Compensate (Carbon offset)

LG Chem is investing in various carbon offset projects to compensate for the GHGs inevitably emitted despite its efforts to cut direct and indirect emissions. We plan to minimize carbon emissions reduction through carbon offset projects and maximize direct and indirect emissions reduction.



Our all-out efforts toward Net-Zero

Dae-soo Kim, Professional, Sustainability Strategy Team & Carbon-neutral Growth TF

Hee-seung Lee, Professional, Energy/Climate Change Team

Here is an interview with two strategists who contribute to reaching an agreement on different business divisions for setting carbon reduction targets and devising and implementing relevant strategies.

What are your roles in the Carbon-neutral Growth TF?

Dae-soo: The first task given to the Carbon-neutral Growth TF is to forecast carbon emissions dependent on business growth and specify ways to accomplish the announced reduction goal in an efficient manner.

Hee-seung: The second task is to agonize over renewable energy supply-and-demand strategies, set a direction, and purchase renewable energy. I can say that we support expanding the use of renewable energy to accomplish our goal, which is net-zero.

Dae-soo: Once net-zero implementation plans are outlined and implemented, many companies will experience financial difficulties due to carbon emissions. There is an external regulatory system called the “emissions trading system (ETS).” Carbon prices in the ETS fluctuates a lot, so every time we simulate a carbon reduction plan with the prices, the results are volatile, which had cost our team much trouble. At the moment, we are conducting the project with the purpose of reviewing carbon prices and periods in which we can achieve our net-zero target and efficiently cut carbon emissions. Once this is finalized, it is our responsibility to provide a standardized guideline of an internal assessment process for new project investments.

LG Chem’s carbon reduction goal has made upward adjustment compared to previous year. What made your team judge that more ambitious goal could be achieved?

Dae-soo: Because a company must grow constantly and expand its businesses, there is no choice but to increase production, which causes us to emit more carbon. Our original goal was to restrain future carbon emissions to current level through continuous efforts. We put in a lot of work, both internally and externally, through a range of carbon reduction activities to meet our objective. As a result, internal conditions have changed, in which we believed that we might be able to reduce more carbon emissions faster than expected. External threats to our earlier goal emerged due to the increased pressure from global carbon regulations.

Net-Zero strategies can be largely divided into direct reduction, indirect reduction, and offsets. All strategies are equally important, but which takes up the largest part?

Hee-seung: The largest part in our goal is indirect reduction, especially renewable energy. Joining the RE100 initiative, which is one of the trendiest topics these days, is also associated with renewable energy.

Dae-soo: Because LG Chem is a petrochemical company, it emits large amounts of carbon in many different forms such as the use and combustion of fuels. There are always limitations no matter how hard we try. That’s why we intend to reduce large amounts of carbon emissions in power generation to meet our goal. Renewable energy costs more than other common energies. **I believe the current goal well reflects the company’s will to achieve its carbon reduction objective by sourcing feasible renewable energy.**

Hee-seung: Although we didn’t pay much attention in the past, we have been engaging in various activities to reduce direct emissions. Because energy conservation leads to cost reduction, we have been reducing costs since our plant was built. Aside from this, the next thing we can do is using renewable energy, or managing indirect reduction. It can be successful if you have a will. So, for me, indirect reduction is more essential.

Dae-soo: More customers are demanding the use of renewable energy, which directly affects our business. Several global giants notify their subcontractors that they will no longer work with them until they use 100% renewable energy. **We have no alternative but to increase our use of renewable energy to meet customer needs and maintain our market competitiveness.**

Business sites in Korea and abroad appear to have different target periods of renewable energy transition.

Hee-seung: We are not in good conditions to source renewable energy in Korea due to geographical characteristics. As a result, renewable energy is far more expensive in Korea than it is in other countries. The company has thus set an earlier target period for business sites overseas. The RE100 initiative also suggested interim targets for Korean companies, considering their financial burden.

Then, how are your renewable energy transition policies going so far? Are they satisfactory?

Hee-seung: The total transition rate was barely 5% in 2021, when renewable energy policies were only in their initial phases. This year, the policies are expected to be more stable in Korea, and we have been regularly bidding for and purchasing the Green Premium since last year. As you may have read the news articles, we signed some long-term contracts for stable supply for the next 20 years through Renewable Energy Certificate (REC) purchases. We have agreements concluded in abroad as well. To summarize, we anticipate that the transition rate will increase by 10% this year, or roughly compared to last year.

Dae-soo: Hee-seung is the one who turned LG Chem into the first Korean company to sign a long-term REC purchase contract.(Smiles)

I believe your perspectives have changed while handling renewable energy and ESG-related affairs.

Hee-seung: It’s worth contributing to creating a sustainable environment for not only my family but also acquaintances and colleagues.

Dae-soo: It is not easy for private companies to make both money and social contributions. The two values used to stand on opposite sides for a long period. However, social trend and people’s awareness is gradually changing, and I feel rewarded whenever I notice it. **It makes me proud when I see that my role is making a significant contribution to society while also generating revenue for the company.**

Do you have any last remarks?

Dae-soo: Last year, power purchase options for businesses were first adopted in Korea. In the past, Korea Electric Power Corporation monopolized the domestic power industry, so it was impossible for companies like us to select options when purchasing. But as soon as the new system was adopted, LG Chem actively made purchases. In addition, we participated the bidding for the Green Premium in its launch last year. We now account for a significant proportion of the market. We don’t have any power plant or business that generates electricity, but we are doing our best to purchase renewable energy from market. These are some of the things I would like to emphasize. (Laughs)

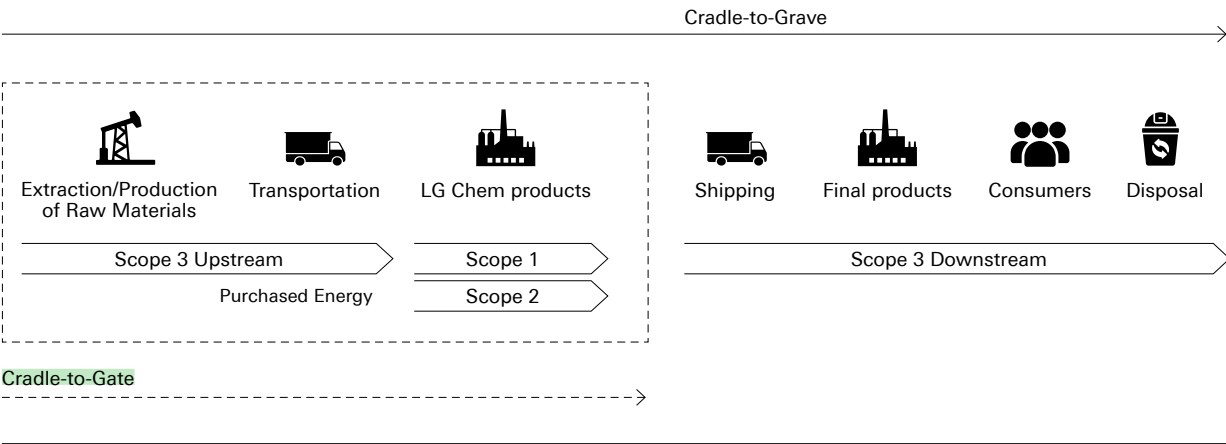
Life Cycle Assessment (LCA)

Life cycle assessment (LCA) is a method used to evaluate a product’s environmental impact throughout its life cycle including extraction and production of raw materials, manufacturing, distribution, use, and final disposal. It is an internationally standardized evaluation method based on international environmental standards such as ISO 14040, 14044, and 14067. We’ve established LG Chem’s LCA methodology by benchmarking PlasticsEurope’s Recommendation on Steam Cracker allocation and the World Business Council for Sustainable Development (WBCSD)’s Life Cycle Metrics for Chemical Products.

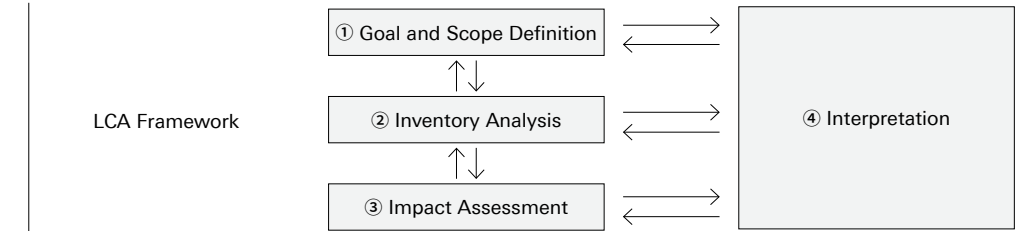
Refer to the interview on p. 44

We plan to complete LCA for all products manufactured in Korea by 2022, and overseas by 2023. This is to set our LCA baseline for each product we produce and try our best to reduce the environmental impacts by implementing our sustainability strategy.

LG Chem pursues to achieve sustainable competitiveness of products that can satisfy both customer needs and market regulations by performing LCA based on global standards. Considering the characteristics of B2B companies value chain, we define our system boundary as “Cradle-to-Gate,” which includes Scope 3 (Upstream). After setting up the LCA baseline, we plan to investigate the environmental hotspots and develop reduction strategies and action plans. We will strengthen our competitiveness in the sustainability business by communicating with stakeholders with transparency and making efforts to improve environmental vulnerabilities.



- **Main ISO phases of LCA**
The first phase is defining the assessment objectives, followed by selecting products to be assessed and setting system boundaries. The second phase involves life cycle inventory analysis, which is the most essential part. LCI analysis is the process of collecting data on raw materials, energy, products, co-products, and environmental emissions that are used and generated throughout the entire process of products, and aggregate them into elementary flows related to each unit process within a product. The third phase stage is life cycle impact assessment (LCIA), where we evaluate the degree of impact of a product’s input/output quantified after inventory analysis. The final phase is interpretation. The LCA result is interpreted to draw implication by identifying environmental hotspot. Based on this information, we internally work together to develop improvement strategies to provide customer a greener products. It is also used to get an Environmental Product Declaration (EPD) certificate which allows us to communicate with stakeholders about the environmental impacts of our products with transparency.



- Our integrated LCA management system allows to:
- 1) Increase data reliability: We can improve the reliability of LCA results by using primary (measured) data within our company to perform LCAs
 - 2) Maintain consistency: We can establish a unified LCA methodology between departments to ensure the representativeness of the result and comparison
 - 3) Ensure effective collaboration between departments: We can ensure close collaboration with various departments, including the production, utilities, procurement, and environmental and safety teams, by assigning LCA focal points in each team
 - 4) Internalize LCA performance capabilities: We can recruit internal LCA experts to provide high quality LCA results and increase mid-to-long-term reliability in setting LCA baseline
 - 5) Respond to stakeholders’ needs immediately: We can build an independent LCA management system to quickly deliver the LCA result to our customers

Internal Carbon Price

A paradigm shift toward a carbon-neutral society is advancing faster than ever thanks to the world’s major countries, notably Korea, the EU, and the US, elevating their 2030 carbon emissions reduction target as an interim target for achieving carbon neutrality by 2050. Considering the recent continuous increase in carbon credits, market leaders are reflecting “carbon pricing” in all business activities, including investment, as a tool to promote the transition to low-carbon business. In particular, the industries are adopting “internal carbon pricing” as part of initiatives to respond to carbon emissions regulations and hasten the shift to low-carbon projects. We are undertaking an internal carbon pricing project with the purpose of voluntarily accomplishing carbon-neutral goals and reviewing carbon prices and a pre-determined period for effective implementation of our businesses. In line with our mid-to-long-term business strategies and sustainability action plans, we are developing a challenging yet practical roadmap for internal carbon pricing by encouraging cooperation between the investment and finance divisions. We also plan to prepare a guideline for internal auditing to be utilized for investing in a new business.



What we can do with LCA

Yong-hee Jang, Professional, Carbon Neutralization TF
Jae-mee Lee, Specialist, Sustainability Strategy Team

Below is an interview with two people who deeply understand the significance of assessing the environmental impact in the entire product life cycle than anyone else.

Please tell us about your responsibilities. Also, what is LCA in brief context?

Jae-mee: LCA is a tool used to quantify a product's environmental impact. For instance, in plastic production, LCA allows us to look at every single stage, including extraction and production of raw materials, transportation, manufacturing, and disposal. Here, we measure and evaluate the environmental impact of the environmental load that is caused by production-related activities. Then it can be represented as a number in different impact categories, such as climate change, and resource depletion.

You work for different divisions and offices, but team up each other once a week. Could you please tell me your roles?

Yong-hee: To perform LCA, we need to develop an LCA methodology. The Sustainability Strategy Team takes charge of the development as LCA experts are there to give us a guide. I, as a Carbon Neutralization TF member, verify whether the collected input and output data is right since domain knowledge is required to understand processes. We are indispensable to each other.

The concept of LCA is not new, but the perception of people about sustainability has recently changed a lot in its concept, needs and application.

Yong-hee: LG Chem has been conducting LCA to take part in creating national database or implementing short-term projects since 1998. The assessments used to be conducted in a passive manner at the request of customers, but nowadays, we perform LCA proactively.

As sustainability issue is a mega trend these days, the need for LCA has also increased. Please give us your opinion.

Jae-mee: Previously, we performed LCA at the customer's request and on a product-by-product basis. Conducting LCA also meant our will to produce products with environmental responsibility. We can get the outcomes of our reduction strategy only when there is an accurate diagnosis, the baseline, of our products.

Yong-hee: The baseline Jaemee just mentioned is the most important thing. We need a reference value so we can develop a strategy or technology that can reduce carbon. This is exactly what we are doing, setting up the LCA reference value for all products that we produce.

Jae-mee: That's right, it could be a parameter to assess whether the implementation of our sustainability strategy has worked out well as intended. And if not, we can come up with a new plan and strategy to further reduce the environmental impact.

Yong-hee: We get a lot of positive reactions to LCA these days. In the past, many people questioned the assessment's necessity, but now, many intend to assess new technology beforehand.

Why do you think LCA is important?

Jae-mee: There are many advantages, but I think the most critical aspect is "customers." It can be another criterion for showing customers how LG Chem is striving for sustainability. European clients often require LCA results.

Yong-hee: In the past, "price" was the crucial factor when purchasing products. But now, the customer's perception has changed, and now they are willing to pay more to source sustainable products.

Tracing a product's life cycle with LCA must be quite challenging.

Yong-hee: LCA is deficiently data-intensive work. Although the result looks pretty simple as it gives us a single figure as a final result, we have to go through a lot of stages to get to this value. We have to verify whether the data is correct or not for each unit process, model it using LCA software, calculate the value... and the process re-iterates.

Jae-mee: Collecting the basic process data is necessary for LCA analysis. To do so, communication with various teams is essential, but it was very difficult at first. We had to liaise with the production, utilities, procurement, and environmental and safety team to collect data and sales, as well as the marketing and public relation teams to deliver the LCA result to customers. Because almost every member requires knowledge of LCA to some extent, the company holds internal LCA training for employees.

Do you have any know-how in communication?

Jae-mee: I believe one of our biggest motivations is the company's declaration for net-zero. We could feel the importance of top-management's engagement.

LCA seems to be all about changing the perception of trading for a sustainable future.

Yong-hee: In the field of R&D, sustainability has become an important pillar of development, so there are a lot of projects emerging related to sustainability. I am proud that I play a role in there by diagnosing and providing the direction through LCA.

Jae-mee: It is obvious that LCA has been in the limelight recently. Other companies also carry out the assessment to keep up with this trend, but there is no unified methodology or regulation. So for the time being, it is impossible to compare LCA results with each other. To overcome this issue, it is necessary to actively participate in international initiatives and contribute to deriving a common methodology. We are proud that we are ready to quickly absorb the results discussed in such initiatives into our methodology.

What are the goals of LCA that LG Chem is trying to achieve after all?

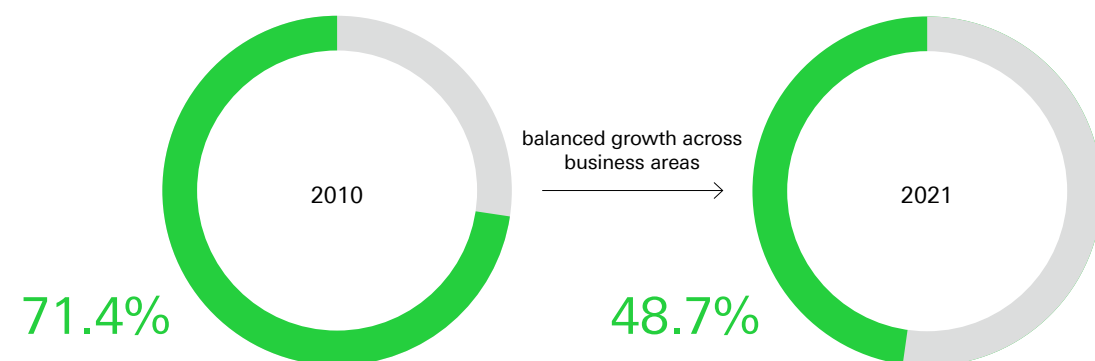
Jae-mee: First of all, we plan to conduct LCA for all domestic products by the third quarter of this year, and we plan to expand it to all overseas products by the second quarter of 2023. If we achieve results in line with preemptive goals, the time will come when our unrivaled sustainability management will be highlighted. **Anyone can declare carbon neutrality goals, but it's a big deal if there's no activity or evidence to support it. I'm confident we'll be able to demonstrate the outcomes to the public.**

3 Next Growth Engines

LG Chem aspires to be a leading global science company that creates sustainable value for customers. We are actively responding to changing business environment under the vision “We connect science to life for a better future” and are striving to enhance our business competitiveness. Over the past few years, we have been closely monitoring industry trends and long-term prospects, as well as diversified our business portfolio ranging from battery business to advanced materials and bio business. As a result, LG Chem is observing a balanced growth across business areas, with the proportion of sales generated from petrochemicals, which accounted for 71.4% in 2010 adjusted to 48.7% in 2021, and the proportion of other businesses expanded.

In July 2021, LG Chem announced its plan to invest a total of KRW 10 trillion in ESG-based businesses by 2025. Corporate competitiveness in the future depends not only on sales and profit but also on sustainability, which is expected to be reflected in the entire business process, including strategy and investment. To this end, we are innovating our business portfolios in compliance with ESG while maximizing the growth potential of current businesses. Our three next growth engines are sustainable & eco-friendly materials, battery materials, and new global innovative drugs.

Proportion of Petrochemical Business in LG Chem's Sales



Producing Sustainable & Eco-friendly Materials

With the growing concerns over rapid increase in plastic consumption and the related environmental impacts, the petrochemicals industry, which involves plastic manufacturing, is faced with ESG regulatory risks. Restrictions on single-use plastics and regulations on carbon emissions have emerged as imminent challenges for the industry, with key success factors shifting from low-cost raw material, local access, and product quality towards green fuels and products and clean energy.

In line with this paradigm shift, LG Chem is transforming into a sustainable company, expanding our business portfolio by developing and commercializing products that actively contribute to reducing waste and carbon emissions.

• Waste plastic recycling business

In tandem with the reinforcement of global policies and regulations on reducing plastic waste and mandated use of recycled plastics, the demand for recycled plastics, which accounted for around KRW 40 trillion in 2020, is projected to grow to roughly KRW 200 trillion in 2030. LG Chem produces PCR materials through the reprocessing of plastics wastes. PCR ABS is produced using plastics collected from disposed appliances, whereas PCR PC and PCR PC/ABS are engineered plastics. PCR PE is made from PE plastics processed for food, industrial and agricultural films and household containers. PCR PP plastics are used for automobile and medical appliances. **PCR plastics require less chemical or heat processing, thus contributing to carbon emissions reduction through reduced energy consumption. In addition, PCR plastics greatly benefit the environment in terms of reducing waste by recycling discarded plastics.**

1) PCR ABS

LG Chem was the first to develop a high-quality PCR ABS with a bright white color. Our PCR ABS products maintain excellent physical properties even after repeated uses.

2) PCR PC & PC/ABS

In 2009, LG Chem commercialized PCR PC and PCR PC/ABS plastics, which are recycled from engineered plastics called polycarbonates. Using a product with 50% PCR PC/ABS is equivalent to reducing carbon emissions by 40% in comparison to using conventional PC/ABS products. In order to establish a closed-loop system from material procurement to recycling, we are expanding our partnerships with a wider range of partners, including LG Electronics and Coupang, Korea's largest e-commerce platform. Furthermore, we are joining hands with Mura Technology, the UK-based pioneer of supercritical pyrolysis for chemical recycling, a breakthrough technology to address plastic wastes. We also plan to venture into the market in full swing with the construction of Korea's first-ever supercritical pyrolysis plant to be completed by 2024.

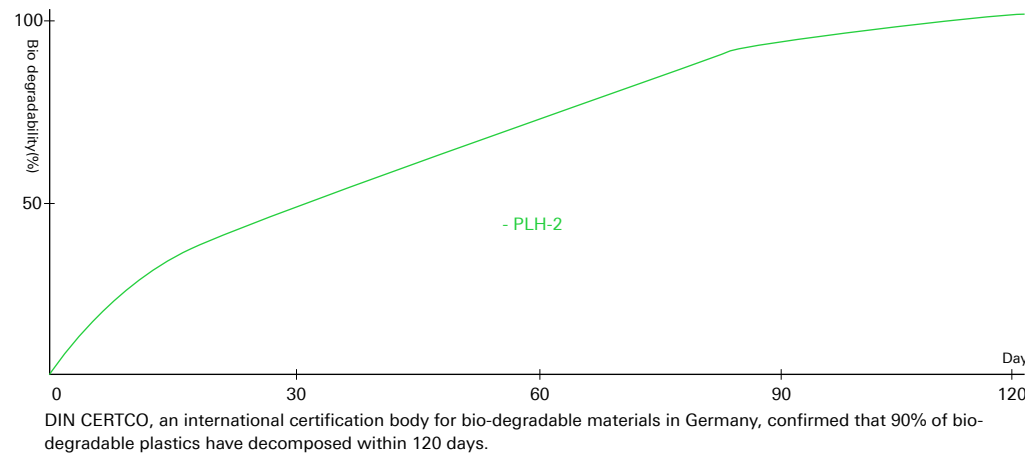
3) PCR PE & PCR PP

LG Chem successfully developed high-quality PCR PE and PCR PP products by recycling PE and PP plastics that are widely used in our daily lives. Our PCR materials demonstrate the same quality as those made of original plastics, and they can fully be processed to their original applications. Another great advantage is that we can apply different PCR materials to a variety of products depending on their use, such as for films or injection molding.

• Bio-degradable plastics

LG Chem is taking the lead in developing bio materials using bio-based materials that can fully decompose within a few months. Bio-degradable plastics are highly eco-friendly as they contribute to the substantial reduction of carbon emissions during raw material sourcing and manufacturing. They can also tackle the plastic waste issue. The market demand is expected to show an annual growth of 20%.

DIN CERTCO's test results on PLH's biodegradation



1) Polylactate-co-hydracrylate (PLH)

Conventional bio-degradable materials requiring different plastic materials or additives for reinforced physical property and flexibility posed limitations of having inconsistent qualities and prices. However, PLH developed by LG Chem is a single material that has improved flexibility by up to 20 times compared to that of existing bio-degradable products, and maintains transparency even after processing. It has a wide range of applications in plastic bags, bubble wraps, disposable cups, foam products, and non-woven fabrics for masks.

2) Polybutylene adipate co-terephthalate (PBAT)

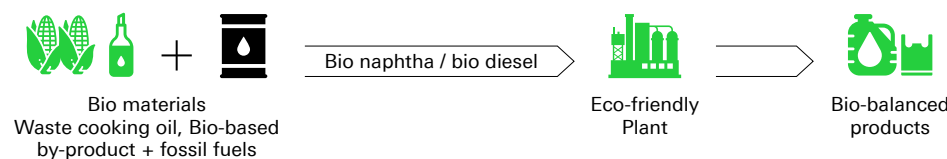
PBAT is a petroleum-based bio-degradable plastic. Unlike general plastics, it is naturally decomposed by water, light, enzymes, and microorganisms in nature within six months. It has excellent elasticity and has a wide range of product applications when compounded with other bio-degradable materials such as PLA. LG Chem plans to dramatically reduce carbon emissions during the manufacturing process by turning butanediol and adipic acid, the raw materials for PBAT production, into bio materials.

3) Polylactic acid (PLA)

PLA is one of the most widely produced bioplastics. It is a bio-degradable plastic decomposed by microorganisms within a few months under certain conditions. Due to its high rigidity and easy applicability to other materials, PLA is widely used in various industries by compounding with other polymers, such as PBAT.

• Bio-balanced products

LG Chem has succeeded in developing bio-balanced products using fossil fuels along with bio-renewable feedstock extracted from renewable bio-based oil. We dramatically reduced carbon emissions during the manufacturing process. We acquired ISCC PLUS certification for 41 bio-balanced products (as of June 2022).



Milestones of bio-degradable plastics

• Apr 2021

Acquired ISCC PLUS certifications for nine bio-balanced products for the first time in Korea

– ISCC PLUS

An international certification that meets the EU's Renewable Energy Directive, which verifies the traceability of sustainable raw materials used in bioproducts according to strict standards.

• Jul 2021

Launched a green materials brand, LETZero

– LETZero

LG Chem's eco-friendly materials brand that reflects our determination to create a sustainable future where humans can coexist with nature, by engaging in carbon reduction activities and resolving harmfulness in the ecosystem.



Recycled products made from plastic waste



Bio materials made from bio-based raw materials



Bio-degradable materials made from glucose extracted from corns, and waste glycerol



LETZero

• Aug 2021

Initiated the export of the first ISCC PLUS-certified super absorbent polymer (SAP) Commenced the construction of a PBAT production plant with an annual capacity of 50,000 tons in Seosan, Korea; commercial production to start in 2024

• Sep 2021

Signed an heads of agreement (HOA) with ADM, a major American grain processing company, for joint venture on LA and PLA with an annual capacity of 75,000 tons; construction to complete by 2025

• Nov 2021

Signed a joint development agreement (JDA) with GS Caltex for the development of a hydroxypropionic acid (a bio-degradable material) mass-production technology and its prototype; prototype production to start in 2023

• Jan 2022

Exported the first bio-balanced neopentyl glycol, which is manufactured using bio materials such as waste cooking oil and palm oil byproducts to Novaresin of Italy

- **Renewable energy**

LG Chem plans to expand the production of polyolefin elastomer (POE) for solar films, by 100,000 tons by 2023. POE with its high durability and insulation properties is expected to indirectly contribute to expanding renewable energy production. The expansion of capacity to 380,000 tons makes LG Chem the second-largest POE manufacturer. We will continue to develop physical properties of POE to gain a competitive edge in the rapidly growing solar power market and gradually expand our renewable energy business.

Driving into a New Era with Battery Materials

LG Chem contributes to the distribution of electric vehicles with battery materials that are safe and beneficial to the environment and society through the expansion of businesses of cathodes, separators and additional battery materials.

- **Cathodes**

LG Chem has been devoted to developing technologies for cathode materials, which are essential materials that determine battery capacity, lifespan, and charging speed. In particular, we were the first in the world to mass-produce nickel, cobalt and manganese (NCM) cathode materials in 2006. Based on accumulated technological competency, world-class unit production capacity, high product quality, and metal sourcing through cooperation with diverse partners, we are expanding our business at a fast pace based on our unrivaled competitiveness.

Refer to the interview on p. 52

In January 2022, LG Chem invested about KRW 500 billion to construct a cathode material plant in Gumi, Korea, with an annual production capacity of 60,000 tons. It is the world's largest in terms of a single factory, and is capable of manufacturing batteries for about 500,000 high-performance EVs. We plan to expand the mass production of cylindrical and pouch products made of high-nickel cathode materials (80% and above Ni content) up to 90% by 2026, and complete the development of cobalt-free technology by 2025 to ensure a stable and responsible battery supply chain. We also focus on developing single crystal cathode materials that will contribute to enhancing the safety of our batteries through reduced gas emissions from battery cells by 85% compared to that of conventional products.

- **Separators**

Separator business is LG Chem's new business area that utilizes its proficiency in the patented safety reinforced separator (SRS) technology. We secured the business basis through acquiring the coating business of LG Electronics in July 2021. We are reinforcing our competitive edge to ensure the safety of batteries by establishing a joint venture in Hungary with Toray, a Japanese company equipped with the world's best technology in fibers and textiles.

In addition to cathode materials and separators, we are expanding our business of additional battery materials into carbon nanotube (CNT), thermal adhesives, anode binders, and battery assembly solutions (BAS). Furthermore, we are exploring opportunities for research and development through external partnerships for greater performance, higher efficiency, and extended lifespan of battery materials.

Improving the Drug Development Pipeline for Well-being of Human

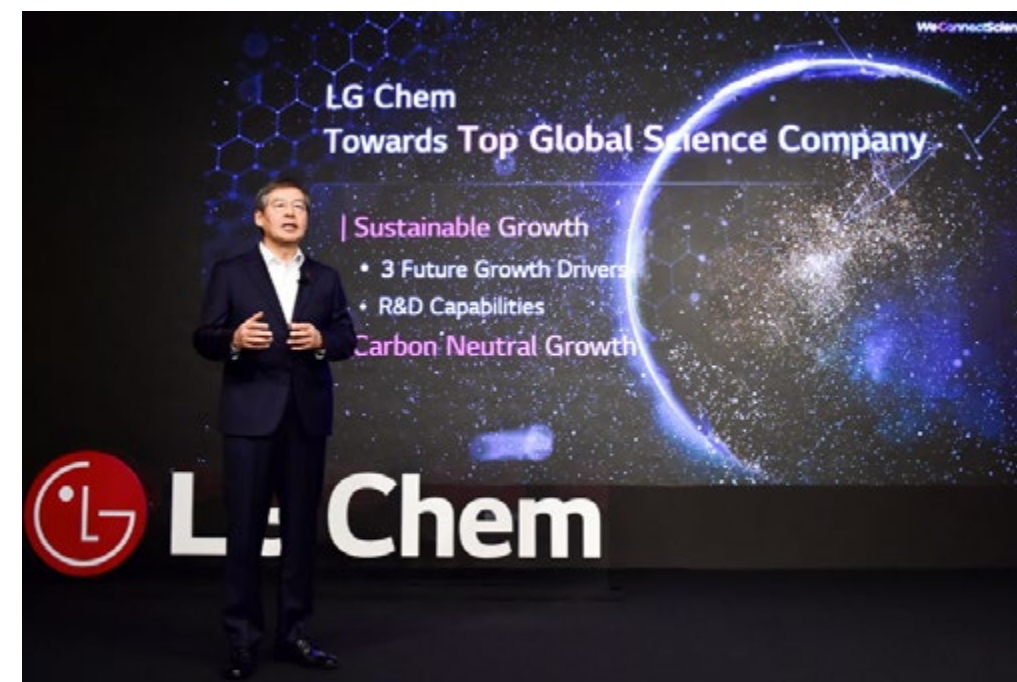
With the goals of improving human health as well as the quality of life, LG Chem has accelerated the development of new drugs through R&D investments, including the recent expansion of drug pipelines from 34 in 2019 to 45 in 2021. As of present, we secured 10 global innovative drug pipelines in the first phase of clinical trials, and we aim at expanding them to 23 in 2030. Gout treatment, which passed the clinical trial phase 2 in the US in 2021, will begin its multinational phase 3 study together with the US and China this year. Nonalcoholic steatohepatitis (NASH) treatment, which is undergoing a clinical trial in the US, and the world's first oral obesity treatment (MC4R agonist) will complete their first-phase study this year and move to the next step.

LG Chem announces plans to develop next three growth engines

At the Investor Day event in February 2022, LG Chem announced its plans to focus on R&D and large-scale investments through the next three growth engines: sustainable & eco-friendly materials, battery materials, and new global innovative drugs.



Investor Day event
in February 2022



Discovering business directivity from ESG

Jung-hyuk Lim, Professional, MI Strategy Team.Battery Materials

Professional Jung-hyuk Lim from the MI Strategy Team. Battery Materials suggests business directivity and scenarios based on his market insight. Look at his interview below.

Please tell us about the roles of your team.

The MI Strategy Team.Battery Materials contributes to setting future business strategies by finding useful insight for the business through market intelligence activities (a process of collecting and analyzing information about the market, trends, competitors, and so on). Here I'm responsible for analyzing the industry's upstream sector and ESG issues and developing insights.

The cathode materials market trends and customer demands seem to evolve quickly. Are there any values that your team considers the most important?

Cathode materials are one of the most crucial elements in battery production. The green vehicle market continues to expand and is coming to prominence as more people get involved. The market is quite promising, with a five-year forecast of four to five times market expansion. Battery makers and, in a broader sense, EV manufacturers are the primary buyers of cathode materials. They demand more stable supply chains and cost-effective products as they increase their physical production. In efforts to meet their demands, **the Battery Materials Business Division aims at supplying outstanding cathode materials in a stable manner. In addition, we do not overlook greenness, which is one of the most significant customer demands.**

How do you produce cathode materials that are free from issues in terms of ESG?

What we need to do first is to cut carbon emissions by using renewable energy as much as possible at the production stage. Cathode materials are produced at high temperatures, which means they require a lot of energy. You could say that this is where the majority of the power is consumed. In other words, we can minimize carbon emissions in an innovative way by switching to green energy. Last year, LG Chem's plant in Wuxi, China signed an agreement with a local power generator for supplying renewable energy 100%. In addition, Cheongju Plant procures 30% of its power through the Green Premium (voluntary funding for investing in renewable energy expansion).

With the growing importance of ESG both domestically and internationally, have there been any changes in your work?

I joined the Battery Materials Business Division two years ago, and performance was prioritized in product development at the time. EVs, for instance, had unsatisfactory driving ranges, which is why performance was spotlighted in the market. Now that performance has progressed to the point that it is currently in its stage of maturity, we have "cost-effectiveness" and "greenness" remaining among the trends I have mentioned earlier. The Europe shows its commitment to the environment by measuring carbon emissions by newly introducing its "new Battery Regulation," more rigorous standard than it was before, mandating the content of recycling, and specifying a guideline for disposal of waste batteries. The era of considering only product performance is now over. It's now time to build a sustainable economy.

Your team has made significant changes even during the pandemic.

The global community has realized the importance of the environment after the COVID-19 outbreak. People needed momentum to go toward the post-COVID-19 era, which explains the reason for the rising trend of EVs having a close relationship with the environment. More automobile manufacturers will put an emphasis on eco-friendliness and seek to work with companies promoting sustainability management. Automobile makers keep emphasizing to consumers the necessity of such values. You can visit the websites of global car makers to witness the changes. Social paradigms appear to evolve even faster as industrial momentum shifts.

Your work involves a series of unpredictable things, as well as numerous variables, and it seems like you can't find the answer in a short period of time.

It may sound strange, but I find it most tough when I have no clue what I'm doing right now. (Laughs) There isn't any common physical laws in this field, and no one clearly give you the right answer. It is hard to be constantly confronted with unclear things. It is like I am taking the next steps in thick mist even though I am witnessing market and customer changes. I just hope that the steps I took today lead me to the right direction.

You might find it more difficult while attempting new challenges ahead of time. But you should feel rewarded now and then.

It may seem too secular, but I feel rewarded whenever my predictions are logical and right. (Laughs) Everything, including changes and customer needs, necessitates foresight. We feel relieved when vague things become clear and go in the direction we had expected as time passes. I guess these elements come together to form insight. Our team suggests the most plausible direction, devises business strategies based on this, and such strategies contribute to the company's businesses. This is when I get a sense of accomplishment.

Do you have your own way to build insight?

It's crucial to think, 'what if.' We should keep thinking about 'What if it goes this way?' and come up with numerous strategies. Some tend to stop thinking when their expectations are not met, and this is when you have no idea what will happen in five or ten years. 'What if' should branch out in several different directions. That's how you get the most plausible direction from numerous scenarios. You will gain clearer insight by repeating this process.

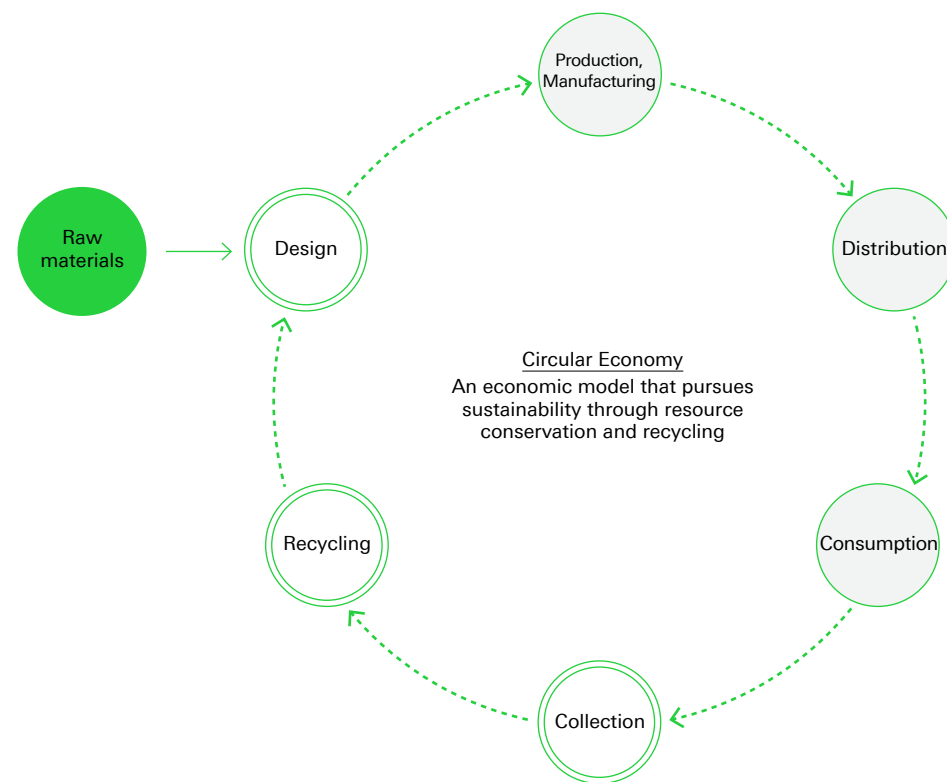
Please share with us your plans and aspirations.

Personally, I would like to do something that would benefit myself in the future, rather than a career that will benefit me in the short term. Our team's goal is specific: **to play the role of a GPS navigator, ensuring that every business moves in the right path based on market insight.** Navigations recommend the best routes for drivers by analyzing road conditions and traffic data. They show the fastest route at times and the cheapest route at other times. We are committed to acting as a GPS navigator for LG Chem's operations.



Transition to a Circular Economy

LG Chem highlighted the need for a circular economy model that raises environmental sustainability by lowering the consumption of natural resources and waste and repetitively using input resources. Now, we attempt to break free from the “production-consumption-disposal” cycle and achieve a circular economy that minimizes the amount of natural resources used and the waste, while maximizing the circulation of materials throughout the process.



Tackling Plastic Wastes

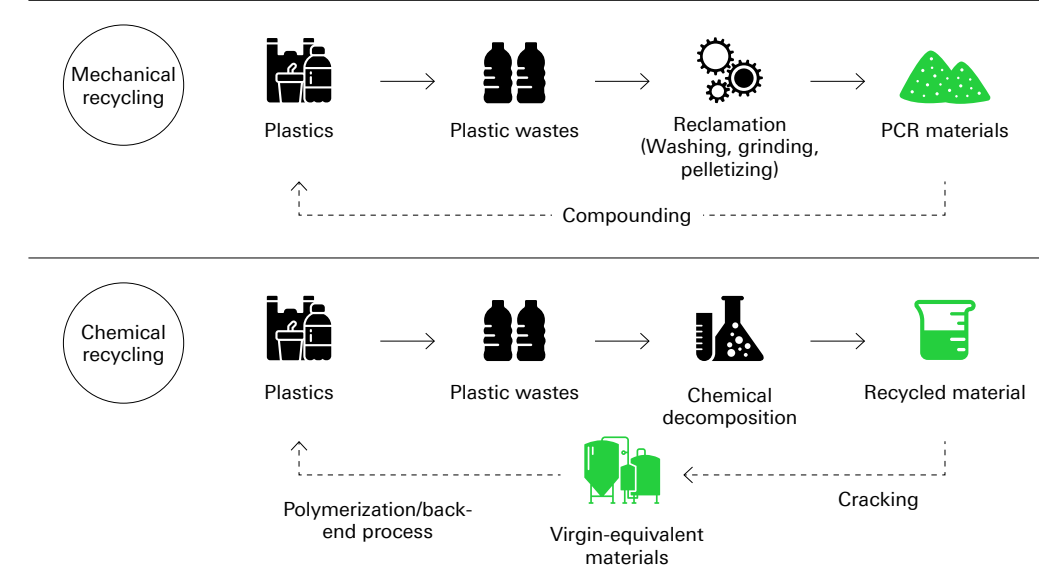
Plastics made of fossil fuels emit GHGs in all processes of petroleum and gas extraction, refining, cracking, and incineration. The majority of emissions are mostly generated when extracting and producing plastic resins. Moreover, it takes up to 500 years to decompose a plastic since it has a chemical structure that cannot be degraded by microorganisms. In that same context, LG Chem is committed to carbon emissions reduction by recycling plastics in which their quality does not deteriorate. We are currently adopting two ways of recycling: mechanical recycling that plastic waste is directly used as raw material, and chemical recycling that retrieves raw materials of plastic waste through a pyrolysis process.

A plastic recycling business shows effective ways to reduce carbon emissions while mitigating environmental problems posed by the plastic wastes accumulated in landfills.

To build a circular economy for plastics, we plan to build a supercritical pyrolysis plant to recycle plastics with an annual capacity of 20,000 tons in Dangjin, Korea by 2024. Dangjin Plant applies a chemical recycling technology that decomposes mixed plastic wastes using high-temperature and high-pressure supercritical vapor. Supercritical water vapor is a special heat source generated when temperature and pressure are above their thresholds. It has both liquid solubility and gas diffusivity, which is highly useful in extracting specific substances.

Additionally, unlike direct heat application technology, black carbon (soot) is constrained in a pyrolysis process, allowing consecutive operation without requiring maintenance. Approximately 10 tons of vinyl and plastics can produce more than 8 tons of pyrolysis oil, which is the highest in the industry, and the remaining 2 tons of byproduct gases are reused as energy for operation, such as creating supercritical vapors. The pyrolysis oil produced in this plant is a renewable material that can be extracted from plastic wastes. It has carbon emissions reduction effects given its utilization in new plastic manufacturing. In addition, through pyrolysis, we can extract naphtha from PE and PP composite materials, such as snack packs, plastic lids, and containers that are difficult to recycle and put them back into the petrochemical process.

How to recycle waste plastic



Collective Action for a Change

LG Chem continues to cooperate with various partners in value chain to create a sustainable circular economy model. The most crucial aspects here is to maintain a cooperative relationship with competent.

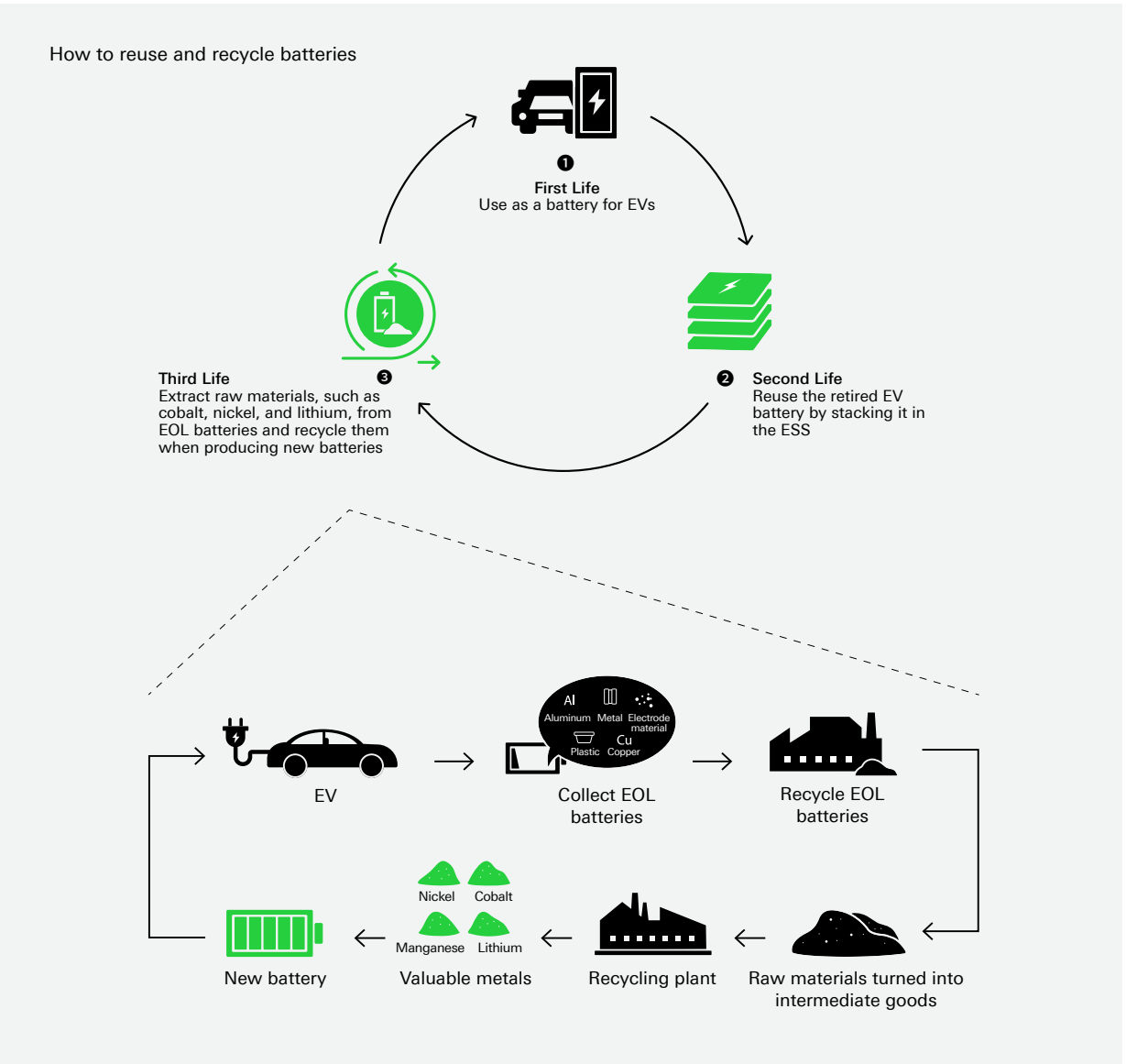
In August 2021, we signed an MOU with Veolia R&E, Korea’s largest recycled methyl methacrylate (MMA) producer. Under the strategic partnership for “stabilizing the supply of chemically recycled MMA and upgrading its quality,” we obtained the opportunity to commercialize low-carbon transparent ABS based on chemically recycled MMA. In September the same year, we signed another agreement with Coupang for “recycling plastics and creating a closed-loop system.” This has led to a successful creation of a circular economy model where stretch films (plastic wraps for logistics packaging) that are put to waste from Coupang’s fulfillment houses are collected, recycled, and supplied once again. In March 2022, we concluded an MOU with Innerbottle and CJ Logistics for building a circular economy platform.

The platform has a structure in which Innerbottle makes cosmetic containers using LG Chem’s plastic material, and then LG Chem and Innerbottle recycle Innerbottle’s used containers collected by CJ Logistics in the form of raw materials. We have also teamed up with the Siheung city government to recycle waste resources generated in the city as clean resources through an agreement on building a circular economy system by recycling waste. We plan to engage in R&D activities for the advancement of the waste screening processes by 2023 using a sorting plant operated by the Siheung Urban Corporation.

Reducing, Reusing and Recycling

Against the backdrop of a dramatically increasing worldwide demand for EVs, the disposal of end-of-life (EOL) batteries has emerged as an important issue from a circular economy perspective. LG Chem serves as a pivotal role in the battery recycling business. There are two ways to recycle batteries: One is that a battery that still has some life in it can be reused for the energy storage system (ESS), and another is to extract core raw materials (e.g. cobalt, nickel, manganese, and lithium) from EOL batteries and recycle them in manufacturing cathode materials. As a cathode material producer, which are the core material for batteries, LG Chem has entered into partnership with smelting and refining companies capable of separating and extracting core materials from EOL batteries in order to contribute to circular economy through battery recycling.

In December 2021, we signed a long-term supply agreement with the North America’s largest battery recycling corporation, Li-Cycle which has secured and specialized technology of recycling batteries and extracting core materials. Li-Cycle adopts a “wet process” to minimize the emission of harmful substances by recycling wastewater without generating dust in the extraction process at a rate of 100%. This enables us to gain competitive edge in ESG in the process of supplying nickel.



Zero Waste to Landfill

LG Chem strives toward zero waste to landfill at our business sites. We have reviewed and implemented projects to reduce waste and transform landfill and incinerated waste into recycled products. As of 2022, we are obtaining Zero Waste to Landfill (ZWTL) certificates for business sites with high recycling rates of at least 90%. We intend to gradually increase the recycling rate and get accredited for ZWTL certifications.

Environment, Health and Safety

The main tasks of the environment, health, and safety (EH&S) are divided into environmental management (i.e. wastewater treatment, operation of air/water pollution control facilities, and responses to the Water Environment Conservation Act, the Clean Air Conservation Act, and the Wastes Control Act) and industrial safety (i.e. workers' safety, identification and removal of risk factors in processes and facilities, and responses to the Occupational Safety and Health Act). In tandem with the growing interest in improving the natural and the industrial environment, corporate commitment to EH&S is becoming increasingly important.

As a global manufacturer and supplier of materials and goods essential for the development of modern industry and the convenience of life, LG Chem feels deeply responsible for the impact of our products on the environment and health. In an effort to minimize the environmental and health impacts of our products, we focus on reducing or eliminating harmful substances from products and maintaining their content below regulatory thresholds in and out of Korea.

EH&S is a fundamental management system essential for any business. Thorough management system and strict operational processes are necessary for raising employee awareness on EH&S in order to respond to various issues in a timely manner. LG Chem will make every effort to ensure that its employees work in a safe and desirable workplace. We are dedicated to monitoring and restructuring world-class standards of environment and safety to the best of our ability.





EHS Policy & Structure

LG Chem operates EH&S management systems according to ISO 14001 and ISO 45001 standards. ISO 14001 is an international certification system that evaluates a company’s environmental management systems. ISO 45001, on the other hand, specifies the minimum requirements for an organization to identify and continuously manage risk factors so that it can prevent industrial accidents on its own.

We set five policies to declare our consistent commitment to EH&S management, as well as in-house environmental and safety regulations and work guidelines for each business site based on these policies. Leaders engage in field management activities, with each organization conducting its own set of actions to avoid accidents. Efforts are being made to raise safety awareness and increase execution power by reflecting the occurrence of safety accidents in employee evaluations. We revised our corporate bylaws on safety and health in accordance with the enactment of the Severe Accident Punishment Act, as well as archived bylaw management progress data in our internal IT system. Based on our commitments, we now have a system in place to perform our duty to ensure employee safety and health.

[EH&S Policy]

- We will comply with all EH&S legal acquirements and establish globally leading EH&S rules and best practices
- We will drive continuous innovation throughout the entire life cycle of the product to supply environment-friendly products and services.
- We will provide a safe and healthy work environment, and ensure the principle-adhering corporate culture.
- We will support our business partners and local communities in the improvement of the EH&S practices as our social responsibility
- We disclose information transparently and communicate sincerely with our stakeholders

• Operation of an integrated IT system for global EH&S management

LG Chem operates an integrated IT system under global EH&S work standard processes. In 2021, we applied this system to small business sites in Korea, as well as to overseas sites, including China, the US, Poland, and Vietnam, to upgrade the management levels of all business sites. We will have our EH&S management system enhanced in 2022 through improved action, such as strengthening connectivity between different work phases and upgrading system performance.

• Strengthening EH&S organization and its competences

In January 2022, LG Chem newly added the position of Chief of Safety and Environment Officer (CSEO), giving the role autonomous and final responsibility and authority in the field of environment and safety. We also formed a technical policy and diagnosis body under the CSEO to bolster its function as a control tower of corporate EH&S. Furthermore, we appointed an EH&S manager for each business site to spread consistent policies and strengthened our field response competences and action by recruiting senior-level experts and engineers. We also hold CSEO meetings to monitor business sites’ policy implementation, discuss improvements in environment and safety, and enable swift decision-making.

Our capacity building program for working-level staff enhances employees’ EH&S management skills, whereas the safety leadership program offered to new executives and team leaders help them build leadership in fostering a safety culture. Lastly, we divide working-level staff’s duties and competences into different levels and suggest customized roadmaps that encourage employees to grow into EH&S experts.

CSEO meetings held in 2022

Meeting	Agenda	Intervals
Environment and Safety Committee	· Decision-making on company-wide major issues · Review on corporate EH&S management performance	Twice a year
CSEO field management	· Fostering a EH&S-prioritized corporate culture · Monitoring on the implementation of LGC Standards	Quarterly
Safety & Health Department meeting	· Discussions on major EH&S issues	Six times a year
EH&S Department meeting	· Discussions on major environmental and safety issues · Management team leaders: Identification of issues on small businesses in advance	Once a month
EH&S leaders’ workshop	· Sharing and reviewing performance according to KPIs on EH&S	Once a year
Regular environment and safety meetings at each business division	· Sharing the progress between divisions · Sharing review items, such as management conference materials	Once a week

Execution and Performance Management

LG Chem executed Project Magnolia from June 2020 to 2021 with the belief that “there is no future if we fail to fix EH&S regulations permanently and irreversibly.” We strive to reorganize the basic EH&S system, improve organizational work processes, and increase investments, thereby building an EH&S management system at a global level.

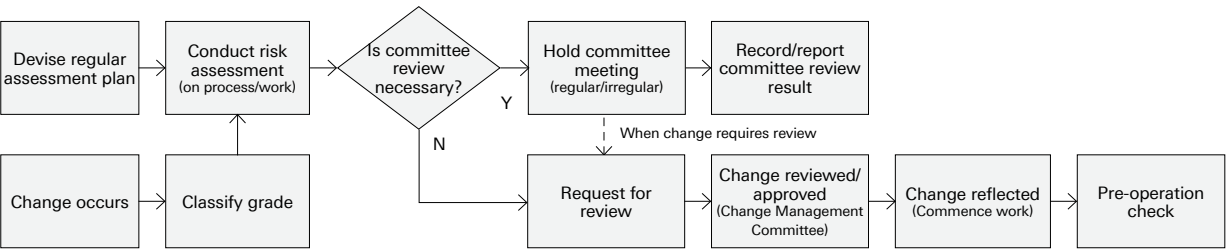
• Establishment of LGC Standards

LG Chem improved high-risk factors and established an accident prevention system by incorporating LGC Standards into the EH&S management system. Furthermore, we are continuing to upgrade the system and make it easier for field employees to carry out their roles.

- 1) Technical Guidelines: Added and amended 84 items to be used as means of process improvement and work standards, thereby enhancing the overall EH&S and technical capabilities.
- 2) Mother Factory Policy: Factory with the best product and manufacturing technology acts as a supporter that provides ongoing assistance to other plants.
- 3) Accident Prevention System: Safety checks before operation, risk assessment committee meetings supervised by the head of a plant, high-risk work inspections, and so on.
- 4) Emergency Response System: Building a quick response system for damage minimization, and enhancement of standards through unplanned drills.
- 5) Digital Transformation (DX): Development and application of a high-risk facility abnormality forecast model

• Preemptive identification of and response to risks

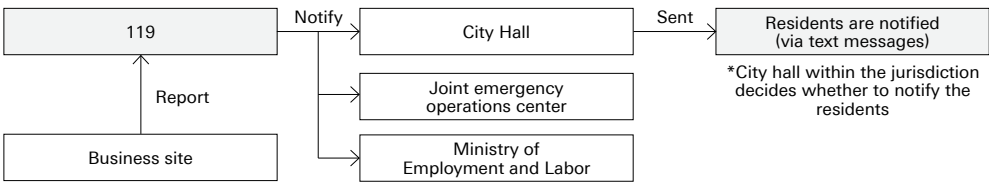
All LG Chem business sites conduct monthly reviews on the suitability of risk assessment under the supervision of the head of a plant for those requiring frequent risk reviews. They also re-identify potential risk factors to prevent serious accidents and ensure workplace safety. In addition, to verify double and triple safety measures, the heads of plants inspect the work risks according to the defined protocol before commencing work to prevent any occurrence of hazards. And we disseminate global workplace accident cases to all business sites with an aim to identify and analyze the causes and consequences of significant workplace accidents in Korea and abroad and improve them. We seek to discover and respond to accident risks at all business sites based on our determination.



• Reinforcement of emergency response system

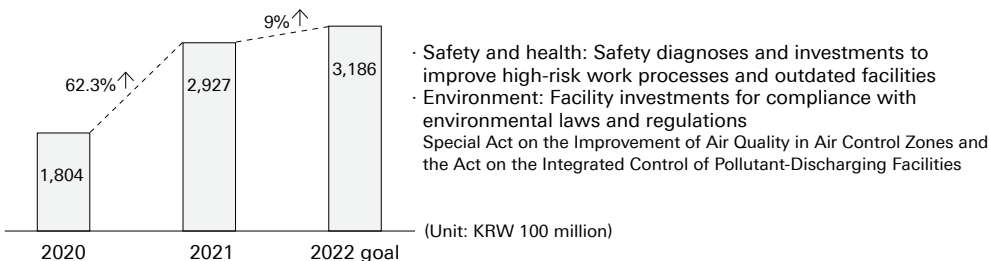
LG Chem identifies the emergency response levels of all business sites by diagnosing their emergency response systems, as well as promotes company-wide improvements by analyzing the root cause of issues. We improved our emergency response through case study analysis of each business sites, standardized company-wide emergency response manuals, and systematized emergency drills and situation notice. In the event of an emergency, duties of individuals are sent via messenger to allow quick response actions.

Establishment of a cooperative system with local governments



• Increasing investments in safety and health

In 2020, LG Chem completed emergency/precision diagnoses of high-risk work processes and facilities in 37 of its business sites (15 in Korea, 22 abroad). Currently, we are making large-scale investments in environment and safety to alleviate the identified shortcomings.



Refer to the interview on p. 64

• Capacity building for supplier safety

LG Chem contributes to enhancing its suppliers' safety supervision and monitoring capabilities by operating a safety overseer system. When selecting a supplier for construction or facility expansion, we first evaluate their basic safety management capability, then inspect their detailed accident prevention systems according to our safety bid evaluation system. In addition, we carry out activities to raise safety awareness by displaying photos of serious accidents and attaching code of conduct for each work process at all work sites and lounges to eliminate accidents caused by unsafe behaviors, as well as distributing leaflets containing the Environmental and Safety Commandments to all employees of suppliers.

• LG Chem's management of hazardous substances

- 1) We conduct stringent inspections on substances that are subject to management from the raw material handling stage according to our Product Environmental Management Guidelines. Hazardous substances are classified into three phases based on risk level. We also improved our system so that all materials are purchased after a review.
- 2) We receive customer requests per product regarding various environmental regulations through an electronic approval system, and we have a system in place that provides answers after reviews and research activities. We modernized the process by creating a chemical substance inventory and building a global chemical substance regulatory database, allowing us to check our compliance with each regulation online and issue warranty documents on the spot.
- 3) By integrating product ingredient information into our bill of substances management system, we constantly monitor the content of hazardous materials in products and provide information to customers upon request.
- 4) We make sure that all purchased chemical substances have their material safety data sheets (MSDS) ready. For exceptions, we record all items in detail in the electronic approval system. The MSDS of all substances can be collected, stored, and accessed 24 hours a day so that we can verify each material's hazardous and harmful impacts any time.

• A safe workplace

LG Chem engages in a variety of activities to protect its employees' health and promote pleasant working conditions. In terms of minimizing hazards that may occur in business sites, we conduct a hazardous factor assessment in the first and second half of the year through a third-party agency. In addition, we set internal standards for managing our work environment that is more stringent compared to the legal standards. We also carry out prevention activities on musculoskeletal disorder and self-inspections on local exhaust ventilation, ensuring that all employees work in a pleasant environment. Our internal doctor's office and Health Management Office provide employees with personalized medical services and aid them in leading healthy lives through diverse health promotion programs. At our psychological counseling office, employees may have an in-depth consultation with a qualified counselor.

Injury Prevention and Safety Activities

LG Chem promulgated the CEO's Environment and Safety Declaration and the Environmental and Safety Commandments in January 2021 to raise leaders' EH&S awareness and promote a mindset that prioritizes EH&S. In April of the same year, we ran an "environment and safety mindset" course for all our employees. We also carry out half-yearly surveys to check their EH&S awareness, as well as to design and implement improvement measures based on the voices of employees (VoE). Our plans for 2022 include adopting the Seven Safety Commandments to solidify employees' basic safety compliance culture, as well as motivating their voluntary engagement through diverse activities, thereby developing an organizational culture of "prioritizing human safety above all."

[The Seven Safety Commandments]

- 1) Wear the appropriate personal protective equipment according to the working condition
- 2) Measure the flammable gas concentration when working with fire and place a fire extinguisher at work sites
- 3) Measure the concentrations of hazardous gases and oxygen when working in a confined space
- 4) Take precautions against falls and put on a double-hook safety belt when operating in high places
- 5) Commence work after obtaining a written permission
- 6) Do not release interlocks at your own discretion
- 7) Follow lockout-tagout procedures.



There's no one-size-fits-all solution for EH&S

Meet Junyeop Kim, a dedicated EH&S Specialist who safeguards Hwachi Complex, Yeosu.

When we say EH&S, we think of various areas of the natural environment. What are your responsibilities in the team?

There are roughly five areas in the Environment Team: air, water quality, soil, wastes, and chemical substances. My work focuses on chemical substances. We can further divide the handling of chemical substances into works related to the Chemical Substances Control Act and works related to the Act on Registration and Evaluation of Chemical Substances. The first concerns installation standards and approval of facilities handling chemical substances, while the latter concerns the registration of the substances that the company handles, to the Ministry of Environment.

It appears the classifications are based on environmental areas rather than specific tasks.

Yes, and this is because the person in charge must have an accurate idea of his/her work under relevant laws. We assign managers for each law, such as the Clean Air Conservation Act, the Water Environment Conservation Act, the Wastes Control Act, and the Soil Environment Conservation Act.

Management of chemical substances would be of particular importance.

Preventive actions are of vital importance considering that we are a petrochemicals company, and that the leakage or explosion of chemical substances could result in grave damage. We need to pay extra attention to Yeosu, which is a cluster of industrial complexes, to ensure that we don't harm the environment or residents' lives. Because we know that even the tiniest hint of odor can make the residents anxious.

There must be a need for joint response with other companies when issues arise in terms of environmental and safety measures.

Yes, and that's the reason why we have the Committee for Yeosu Industrial Complex Environment. It is sometimes difficult to identify straight away which industrial complex caused certain environmental issues. In this case, managers contact each other to find the cause. Even when a solution is available, we must still cooperate with the nearby complexes to ensure that no harm occurred to them.

Your team sure requires communication with lots of other teams. How do you deal with difficulties at work?

Safety & Environment Teams basically need to communicate with almost all the teams, going through numerous meetings and reviews throughout the process. The Production Team equipped with the production facilities is one of our main candidates for negotiations. Every team or department is a candidate for cooperation, from the Maintenance Team, which is involved in placing facilities in plants; to the Procurement Team for purchasing materials and distributing chemicals; and the R&D Team that handles chemical substances at the Petrochemical Research Center. I can say that all divisions must go through our team to lay the true foundation of safety. Oh, and the same goes for the Business Support Team. They must get our approval when managing a company building or constructing buildings. I almost forgot, there is the Corporate Affairs Team, too. We need to partner up to respond to the press in times of an accident or conducting emergency drills.

It sounds like your team entails tremendous responsibility.

That's right. I always ponder if a manager must bear all the responsibilities. The burden has greatly increased since the enactment of the Severe Accident Punishment Act in January 2022. Nonetheless, I approach my work with a sense of responsibility now that I see that environment and safety is significant than ever. This is a major concern because if a company fails to comply with environmental and safety regulations, it is bound to encounter sanctions and may even be forced to close. Our team's goal is to create safer and cleaner business sites.

How is the Yeosu Industrial Complex prepared in terms of environment and safety?

We conducted our very first regular inspection per the Chemical Substances Control Act in the summer of 2020, and the Yeosu Industrial Complex passed the safety assessment. We also received grade 1 with an average score of 91 points during an inspection of hazard control plan implementation in July 2020. Personally, I try to have a better understanding of chemical substance-related works at Yeosu Plant. I am doing my best to have a broad range of experience. My efforts were also acknowledged, in which I got an early promotion last year. (Smiles)

The Yeosu Industrial Complex is divided into four complexes: Hwachi, Yongseong 1, Yongseong 2, and Jeongnyang. I can see that some are considerably older than others. Which complex is your team's responsibility?

We oversee the Hwachi Complex. It is the oldest one, established in 1974, so we do get extra works because of that. For example, it's quite frequent here to lose documents like test certificates. On the other hand, a small advantage is that Hwachi Complex uses batch processes which tend to have shorter maintenance periods. Accordingly, there is no need for the entire complex to be shut down. Instead, we do get more maintenance-related paperwork.

The Yongseong Complex 2 has a slogan that says, 'Do not let your guard down with good facilities.' Aren't new facilities safer in terms of environment and safety?

Not necessarily. Environment and safety is related to workforce as well as facilities. In other words, letting inexperienced individuals manage a new facility may raise environmental and safety concerns. We should give them some time to adapt to the facility, and to the response framework in the event of any issues.

For you, what is the most critical capability of an environment and safety expert? Compliance with regulations? Rigor for prevention? Or crisis management capability?

They are all essential, but what matters the most is his/her meticulousness. One must go out and do things paying attentions to smallest details, without assuming that someone else will do the job.

Now that the interview is complete, your armband looks different from the beginning of this interview.

I always wear this armband on business sites. No unauthorized personnel may access the area, whereas Safety & Environment Team may walk right in showing this armband. (Laughs)

Sustainable Supply Chain Management

At LG Chem, we do not simply think about how to make high-quality products. We also consider the entire process of making them because the problems arising within our supply chain are considered as the joint responsibility of LG Chem. Recently, the scope of responsibility for supply chain management has been expanded to human rights, resource depletion, anti-corruption, and other issues. Therefore, preventing and managing such risks is considered one of the core competitive aspects of the global corporation.

This leads to the essence of why we must ensure sustainable supply chain management. We established a strict supply chain management system to secure traceability and transparency and minimize risks. We prioritize high-risk minerals in human rights and the environment, such as cobalt, nickel, manganese, and lithium, in our “responsible supply chain” management.

We conduct due diligence on our suppliers, especially those with sensitive issues, with a third party to ensure efficiency and objective management. LG Chem strives to protect human dignity, ensure sound growth for all companies in the supply chain, and guarantee the supply chain’s sustainability through innovative management systems.

Supply Chain Management Policy



LG Chem Responsible Sourcing Policy



LG Chem Code of Conduct for Suppliers



LG Chem Global Human Rights & Labor Policy

- **Responsible supply chain**

LG Chem aspires to create a responsible supply chain for the products it manufactures. In 2020, we adopted a “responsible sourcing policy” that applied the “OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict- Affected and High-Risk Areas.” We are expanding the Guidance throughout the company’s entire procurement process.

- **Code of Conduct for Suppliers**

LG Chem established the “Code of Conduct for Suppliers” in 2016 based on international rules, standards, and legal requirements to ensure suppliers’ consistent implementation of their social responsibilities. The Code of Conduct consists of matters that suppliers must comply with, such as human rights and labor, business ethics, health and safety, environmental sustainability, responsible mineral sourcing, and reporting systems. Based on this, it verifies the adequacy of the supply chain management system in advance from the selection of new companies, and continuously manages the risk of the supply chain through regular evaluation and monitoring process. The Code of Conduct for Suppliers is available on the website and the procurement portal.

- **Global human rights and labor policy**

At LG Chem, we ensure rights for human dignity, happiness, and freedom as the fundamental values of our “people-oriented business”. In 2014, we joined the UN Global Compact (UNGC) to endorse international human rights and labor standards and comply with the labor laws of all nations and regions we operate in. We also apply the Global Human Rights and Labor Policy to all business sites across the globe and check and improve relevant risks through continuous monitoring. We share this policy with all stakeholders directly affected by LG Chem’s business activities, which include our employees, customers, and suppliers, and contribute to raising their awareness.

In addition, all our employees are required to take human rights training such as compliance, raising disability awareness, and prevention of sexual harassment in the workplace at least once a year. Furthermore, in accordance with the Global Human Rights and Labor Policy, we also conduct human rights impact assessments based on a self-check list to evaluate human rights impacts and diagnoses its risks.

Supply Chain Management Action

Refer to the interview on p. 70

- **Supply chain management system**

LG Chem establishes and operates a systematic supply chain management. We proactively identify and manage supply chain risks through verification of their system adequacy as well as ESG evaluations and risk improvements at the new supplier selection stage. Our cooperation with external agencies also ensures objective management. Additionally, we enhance the supply chain transparency by developing a platform embedded with the blockchain technology that is impossible to hack and by blocking diverse risks that may occur during production through a tracking system.



Audit Report on CDM

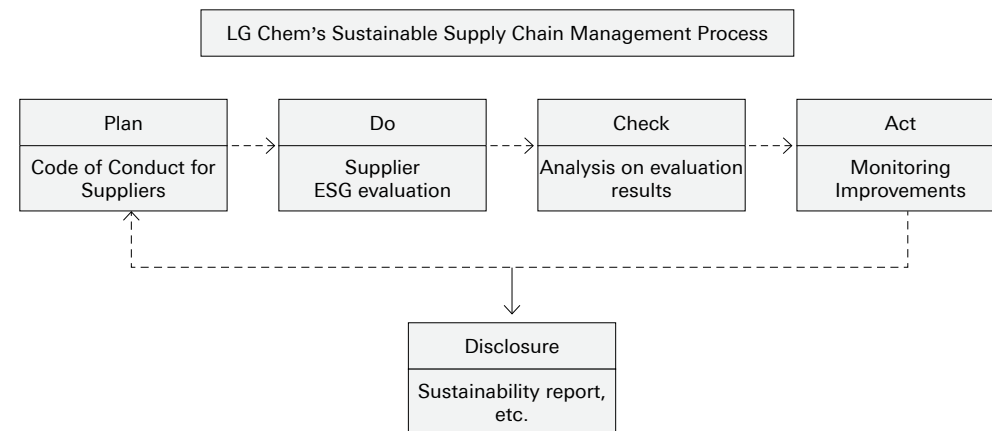
• Due diligence in the raw material supply chain

To secure the transparency of raw materials, LG Chem conducts due diligence on raw material suppliers within the supply chain. In particular, we conducted a third-party audit on cobalt refining and precursor suppliers in China in 2017, as well as due diligence on small scale mines in the Democratic Republic of the Congo (DRC), the world's largest cobalt producer, in 2018 to check on the status of child labor and transparency of suppliers. We have fully disclosed all our due diligence reports on the website.

• Global initiatives and community efforts

Human rights issues in the battery industry, such as child labor from cobalt supply chains cannot be solved by one company's efforts alone. In 2019, LG Chem joined the Responsible Minerals Initiative (RMI), a global mineral-related initiative, for the first time in the Korean battery industry, and established a cooperative system with global partners. Recently, we have stepped up and joined the Responsible Business Alliance (RBA) an upper-level consultative body of the Responsible Minerals Initiative (RMI), and we applied the RBA standards as well as other international guidelines recommended by the UN and OECD to build a system for managing our suppliers' ESG activities across value chains, including mineral producers.

• Supply chain management process and suppliers ESG evaluation



LG Chem conducts ESG evaluation to identify suppliers' potential ESG risks and statuses and form a sustainable supply chain. In 2021, we launched an ESG-oriented evaluation system within our supply chain management portal. The evaluation items include GHG emissions, energy reduction, safety and health, human rights, and ethics. We plan to modify those items to include more evaluation targets and enhance the document submission requirements in 2022. We also intend to audit high-risk suppliers according to the evaluation results through third-party agencies and undergo subsequent monitoring. We share the results with our suppliers and request them to manage risks through improvement measures as necessary. We plan to operate various supplier programs such as financing and system support and safety and health enhancement support in order to improve suppliers' ESG capabilities.

Activities for Responsible Supply Chain

2021

Established an ESG evaluation system for suppliers

To manage suppliers' ESG risks, we conduct ESG evaluations and boost their ESG capabilities by assisting them in formulating improvement measures based on the results.

2020

Enacted the Responsible Sourcing Policy

To strengthen commitment to responsible sourcing, we enacted Responsible Sourcing Policy and required all suppliers to sign the Code of Conduct for Suppliers.

2019

First Korean battery manufacturer to join RMI

To secure transparency and traceability over the entire supply chain, we joined RMI as the first Korean battery manufacturer.

2018

First Korean company to perform on-site audit on cobalt mines in the DRC

To ensure there is no human rights violation in our supply chain, we conducted a third-party audit in collaboration with our customer and supplier.

2016

Implemented the Code of Conduct for Suppliers

To fulfill our social responsibilities, we developed LG Chem Code of Conduct for Suppliers based on international norms, standards and legal requirements.



Dreaming of a sustainable and mutual growth

So-hee Nam, Specialist, Procurement Strategy Team

Specialist So-hee Nam at the Procurement Strategy Team shares her opinion on building a sustainability in supply chain with suppliers.

What are the roles of the Procurement Strategy Team? And what are your responsibilities?

The Procurement Strategy Team is involved in devising procurement strategies and managing procurement performance. We also standardize the standards and regulations of different divisions. Furthermore, we focus on managing risks in the supply chain in line with climate change, war, increasing oil prices, and other variables. I am particularly responsible for sustainability in procurement. I evaluate the suppliers' ESG levels and work to improve their capabilities according to the evaluation results.

What types of suppliers are there?

We can divide the suppliers into those involved in direct procurement and those involved in indirect procurement. Some of the suppliers in direct procurement include raw material suppliers, construction suppliers for installing new lines in plants, and equipment suppliers providing equipment or parts for plants. Among them, we give priority to direct procurement suppliers as part of our efforts to build a sustainable supply chain.

Has your procurement strategy changed significantly in step with the ESG trend?

We had focused on price, delivery, and quality of materials before. But now, we are facing growing demands for sustainability across the globe. **LG Chem also partners with companies supplying bio-SAP, PCR ABS, PCR PC, and other materials that are used for producing green products. We also strive to build a win-win supply chain by enhancing suppliers' ESG capacities. Our primary task is to form a friendly partnership with suppliers for sustainable growth.**

Please elaborate on the part of building and managing a sustainable supply chain.

We commenced a project last year and put up an evaluation system. We will be conducting regular evaluations for the first time this year. The project aims to assess the current position of our suppliers through an ESG evaluation. Based on the self-evaluations conducted by suppliers, we will categorize suppliers with potential to provide them with mutual growth programs or financial support to help them improve their capabilities.

What you're saying is that the suppliers will evaluate themselves. Could you please give us more details?

The evaluation will be divided into three stages. First, the suppliers conduct self-evaluations. Second, our team holds on-site inspections based on the results. Finally, we offer types, scope, and method of support and necessary improvement measures according to the findings.

If things go as planned, it sure will paint a big picture of mutual growth. But you may also encounter unexpected risks, given that each supplier has their own set of circumstances.

During a pilot test before forming it into it a formal project, we found that the environment section received the lowest score. Suppliers were in full compliance with the laws, such as the Labor Standards Act or the Minimum Wage Act, but it appears that legislations requiring carbon reduction, or the use of sustainable materials are not as essential to

them. Many small and medium-sized enterprises in our supply chain are under-equipped in this sense. **Suppliers may find it burdensome to install additional equipment, get assessments, or receive certificates to improve their environment. However, it is also my team's responsibility to find solutions to such issues.**

Please share us some tips on engaging in regular communication with the outside world.

Sadly, there isn't any. (Laughs) I just get a load of inquiry calls during performance appraisals. Some ask why evaluations are necessary, while there are some small companies saying that they cannot afford to do it. The most critical part is to persuade them to cooperate so that we may all share our interests and accomplish better results; the only way to do so is keep persuading them. Whenever I get calls, I explain the direction we should venture on together and the global trends. Whatever the situation is, I will stay committed to my job.

You must be aware of the importance of ESG as an evaluator.

In fact, I didn't know much about it before I took this position. I simply thought of it more like a volunteer or charity work. But as I continued my study in this field, I felt a sense of responsibility growing inside me. It inspired me to do better and make greater contribution to society, which is the main reason why I keep gaining knowledge and put into practice what I've learned.

Which team do you most frequently collaborate with in your line of work? Is there any team that you desperately want to work together?

Each division has a division level procurement planning team and a working level procurement team. I'd say I communicate the most with each division's procurement teams. Other than them, I also talk a lot with the Sustainability Strategy Team or CSR Team. Personally, I wish to communicate more with those that do the same jobs in our affiliated companies. Each company has different strengths, so I believe they have their own tactics and know-how. The more we hold communications with other departments, the more it would benefit us.

Before we end, what are your plans?

Our team's goal for this year is to carry out ESG evaluations to cover 70% of the domestic suppliers' procurement amount. We aim to cover 70% of the total procurement of both domestic and overseas suppliers by 2023, and 80% by 2024. Suppliers conduct ESG evaluations on their own, so the level of performance varies on their evaluation extent. It is essential to encourage their participation. Also, we are seeing a growing demand of expanding LCA or carbon emissions reduction plans to include the suppliers. This would be a quite challenging task as we will need to gather data from the suppliers. As primary steps, we will get suppliers' data by key item and gradually expand the scope of actual data.

People in LG Chem

Maximizing employee satisfaction through the enhancement of diversity, human rights, and talent development, and further building an ESG ecosystem that coexists with a wide range of stakeholders: This is the human capital management-focused organizational culture that LG Chem strives to achieve. To accomplish so, we shall begin by encouraging employee engagement.

Speak-up Table is a program that runs as part of LG Chem's efforts to improve its internal organizational culture. This is where employees present constructive direction to make a better company, a better working environment, and better welfare benefits with the CEO. In the past three years, about 1,500 employees attended the program for a total of 111 hours on 74 occasions. Changes brought by this event are found in every part of our organization. Our employees made huge contributions to creating more flexible policies, including internal hires (career transfer through internal hire), enhanced reporting/meeting culture, improved working hours (shortened work hours and flextime), extended scope of congratulations/condolences allowance, and repealed dress code policy. They also made a huge part in creating a smart workplace, such as the introduction of an online work collaboration tool and establishment of intensive workspaces and collaboration hub offices. Based on such changes initiated by our employees, we plan to continuously engage in various communication and attempts to instill a horizontal and flexible organizational culture.

Inclusion and Diversity

- **Recruitment activities for securing diverse talents**

LG Chem, as a global chemical company that interacts with customers from different cultural backgrounds, puts diversity first. We invest in strategic human capital management, for instance, securing a diversified pool of talents and helping them develop their skills. One of the best examples is our global recruitment activity called the "BC Tour (Business & Campus Tour)." During the tour, the CEO and key management visit major overseas cities to communicate with and interview outstanding local talents. This event involves a presentation of the company's vision and R&D progress, as well as talks with management, which includes the CEO, CTO, and Chief HR Officer (CHO). In addition, we host a "Tech Conference" where R&D talents pursuing master's and doctoral degrees in natural science and engineering at Korean universities and research institutes are invited to hear about the company's current innovative technologies and visions. We meet and interact with a wide range of talents in domestic and international scenes as our efforts to secure the most competent candidates.

- **Diverse policies for female talents**

Diversity and inclusion, as well as gender equality, are vital to LG Chem. First of all, we recruit individuals in accordance with our "gender irrelevance" policy that does not discriminate against candidates based on their gender. Additionally, we operate the "Systematic leadership enhancement program" for female leaders to help them create a career vision and roadmap. It is a program that teaches individuals how to gather strategies to achieve high performance and establish your own brand through relationships, cooperation, and agreements based on their understanding of internal and external environments, as well as awareness acquired through individual and group activities. Furthermore, we operate sexual harassment/ workplace bullying report centers and psychological counseling and legal/financial consulting programs. Likewise, we are devoted to nurturing a sound workplace culture and an environment where female employees can fully immerse themselves in their work.

- **Programs to foster talents in foreign corporations**

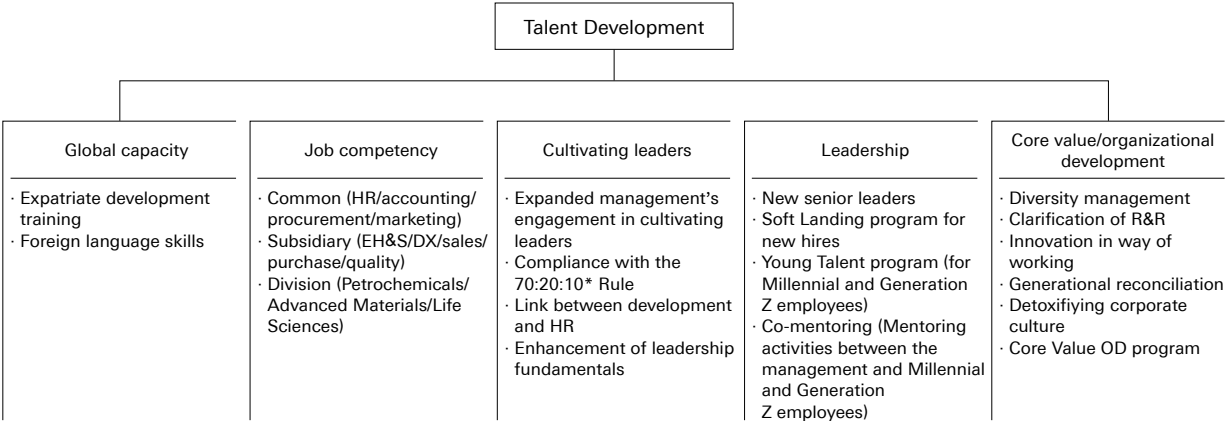
LG Chem operates global networks that include overseas subsidiaries, production sites, sales subsidiaries, and R&D centers in 18 countries worldwide. We respect the values of diversity, equity, and inclusion, and we contemplate how we may leverage these values to drive progress. Based on this responsibility, we realize our vision by developing a structured employee onboarding program for new hires, as well as various development courses and programs that assist our employees in stepping up as leaders. In addition, the "Global Mobility" program is a career development program for outstanding talents working in overseas subsidiaries. From 2022, we plan to operate the "Working Globally" training program to foster smoother cooperation between overseas employees and expatriates.

- **Prohibition of discrimination in accordance with the Human Rights and Labor Policy**

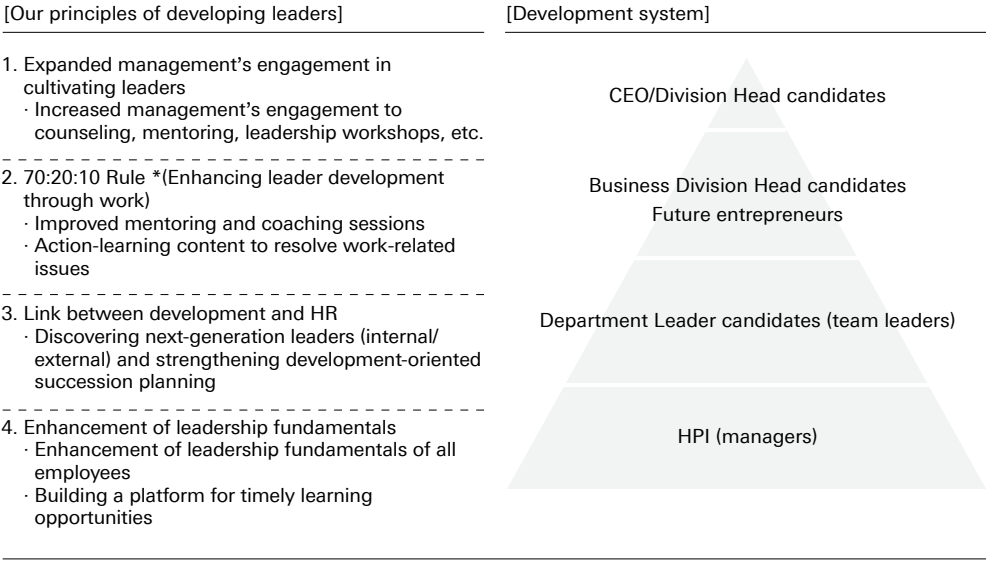
At LG Chem, we provide equal opportunities for recruitment, promotion, remuneration, and education in accordance with the Global Human Rights and Labor Policy. Therefore, we prohibit all kinds of discrimination based on gender, age, race, religion, union activity, disability, pregnancy, marital status, social status, and other forms, throughout our business activities, as well as in hiring processes. Going forward, we are diversifying our human resources by offering internship programs to foreigners studying in Korea. In order to contribute to a balanced regional development and lowering the youth unemployment rate, we also have programs in place for developing and recruiting talents in non-metropolitan areas.

Growth and Development

At LG Chem, we develop and support growth initiatives through which employees and the company can grow together under the belief of “human resource is the wellspring of unparalleled competitiveness.”



- Global talent development programs**
LG Chem offers global organizational competency building programs for employees at the contact points with customers abroad. Trainees learn the global standard work process, presentation and negotiation skills, and business manners, among others, as well as improve their foreign language skills in a long-term training camp. In addition, we send employees to take global MBA courses at top universities in and out of Korea and run local experts programs as part of our efforts to bolster our global organizational capability and execution power.
- Fostering key talents**
We never cease to seek and systematically develop talents with business execution capabilities and leadership to assist them in leading the future market.



*70:20:10 model: A theory that suggests that individuals obtain 70% of their knowledge that affects organizational performance and individual growth from job-related experiences, 20% from mentoring/coaching activities, and 10% from formal educational events.

- Junior development programs**
In September 2021, LG Chem held the Young Talent Hackathon, a company-wide contest where the Millennial and Generation Z employees propose ideas for future markets. The finalists learned the latest trends and how global companies pursue innovation in their way of working, and they were given the opportunity to develop business plans with the help of experts in diverse fields. For about four months, five teams engaged in training, defining tasks, deriving solutions, developing and verifying prototype products or services, devising a business plan, and giving a final presentation. They used a metaverse (a three-dimensional virtual world) platform to present their final business plan, in which executives for product planning provided them with feedback.

Well-being

- Physical and mental health**
LG Chem's psychological counseling program is intended for promoting the mental health of our employees. We also offer phone call and text message counseling services open 24 hours a day. Furthermore, we financially aid employees' comprehensive health check-ups to ensure their physical well-being.
- Organizational culture free of workplace bullying and discrimination**
LG Chem operates a Workplace Bullying Report Center, where a filed report undergoes a swift process of verification, investigation, and disciplinary actions. Based on our intention to create an organizational culture free of bullying and discrimination, we disseminate messages through various channels, including Town Hall meetings and leadership workshops for executives and managers.
- Work and life balance**
LG Chem puts priority on taking actions to nurture a corporate culture that respects employees' work and life balance. In 2018, we adopted a “flextime” system to be observed by all office and technical workers, as well as a selective working hour system, where an employee can choose his/her working hours not less than 40 hours a week on average and 52 hours maximum. Weekday overtime that exceeds the monthly maximum and weekend overtime is paid with 1.5 hours of leave for every extended work hour. This policy ensures that our employees are guaranteed time-offs after long hours of work. We also financially support our employees and their families in a variety of ways, such as giving shortened work hours for pregnant employees or employees who are the main carer of a child, as well as gifts for childbirth. As such, we will further improve our organizational culture that contributes to boosting employees' energy.

Refer to the interview on p. 76

Believing that we can make a change for the better

Young Choi, Specialist, Corporate Culture Transformation Team

Take a glance at the efforts of the Corporate Culture Transformation Team that promotes communication between the Employees and the Management.

What are the roles of the Corporate Culture Transformation Team?

The Corporate Culture Transformation Team is in charge of nurturing a workplace where employees find it pleasant to work in, and developing a corporate culture that supports business activities. In the team, I am responsible for communications activities, such as the Speak-up Table with the CEO and Town Hall meetings, as part of the company's "The Better Company" project for improving employee growth, welfare, and training. In terms of diversity and inclusion, we are working to ensure that no one is discriminated against based on his/her race, gender, or religion.

Are there trends in organizational culture?

Yes, certainly. Business-oriented organizational culture and play-oriented culture, which emphasized fun at work, are some of the past trends. The current trend is making a "good company to work for." I believe the boundaries between trends are now vague.

Your organization must have gone through a lot of changes since the COVID-19 pandemic.

The pandemic was a tragedy, but it was also a period during which we could make different attempts in terms of organizational culture. We adopted the telecommuting and flextime policies, as well as online meetings. With the disappearance of spatial and temporal restrictions, employees were granted more opportunities to voice out their opinions. We got staggering 2,100 comments during our recent Town Hall meeting. Can you imagine that? This would have been impossible if the event was held offline. I believe this online meeting encouraged employees to voice their opinions. The company switched the Speak-up Table program to online as soon as the COVID-19 pandemic broke out. The event has now become even more active, thanks to the relaxed atmosphere it suggests. In fact, we are getting more candid and practical comments compared to when the program was held offline.

Was there any memorable feedback?

I remember someone saying that the company seems to be changing. It made me feel as if our team's efforts to bring about changes were acknowledged. Due to the nature of corporate culture, it is quite challenging to observe immediate results or instant improvements and feedback. I, too, sometimes wonder if we're on the right track. But positive feedback makes me feel overjoyed.

Please give us brief introduction about a project that was well-received and meaningful.

Our "Female Talent Development Program" matches female employees with leaders so that they do not miss out on career opportunities. Every year, we place three to five female employees per coach, and they talk about their career concerns and form female employee communities. I find it a meaningful project as it is well-received, and employees find it satisfying. There is also the Purse Survey that is conducted more casually and regularly. The survey asks questions like, "When do you think you are appreciated at work?" and we get around 25% response rate. This is quite a remarkable figure, considering that this is a survey conducted every two weeks.

The majority of the present projects are focused on the environment (E), but the importance of social (S) and governance (G) is growing as well.

Our team is strongly associated with the "social" part. I believe that laying the foundation where employees of different races, genders, and languages can work as one "company" suggests a positive direction for corporate development. To that aim, we are attempting diverse strategies, such as increasing foreigner recruiting and expanding core value-related platforms and organizational culture development programs that were previously limited to domestic sites to overseas subsidiaries. Global companies nowadays respect diversity in all aspects, including religion and gender identity. Our role here is to build an organizational culture where individuals can work freely without any hindrance to their identities. And to make this happen, I believe it is crucial to gradually eliminate hurdles standing in our way.

What would be essential to achieve your goal?

In my opinion, the overall awareness, like the direction that the organizational culture suggests or catchphrases, is showing some improvements, but we still have a long way to go in terms of maturity. Maturity here may refer to employee's "attitude" in communication and engagement, or the company's "attitude" in quickly responding to the voices of employees to ensure smooth communications. Our next goal would be to create a chain of feedback so that we can encourage more mature engagement and communication. Also, it is crucial to carry out ESG management and take specific actions. I believe we should take the role of informing the public of how we are influencing the society, rather than merely telling them about the changes we have made. I am planning to broaden my studies in this field.

The most fundamental and essential factor would be one's attitude, which cannot be easily changed.

It's true that employees should also put forth the effort, but the company should be at the forefront. One of such efforts is giving confidence. The biggest barrier in communication is the assumption that 'nothing will change even if I raise my voice.' It is the company's responsibility to gain trust from its employees and encourage them to voice out their views, whereas employees should be aware that positive thinking will return them with quicker feedback rather than negative thinking.

Has your personal character changed after taking this role? Or did you get any work-related habit?

My position involves talking in front of many people in several events. I used to be a very introverted person, so approaching people first was never something I enjoyed doing. But now, I just love talking with anyone. Am I talking too much? Should I stop here? My friends keep telling me that I'm too talkative. (Laughs)

Before we end, what is a good company to you?

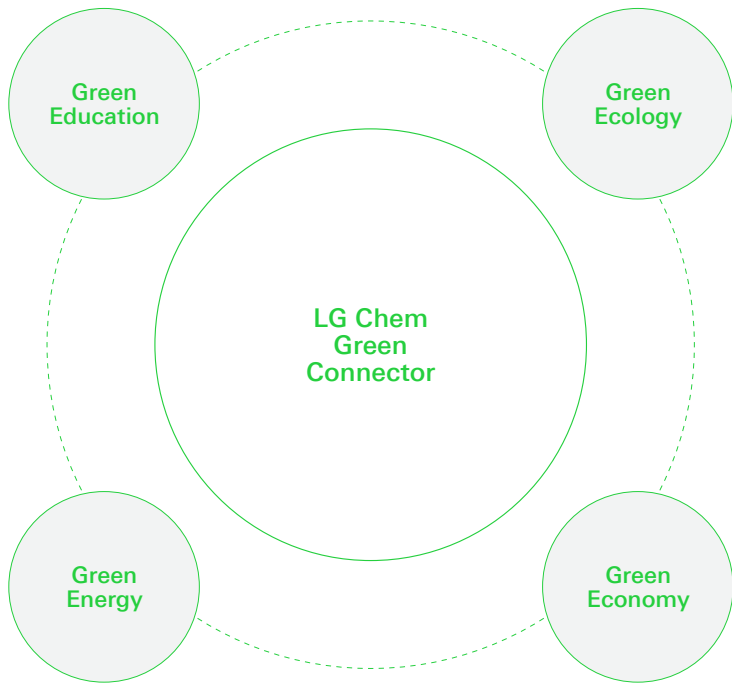
Our Department Leader always reminds us of this: "A company that no longer needs a Corporate Culture Transformation Team makes it a good organization." I'm not sure if this day will ever come, though. (Laughs) For me, we must develop into a company that doesn't require any extra activities or inspections. In that sense, our team will try our best until the right time comes.



Green Connector

At LG Chem, we are committed to providing innovative products and high-quality services while raising social and environmental values. We believe that corporations can move forward when society and the economy grow together.

Based on our belief, we have established a social contribution slogan called “LG Chem Green Connector,” which expresses our commitment to connect social contribution activities with green values such as delivering environmental values across society and human life. Based on this, we are promoting diverse social contribution projects under the names of Green Education, Green Energy, Green Ecology, and Green Economy.



Green Education

- Like Green**
“Like Green”, meaning ‘the friends who like the green earth’ is one of LG Chem’s online social contribution activities that guides teenagers and college students who are interested in science and the environment through mentoring programs and environmental education. “Like Green” which develops global leaders in the ESG sector, holds Green Concert, during which participants share their impressions of the online lectures and mentoring sessions, Green Festival, where science and environmental experts provide public lectures for anyone who is interested, and Green Class, that provides ESG education (using videos or workbooks) to public schools and daycare centers.

LG Chem was nominated for the Donation for Education Award in 2021 and received the Education Minister’s Commendation for continued contribution to the revitalization of educational donations, including “Like Green”, “Chemistry Camp,” and “Chemistry Park.”

About	Cumulative	Cumulative	Total
120 persons	9,698 views	59,313 views	490 institutions
College students, children and youth who took mentoring sessions	Green Concert video	Green Festival video views	No. of institutions that applied for Green Class; 31,320 children/youth benefited from the education

Green Ecology

- Preserving biodiversity on Bamseom**
LG Chem engages in a variety of social contribution activities in efforts to safeguard biodiversity, which is emphasized in the UN Sustainable Development Goals (SDGs). As part of this, we are preserving the ecological value of Bamseom, a Korean island designated under the Ramsar Convention on Wetlands (an international treaty that acknowledges the value of preserving a habitat with unique biological or geographical features or a place inhabited by rare fauna/flora). We launched an employee volunteer group called “Green Maker” in 2017, built the Bamseom Ecological Experience Center and offer biodiversity education at local children’s centers.

Green Energy

Refer to the interview on p. 82

- **Hope Green Power Plant**
LG Chem promotes the Hope Green Power Plant project with local governments and NGOs. This is a 20-year long project of generating and selling renewable power using solar panels, and using its profits (KRW 62 million a year) for youth scholarships and for heating supplies and expenses for energy-marginalized groups. The Hope Green Power Plant has been in operation since 2018. As of 2021, 100 students benefited from the scholarship program, and we covered the heating bills of and provided heating supplies to 3,481 marginalized households. The plant generates approximately 2.85 million kWh, which is equivalent to 1,330 tons of carbon emissions reduction, or planting 160,000 young pine trees.

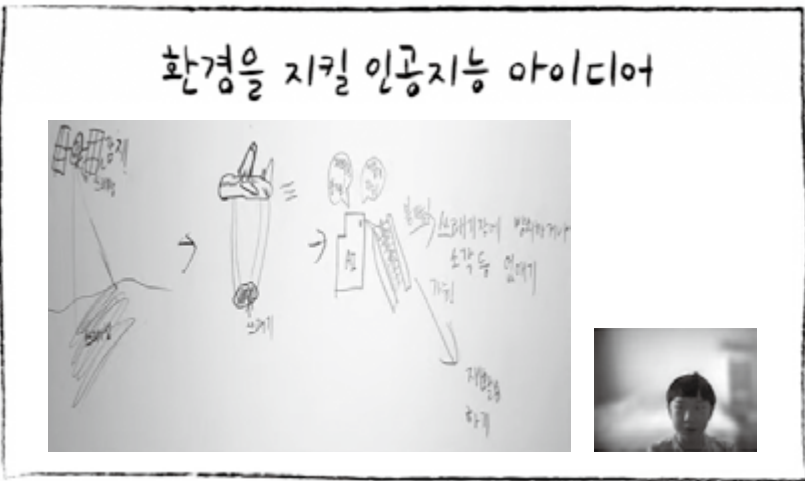
Green Economy

- **LG Social Campus**
LG Chem operates LG Social Campus with LG Electronics to discover social economy enterprises and support their growth. LG Social Campus is an integrated socioeconomic platform that provides support in a wide range of areas, such as finance, office space, growth, and talent development, so that social enterprises in the specializing in environmental business can lay a solid foundation for further development. Here NGOs, governments, and companies set up a common goal of creating a “social economy,” and generate shared values to address social issues. Since its beginning in 2011, LG Social Campus has raised KRW 15.8 billion of funds until 2021 and incubated 160 social fellow companies. We also provided offices and conference rooms to 70 social enterprises, and a total of 3,223 individuals benefited from the talent development program.
- **ESG practice and donation challenge app**
LG Chem launched the “RZ?” app, an ESG practice and donation challenge app, on January 10, 2022. RZ stands for “RE:ACT TO ZERO,” which calls for joint response and action to bring social conflicts, imbalances, and environmental issues to zero. **The RZ? app helps public to easily understand and practice ESG in their daily lives, and leads the way in resolving social problems and building a sustainable environment and society by connecting them to donations to areas in need.** 10,000 users joined the service within three months of its release. As of June 2022, more than 16,000 users completed a wide range of quests, including uploading photos of green products, solving OX quizzes on bio materials, and posting reviews for green consumption. The total donation amount was KRW 347 million. It will be used for more than 20 purposes, including rehabilitation costs for marginalized youths, providing heating supplies, saving trees along the streets, preparing meals for elder patients with chronic conditions, offering sports facilities and equipment for children with developmental disabilities, and providing emergency support for victims of wildfires in Uljin-gun, Gyeongsangbuk-do.

Member	Contribution	Participation
16,519	KRW 381 million	9.25 million



Online Mentoring Program
An online mentoring program in which 100 children and adolescents interested in science and the environment grow into global leaders in the ESG field with 20 university student mentors.



Green Concert
Online presentation of what teenagers and college student mentors who participated in the online mentoring program “Like Green” have learned and achieved for a month.



Green Festival
Online cultural program with lectures by experts in the field of science and the environment, for teenagers and the general public

Our commitment in CSR activities for better community

This is an interview of In-seong Bae from the Corporate Affairs Team who strives to support more residents and protect beautiful nature in Yeosu.

Please tell us about the CSR activity that you participated this morning.

I just got back from there. As you can see, the industrial complex is surrounded by villages and nature. The majority of residents are seniors. We run a wide range of programs for residents, and today, we held a program to provide free reading glasses to seniors. Almost 150 residents were present at the event.

It sounds like quite a satisfactory engagement rate.

There are about 5,000 residents living in five villages in this area. This type of event is usually co-organized with a local welfare facility or community center. I suppose this is the reason why our programs are well-publicized. With the information and know-how shared with us by the partnering agencies, we can provide customized programs in consideration of the relative levels of income.

Yeosu Plant has a long-standing CSR history, and the first social volunteer group in the Yeosu National Industrial Complex was established in 1996.

That's right. The Yeosu Industrial Complex is a cluster of several companies, and every one of them is engaged in social welfare activities. Most of LG Chem's welfare projects are associated with the word "hope." We use names like Hope Box and Hope Smile, to express our intention to differentiate these from other programs. Based on the satisfaction rate of the beneficiaries, the projects seem to be going well as intended. This is how we have been engaging in decade-long projects.

What is your most memorable project?

It has been less than three years since I joined the company, but among the projects I have been working on, "Hope Box with Dreams" was the most memorable project. We packed feminine hygiene products for around 500 underprivileged youths and wrote them messages of hope. The best part was when the children sent us messages through their welfare centers, saying how grateful they were to be benefited from the program. As it was a joint CSR program in which all LG Chem members aided in packing supplies, this project not only satisfied the underprivileged youths but also our company's employees and the management.

It seems that coming up with brilliant ideas for each project is crucial in your team.

All the members of the team get together and brainstorm new ideas to come up with a project concept. It is crucial to understand what the latest issues and trends are. Nowadays, we prioritize "eco-friendliness" on top of supporting seniors, youths, and low-income families in planning our projects. With the Yeosu Plant Social Volunteer Group declaring "Green Connector" as its new mission, we seek CSR activities that may lead to connecting to environmental values in diverse areas.

Tell us about your contributions as a Green Connector.

We have roughly 150 coffee machines in our Yeosu Plant alone, and we collect 10 tons of coffee grounds every year. This motivated us to launch a project to supplying coffee grounds to nearby villages, which then will be used as

fertilizer. The project significantly benefits seniors engaging in agriculture and in creating a virtuous cycle of resources. We also have this project called "Fly, Dirt Ball" to raise environmental awareness among local youths. This involves children making small balls of dirt using EM bacteria, which are used to purify local streams. Kids throw the balls they have made into streams that are heavily infested with algae. Our aim is to continuously develop fascinating projects by interacting with relevant and cooperative organizations.

Is there a reason why your team is particularly engaging in Green Connector activities?

The main reason is that the company has emphasized ESG from the top-management level, and that the message was delivered to various departments in an integrated manner.

Do you have any plans for Green Connector activities?

Although it is still in the planning stage, we are preparing to conduct beach cleanup activities together with the YMCA Youth organizations. Yeosu being a coastal city, it is something that we can do to contribute to the society. We are seeking ways to make donations to the energy-marginalized groups, such as by converting the distance walked along the coastal area to collect trash, into money. We are also preparing to provide environmental education opportunities to youth, as we believe it is important to raise their overall awareness of the value of the environment. There are about 40 support centers for children from low-income households in the city. Our plan is to encourage them to make YouTube videos, and we intend to host a YouTube environment contest at local children's centers.

Did you face any obstacles or hardships when participating in CSR activities?

We try our best to provide support to as many people as possible, but there are still blind spots in our coverage that we cannot reach. In this framework, we hope to act as a liaison between welfare centers, senior welfare centers, children's centers, YMCA, YWCA, local fire departments, and police stations by helping them achieve their objectives according to their plans.

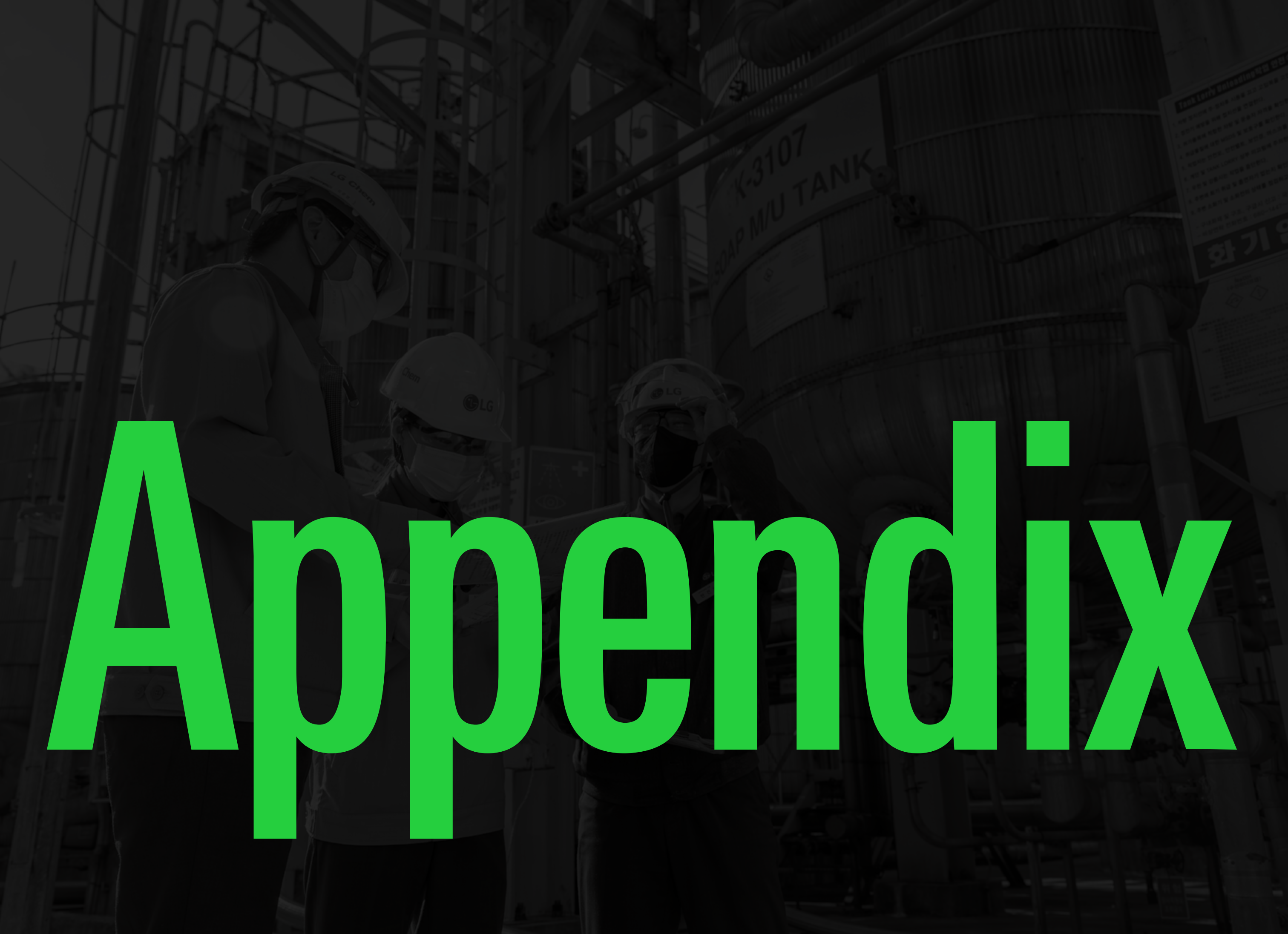
Does the fact that you were born in Yeosu provide you any advantages?

Volunteering makes everyone feel honored, but for me, it motivates me even further to make my hometown a better place. I used to visit different facilities in the city to volunteer as a student, and now visiting the places once again as a project manager gives me more of a sense of burden and responsibility. This still makes my job fun at the same time. It brings back so many wonderful memories.

Do you feel that engaging in such activities changes you in any way?

It occurred to me that CSR activities could enhance our company's productivity. They can also encourage employees to feel honored to be members of such an inspiring company. If we keep building these small changes, we can make big changes.





Appendix

Our History and Commitments

- 2007

Published the first sustainability report
- 2014

Joined the UN Global Compact (UNGC)
- 2019

Issued USD 1.56 billion global green bonds for the first time in the global chemical industry

Joined the Responsible Minerals Initiative (RMI)
- 2020

Declared 2050 Carbon-neutral Growth

Joined the World Economic Forum (WEF)

Joined the World Business Council for Sustainable Development (WBCSD)

Joined the Global Battery Alliance (GBA)
- 2021

Announced plans to perform life cycle assessment (LCA) for all products

Issued USD 1 billion global green bonds

Announced plans to invest KRW 10 trillion in three new growth engines by 2025
- 2022

Declared 2050 Net-Zero

Joined the Ellen MacArthur Foundation (EMF)

Committed to the Science Based Targets initiative (SBTi)
- 2023

Complete LCA for all products
- 2030

Complete 100% transition to renewable energy in overseas business sites
- 2050

Complete 100% transition to renewable energy in all global business sites and achieving 2050 Net-Zero

Memberships and Recognitions

Global Memberships



Recognitions

	Listed on the 2021 MSCI Korea ESG Leaders Index
	Listed on the 2021 S&P DJSI Asia-Pacific & Korea Index
	Scored A- on 2021 Climate Change and A- on 2021 Water Security
	Rated B+ on 2021 KCGS ESG Ratings
	Rated Medium Risk by 2021 Sustainalytics

ESG Key Indicators

Key Indicator Development

Sustainability is one of the core values in achieving LG Chem’s vision, “We connect science to life for a better future.” LG Chem has selected key ESG indicators to strengthen company-wide ESG implementation, and is actively introducing them into corporate management. Through the analysis of indicators from ESG reporting frameworks, ESG rating agencies, and peer industry, we consolidated 20 indicators that are most material to corporate sustainability. Based on the concept of “stakeholder capitalism” proposed by the WEF, our key ESG indicators are classified into four categories: Environment, Social, Governance (ESG), and Growth. Furthermore, LG Chem seeks to align ESG performance disclosure to global sustainability disclosure standards by keeping a list of indicators that may arise as potential issues in the global sustainability arena. We will continue to practice Sustainability for the environment, society, and customers sincerely, and promote transparent communication of its progress.

ESG Performance Disclosure

To keep pace with the rapidly evolving global regulatory landscape of ESG disclosures, LG Chem strives to disclose ESG Performance Data with consistency and integrity. In this regard, we comply with the general principles of ESG disclosure (Accuracy, Clarity, Comparability, Balance, Verifiability, and Timeliness) set out in the ESG Information Disclosure Guidance proposed by Korea Exchange. We disclose our ESG Performance Data by adopting the “Reporting on enterprise value - illustrated with a prototype climate-related financial disclosure standard” methodology developed by five leading sustainability and integrated reporting organizations—Carbon Disclosure Project (CDP), Climate Disclosure Standards Board, Global Reporting Initiative (GRI), International Integrated Reporting Council (IIRC), and Sustainability Accounting Standards Board (SASB)—based on the Task Force on Climate-related Financial Disclosures (TCFD) recommendations.

Reporting Scope and Boundaries

This report covers LG Chem’s performance data in FY 2021 collected from headquarters and sales offices, 35 domestic and global production sites, and R&D campuses. Data of LG Energy Solution and FarmHannong have been excluded from the report since 2019. *Financial statements have been written in accordance with the K-IFRS Consolidated Financial Statement Standards. Statements with different reporting scopes have been expressly stated otherwise.

Metrics and Targets

Summary and target for each metric reflects the definition of ESG indicator as described by the CDP, GRI, SASB, TCFD, and S&P Global Corporate Sustainability Assessment.

(E) Environment

(S) Society

(G) Governance

(G) Growth

Key Indicator	Summary and Target
(E) Greenhouse Gas Emissions Reduction	Chemical company’s greenhouse gas (GHG) emissions are classified into three scopes: direct emissions that occur from sources that are controlled or owned by an organization (Scope 1); indirect emissions associated with the purchase of electricity, steam, heat, or cooling (Scope 2); and other indirect emissions from assets not owned or controlled by the reporting organization (Scope 3). We plan to manage and reduce Scope 1, 2, and 3 emissions through preemptive identification of risks and opportunities associated with GHG emissions and setting reduction target.
Energy Consumption Reduction	Total energy consumption includes both direct energy (energy consumption during operation) and indirect energy (energy purchased or acquired), and renewable energy includes self-generated renewable energy and purchased renewable energy. We will strive to actively reduce energy consumption by improving energy efficiency in all manufacturing processes and increasing the proportion of renewable energy.
Water Withdrawal, Consumption and Discharge	As water scarcity aggravates, the importance of water resource management continues to rise. In this regard, we manage the amount of withdrawal, consumption, and discharge of water used in cooling, steam generation, and raw material processing during the manufacturing process. Furthermore, we intend to identify and minimize withdrawal from water-stressed areas.
Water Pollutants Reduction	In order to return the water used during the manufacturing process to the aquatic ecosystem, we strictly comply with permissible limits of water pollutants discharge and tightly monitor effluent water quality. We intend to minimize the discharges of water pollutants into aquatic ecosystems by measuring the discharges of chemical oxygen demand (COD), total nitrogen (TN), total phosphorus (TP), and suspended solids (SS); tracing the cause and the related impacts of discharge; and conducting regular inspections on wastewater discharge facilities.
Air Pollutants Reduction	Air pollutants generated through fuel combustion during the manufacturing process can impact our health and environment, hence we strictly comply with permissible limits of air pollutants emissions and tightly monitor air quality standards. We intend to lessen the emissions of air pollutants into the air by measuring the emissions of dust, NOx, SOx, hazardous air pollutants (HAPs), and volatile organic compounds (VOCs); tracing the cause and the related impacts of emissions; and conducting regular inspections on emission facilities.
Waste Discharge and Recycling	Wastes generated from business sites include general (nonhazardous) waste and designated (hazardous) waste. In addition to disposing wastes through legitimate means, we manage wastes based on different methods of treatment to reduce waste generation and increase the recycling rate. Waste treatment is classified into four types: recycling, incineration with heat recovery, incineration, and landfill. We analyze wastes directed to incineration and landfills, and strive to maximize the amount of waste recycled.
Product Responsibility and Chemical Stewardship	Since chemical substances may pose risks during use, storage, and transportation, we evaluate risks that may arise from hazardous chemical substances, and maintain a database of products containing hazardous substances. We are continuing our efforts to reduce the use of hazardous substances or replace them with less hazardous chemicals. We actively carry out LCAs to analyze our products’ environmental impacts and identify areas for improvement.
Reused and Recycled Materials	In accordance with the obligation to reduce and recycle waste, we continuously monitor the input of reused and recycled raw materials processed by mechanical and chemical recycling, as well as the volume of products based on reused and recycled materials. We plan to actively expand the input of reused and recycled raw materials, and thereby increase the production volume of products based on them.
(S) Employee and Process EH&S	As chemical manufacturing is exposed to heavy equipment, hazardous substances, and high temperatures and high pressure, employee and process safety is of paramount importance. We have expanded the scope of EH&S management not only to employees but also to include employees of our in-house subcontractors. We operate EH&S policy and conduct regular facility inspections to prevent safety incidents. In the event of unforeseen incidents, we transparently disclose the number of EH&S incidents occurred.
Employee Diversity, Equity and Inclusion	We can promote work efficiency and improve job performance through fair treatment and inclusion of employees with diverse backgrounds and perspectives. We identify the diversity of domestic and global employees by gender, region, age, and job groups, as well as the ratio of management and executive positions in consideration of diversity. We monitor as well the equity of remuneration.
Talent Attraction, Training and Employee Engagement	To attract and develop talents of diverse backgrounds, we monitor the employee hires and turnover by age and gender, and provide leadership and job training in addition to statutory training. Going forward, we plan to expand the development and implementation of various programs in an effort to secure and nurture human resources and enhance employee engagement, and thus advance our competitive edge.
Human and Labor Rights	We conduct risk assessments for labor and human rights, such as prohibition of child labor and protection of minors, voluntary employment and labor, freedom of association and collective bargaining, non-discrimination and respect for diversity, compliance with working hours, and fair remuneration. We plan to expand training on labor rights to raise employee awareness on the topic.
Supply Chain Sustainability	Issues arising in the supply chain, including but not limited to labor rights, resource depletion and anti-corruption, are regarded as shared responsibility of all companies in the supply chain, hence identifying and improving such issues has become a competitive advantage for companies. We plan to reinforce our supply chain sustainability and partnership with suppliers through ESG assessments and on-site inspections.
Community Engagement	We engage with local communities through employment opportunities and regional development, as well as employee volunteering and partnership programs. We intend to reinforce our environmental and safety management, pursue active interaction with the local community, and continue to uphold our responsibilities as a community member.
(G) Corporate Governance	A board of directors with independence, expertise, and diversity is essential to ensure effective and active corporate governance. Since the BOD is responsible for corporate policies and overall performance, we plan to establish a global governance system and internalize a BOD-centered management system through empowerment and capacity building.
Corporate Behavior and Ethics	We conduct regular inspections on corruption and bribery, and handle identified cases through disciplinary actions and/or legal procedures. Furthermore, we provide training on corporate ethics and fair trade to raise awareness and prevent recurrence. We plan to devise policies and strategies for corporate and employee behavior and ethics, and extend them to all business sites.
Cybersecurity and Information Security	We conduct risk assessments on cybersecurity and information security, and raise employee awareness through information security training. Information leakage occurs in various forms, such as leakage of core assets of a company as well as customer data. In this regard, we plan to establish a company-wide management system to securely collect, use, and manage information relevant to corporate processes.
Public Policy and Regulation	Changes in public policy and regulation greatly influence corporate business, hence we report related issues and measures to the management on a regular basis. We continue to seek public-private partnerships by identifying policy support and promoting government proposals.
(G) Sustainable Solutions	We established Sustainable Solutions as internal standards of classifying products with distinguished social and environmental values in terms of sustainability. We not only consider product characteristics such as bio materials and recycled materials, but also the social and environmental characteristics throughout the value chain, such as water consumption during manufacturing. We will continue to expand R&D investment and achieve sustainability competitiveness.
Customer Satisfaction	We reflect a customer-centered approach as a top priority across all our business processes, and identify improvement tasks through a customer satisfaction survey. We intend to foster a customer/market-oriented culture by monitoring customer pain points, and to meet customer expectations through active communication with customers.

ESG Performance Data

Environment

Greenhouse Gas Emissions	Unit	Scope	2019	2020	2021
GHG Emissions (Scope 1 + Scope 2)	tCO2e	Global	9,510,011	9,532,948	10,339,725
		Korea	8,140,033	8,071,712	8,841,025
		excl. Korea	1,369,978	1,461,236	1,498,700
GHG Emissions Intenstiy (Scope 1 + Scope 2)	tCO2e/KRW 1M	Global	0.5187	0.5536	0.4296
Scope 1 Emissions	tCO2e	Global	5,405,608	5,395,112	5,856,588
		Korea	5,260,041	5,199,836	5,707,208
		excl. Korea	145,567	195,276	149,380
Scope 1 Emissions Intensity	tCO2e/KRW 1M	Global	0.2948	0.3133	0.2433
Scope 2 Emissions	tCO2e	Global	4,104,403	4,137,836	4,483,137
		Korea	2,879,992	2,871,876	3,133,817
		excl. Korea	1,224,411	1,265,960	1,349,320
Scope 2 Emissions Intensity	tCO2e/KRW 1M	Global	0.2238	0.2403	0.1863
Scope 3 Emissions ¹⁾	tCO2e	Korea	1,081,852	1,209,828	1,320,247
- Purchased Goods & Services			494,538	517,985	571,164
- Capital Goods			54	14	56
- Fuel- and Energy-related Activities			122,922	121,904	175,732
- Upstream Transportation			151,406	318,438	197,919
- Waste			19,113	19,679	28,925
- Business Travel			2,767	2,265	970
- Employee Commuting			7,987	4,737	7,488
- Investments			276,686	219,190	322,438
- Other Upstream			6,379	5,616	15,555

1) Scope 3 emissions have been calculated for operations within Korea, on relevant categories of GHG Protocol's Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2011)
* Scope 1 and Scope 2 emissions in Korea in 2020 have been revised in accordance with the verification outcomes of the Ministry of Environment
* Scope 1 and Scope 2 emissions in Korea in 2021 have been reported in accordance with the GHG Statements submitted to the Ministry of Environment; the data is subject to change depending on the verification outcomes
* Emissions calculations for some Scope 3 categories have been adjusted based on updated methodology

Energy Consumption	Unit	Scope	2019	2020	2021
Total Energy Consumption	TJ	Global	168,090	162,234	178,426
		Korea	159,327	152,411	169,105
		excl. Korea	8,763	9,823	9,321
Total Energy Consumption Intensity	TJ/KRW 1M	Global	0.0092	0.0094	0.0074
Direct Energy Consumption	TJ	Global	99,496	98,532	109,049
		Korea	96,964	95,049	106,349
		excl. Korea	2,532	3,483	2,700
Direct Energy Consumption Intensity	TJ/KRW 1M	Global	0.0054	0.0057	0.0045
Indirect Energy Consumption	TJ	Global	68,594	63,702	69,377
		Korea	62,363	57,362	62,756
		excl. Korea	6,231	6,340	6,621
Indirect Energy Use Intensity	TJ/KRW 1M	Global	0.0037	0.0037	0.0029
Total Renewable Electricity Consumption	MWh	Korea	1,426	1,760	344,528

* Direct and indirect energy consumption in Korea in 2020 have been revised in accordance with the verification outcomes of the Ministry of Environment
* Indirect energy consumption overseas in 2019 and 2020 have been revised to reflect updated data from production sites

Water	Unit	Scope	2019	2020	2021
Water Withdrawal	m³	Global	69,559,329	61,207,704	66,881,345
- Groundwater			548,051	501,077	431,327
- Surface water			609,695	-	-
- Industrial Water			61,379,578	52,917,433	59,128,641
- Municipal Water			6,947,778	7,773,729	7,307,267
- Rainwater			12,857	8,714	6,467
- Other			61,370	6,751	7,643
Water Withdrawal Intensity	m³/KRW 1M		3.7936	3.3381	3.6475
Water Consumption	m³		50,070,305	41,252,742	45,309,082
Water Consumption Intensity	m³/KRW 1M		2.7307	2.2498	2.4710
Water Discharge	m³		19,489,024	19,954,962	21,572,263
Water Discharge Intensity	m³/KRW 1M		1.0629	1.0883	1.1765
Wastewater Recycling	m³		1,770,024	1,869,328	2,135,019
Wastewater Recycling Rate	%		8.33	8.57	9.01

* Data of 2019 and 2020 have been revised due to changes in data coverage (includes data from water and wastewater not subject to legal reporting)

Water Pollutants	Unit	Scope	2019	2020	2021
COD	Metric tons	Global	883	738	734
COD Intensity	kg/KRW 1M		0.0482	0.0429	0.0305
TN	Metric tons		316	276	308
TN Intensity	kg/KRW 1M		0.0172	0.0160	0.0128
TP	Metric tons		57	41	49
TP Intensity	kg/KRW 1M		0.0031	0.0024	0.0020
SS	Metric tons		344	366	301
SS Intensity	kg/KRW 1M		0.0188	0.0213	0.0125

* Data of 2019 and 2020 have been revised due to changes in data coverage (includes data from water and wastewater not subject to legal reporting)

Air Pollutants	Unit	Scope	2019	2020	2021
Dust	Metric tons	Global	164	123	168
Dust Intensity	kg/KRW 1M		0.0089	0.0071	0.0070
NOx	Metric tons		998	876	4,144
NOx Intensity	kg/KRW 1M		0.0544	0.0509	0.1722
SOx	Metric tons		172	142	181
SOx Intensity	kg/KRW 1M		0.0094	0.0082	0.0075
HAPs	Metric tons		99	238	274
HAPs Intensity	kg/KRW 1M		0.0054	0.0138	0.0114
VOCs	Metric tons		278	580	956
VOCs Intensity	kg/KRW 1M		0.02	0.0337	0.0397

* Data of 2019 and 2020 have been revised due to changes in data collection methodology (based on actual emissions)
* Reported data of some air pollutants have increased in 2021 due to new factories and the revision of the Clean Air Conservation Act

Waste	Unit	Scope	2019	2020	2021
Total Waste Generated	Metric tons	Global	253,127	227,152	266,065
Total Waste Intensity	Ton/KRW 1M		0.0138	0.0132	0.0111
Nonhazardous Waste	Metric tons		129,697	109,393	144,390
- Recycling			82,446	76,118	106,420
- Incineration with Heat Recovery			9,230	7,753	14,242
- Incineration			17,321	16,505	12,797
- Landfill			20,700	9,017	10,931
Hazardous Waste			123,430	117,759	121,675
- Recycling			68,270	62,914	70,672
- Incineration with Heat Recovery			27,362	31,160	33,529
- Incineration			25,772	22,691	16,321
- Landfill			2,026	995	1,153
Waste Reycling Rate (excl. incineration with heat recovery)	%		60	61	67
Waste Reycling Rate (incl. incineration with heat recovery)			74	78	85

* Data of 2019 and 2020 have been revised due to changes in data coverage (includes data from wastes not subject to legal reporting)

Hazardous Substances	Unit	Scope	2019	2020	2021
REACH ¹⁾ Annex 17 Substances	%	Global	17.74	29.80	16.10
REACH SVHCs ²⁾			8.40	2.39	1.57
CMR ³⁾ Substances			15.89	5.99	2.71
Hazardous Substances Risk Assessment ⁴⁾			5.92	13.59	25.09

- 1) Registration, Evaluation, Authorisation and Restriction of Chemicals
- 2) Substances of very high concern
- 3) Carcinogenic, mutagenic and reprotoxic chemicals
- 4) Percentage of substances registered amon chemical substances in sales products

Reused/Recycled Materials	Unit	Scope	2019	2020	2021
Products based on reused/recycled materials ¹⁾	Metric tons	Global	10.602	13.411	14.668
Reused/recycled materials ²⁾ input			2.746	4.175	4.841

- 1) LUPOY PCR PC products
- 2) PCR PC

Society

Employee and Process EH&S	Unit	Scope	2019	2020	2021
Employees					
- Fatality rate ¹⁾	Rate	Global	-	0.0115	0.0056
- TRIR ²⁾			0.4725	0.6506	0.7642
- LTIR ³⁾			0.1501	0.2476	0.2454
Subcontractors					
- Fatality rate	Rate	Global	-	0.0051	-
- TRIR			0.3065	0.3345	0.5078
- LTIR			0.1591	0.1774	0.2132
Process Safety Events					
- PSE ⁴⁾	Case	Global	1	5	-
- PSER ⁵⁾	Rate		0.0029	0.0135	-
Transport Incidents	Case		2	2	1
- Road			2	1	1
- Rail			-	-	-
- Ship			-	1	-

- 1) Total fatality cases * 200,000 / Total working hours
- 2) Total recordable incident rate: Total recordable incidents * 200,000 / Total working hours
- 3) Lost time incident rate: Total lost time incidents * 200,000 / Total working hours
- 4) Process safety events
- 5) Process safety event rate: Total process safety events * 200,000 / Total working hours
- * Total working hours refer to 8 hours a day for 300 days for full-time employees; Process safety events are reported based on the internal standards set in Accident Index which includes injuries, fire, leakages, amount of loss, etc.
- * Fatality rate, TRIR, LTIR, and PSER of 2019 and 2020 have been revised due to the correction of the number of employees

Employees	Unit	Scope	2019	2020	2021
Total No. of Employees	Person	Global	19,025	18,243	18,841
- Korea			13,567	12,551	13,955
- China			4,177	4,394	3,564
- Asia-Pacific (excl. China)			694	706	627
- Europe			315	318	419
- Americas			272	274	276
Total No. of Employees in Leadership ¹⁾ Levels			4,905	4,635	5,082
- Korea			4,681	4,389	4,936
- China			162	181	101
- Asia-Pacific (excl. China)			36	38	31
- Europe			17	15	5
- Americas			9	12	9
No. of Employees by Age Group			Person	Korea	13,567
- Under 30	2,930	2,407			2,521
- 30 to 49	8,297	7,731			8,671
- 50 or above	2,340	2,413			2,763
No. of Employees by Gender	Person	13,567	12,551		13,955
- Male		11,633	10,825		11,985
- Female		1,934	1,726		1,970
- Ratio of Female Employees		%	14		14
No. of Employees in Revenue Generating Positions (Sales, Production, R&D) by Gender	Person	3,486	3,224		3,521
- Management Level ²⁾ (Male)		2,883	2,670		2,923
- Management Level (Female)		603	554		598
- Ratio of Female Managemet Level		%	17		17

No. of Employees in Leadership Levels by Gender	Person	Korea	4,681	4,389	4,936
- Management Level (Male)			3,833	3,577	4,031
- Management Level (Female)			763	717	808
- Ratio of Female Management Level	%		17	17	17
- Executive Level (Male)	Person		78	88	89
- Executive Level (Female)			7	7	8
- Ratio of Female Executives			%	8	7
Ratio of Average Female Salary to Average Male Salary					
- Non-management Level (Base salary only)	%	Korea	76	76	77
- Management Level (Base salary only)			92	93	94
- Management Level (Base salary + other cash incentives)			91	94	94
- Executive Level (Base salary only)			92	90	93
Social Minorities					
- Persons with Disabilities ³⁾	Person	Korea	311	330	323
- National Veterans			280	276	270

1) Leadership level refers to all positions from professionals/senior managers and above
2) Management level refers to all positions from professionals/senior managers and above excluding executive level positions
3) Number of persons with disabilities hired in 2019 and 2020 have been corrected to the numbers reported to Korea Employment Agency for Persons with Disabilities

Parental Leaves	Unit	Scope	2019	2020	2021
No. of Employees on Maternity Leave	Person	Korea	89	119	107
No. of Employees on Childcare Leave			128	148	161
No. of Employees on Childcare Leave (Female)			98	108	110
No. of Employees on Childcare Leave (Male)			30	40	51

Employee Hires	Unit	Scope	2019	2020	2021
Total New Hires	Person	Korea	1,497	402	1,560
- Male			1,246	320	1,255
- Female			251	82	305
- Under 30			1,126	187	759
- 30 to 49			302	144	635
- 50 or above			69	71	166
Total Local Hires		Global	995	764	1,580
Total No. of Senior Management Level ¹⁾ from Local Hires			10	15	17

1) Senior Management level refers to all positions from department leaders/executives and above

Employee Turnover	Unit	Scope	2019	2020	2021
Total No. of Employee Turnover	Person	Korea	562	575	642
- Male			483	490	556
- Female			79	85	86
Total No. of Voluntary Employee Turnover			317	284	341
- Male			248	223	276
- Female			69	61	65

Employee Training	Unit	Scope	2019	2020	2021
Total Training Hours	Hour	Korea	491,626	428,997	577,372
Training Hours per Employee			36	34	41
Total Costs Spent on Training	KRW 100M		183	125	156
Training Costs per Employee	KRW 10K		135	92	115

Labor Rights	Unit	Scope	2019	2020	2021
No. of Employees Participating in Labor Union	Person	Korea	5,177	5,075	5,436
No. of Employees Eligible to Join Labor Union			7,303	6,745	7,337
Ratio of Employees Participating in Labor Union	%		71	75	74
% of Employees Covered by Collective Bargaining Agreements			100	100	100

Supply Chain	Unit	Scope	2019	2020	2021
No. of Regular Suppliers ¹⁾	Company	Global	968	1,064	1,132
- No. of Suppliers Subject to Sustainability Assessment			292	291	472
- No. of Suppliers Evaluated on Sustainability			239	191	233
- High-risk Suppliers ²⁾			33	8	-
- On-site Audits ³⁾			13	-	-

1) Regular suppliers, based on internal management standards, exclude suppliers with less than 3 orders and purchase value of less than KRW 300 million (KRW 100 million for suppliers in life sciences)
2) High-risk suppliers refer to suppliers that scored below 65 for Supplier CSR Assessment results
3) On-site audits have been suspended from 2020 due to COVID-19, and have been replaced with an operational guide

Community Engagement	Unit	Scope	2019	2020	2021
Total Contributions to Local Communities ¹⁾	KRW 100M	Global	171	156	163
Employee Volunteer Hours ²⁾	Hour		13,665	4,879	4,965

1) Total contributions to local communities in 2019 and 2020 include contributions of LG Energy Solution; Contributions made by LG Energy Solution (KRW 2.6 B) and FarmHannong (KRW 10 M) have been excluded from 2021
2) Employee volunteer hours reduced significantly since 2020 due to COVID-19

Governance

Corporate Behavior and Ethics

	Unit	Scope	2019	2020	2021
No. of Investigations on Corruption	Case	Global	13	5	7
No. of Corruption Cases Handled			9	2	3
No. of Employees Participating in Anti-corruption Training ¹⁾	Person	Korea	13,567	12,511	13,431
No. of Employees Participating in Fair Trade Training ²⁾			430	14,444	14,413

1) Anti-corruption training covers trainings on “Jeong-Do Management” and the Code of Ethics
2) Fair trade training covers trainings on subcontractors and compliance

Cybersecurity

	Unit	Scope	2019	2020	2021
ISO 27001 Certified Business Sites	Site	Korea	4	4	4
Cybersecurity Awareness Activities	Case		12	12	12
Cybersecurity Training Hours Per Employee	Minute		20	30	30

Public Policy and Regulation

	Unit	Scope	2019	2020	2021
Contributions to Trade Associations ¹⁾	KRW 1K	Korea	2,311,660	2,090,714	2,222,895
Contributions to Political Campains ²⁾			-	-	-

1) Contributions have been made to the following top 5 organizations in 2021:
- Korea Enterprises Federation: KRW 321,450,000
- Korea PC/BPA Council: KRW 221,672,000
- WEF: KRW 221,618,000
- Korea Petrochemical Industry Association: KRW 213,780,000
- Korea Vinyl Environmental Council: KRW 202,500,000
2) Companies are prohibited to sponsor political groups, in accordance with the Political Funds Act

Tax Strategies

	Unit	Scope	2019	2020	2021
Total Reported Taxes ¹⁾	KRW 1M	Global	169,180	367,839	1,235,790
- Korea			100,760	692,538	672,683
- Asia			108,503	290,065	565,833
- Europe			4,747	6,800	61,505
- Americas			18,847	53,112	2,421
- Others			149	141	39
- Consolidated Adjustments			26,131	674,817	56,319
Cash Payment of Corporate Tax			576,713	513,128	1,281,796

1) Reported taxes are based on consolidated financial statements of FY 2021

Customer Satisfaction

	Unit	Scope	2019	2020	2021
Customer Satisfaction Survey Scope ¹⁾	%	Global	94	100	100
Customer Satisfaction Survey Score	Score		66.1	79.9	78.7

1) % of business areas (petrochemicals, advanced materials, life sciences) that conducted customer satisfaction surveys; Surveys have been conducted for all business areas since 2020 under the supervision of the Customer Value Innovation Team

Other Economic Performances

	Unit	Scope	2019	2020	2021
Total Revenues ¹⁾	KRW 1M	Global	27,331,968	30,058,872	42,654,722
- Revenues excluding LG Energy Solution, and Common and others ²⁾			18,335,975	17,221,356	24,068,819
R&D Expenses			718,600	719,300	710,100

1) Based on consolidated financial statements of FY 2021
2) Represents simple deductions of revenues of LG Energy Solution and Common and others from Total; used for normalizing environmental data.
Common and others includes the revenues of FarmHannong, please refer to notes on consolidated audit report of FY 2021 for details

ESG Indicator Map

GRI

GRI Standard		Disclosure	Location	Notes
GRI 102	102-1	Name of the organization	46-51	
GRI 102	102-2	Activities, brands, products, and services	-	Available on Website
GRI 102	102-3	Location of headquarters	-	Available on Website
GRI 102	102-4	Location of operations	-	Available on Website
GRI 102	102-5	Ownership and legal form	-	Available on Website
GRI 102	102-6	Markets served	-	Available on Website
GRI 102	102-7	Scale of the organization	-	Available on Website
GRI 102	102-8	Information on employees and other workers	93-94	
GRI 102	102-9	Supply chain	66-69	
GRI 102	102-10	Significant changes to the organization and its supply chain	16-17, 66-69	
GRI 102	102-11	Precautionary Principle or approach	31	
GRI 102	102-12	External initiatives	87	
GRI 102	102-13	Membership of associations	87	
GRI 102	102-14	Statement from senior decision-maker	16-17	
GRI 102	102-15	Key impacts, risks, and opportunities	16-19	
GRI 102	102-16	Values, principles, standards, and norms of behavior	-	Available on Website
GRI 102	102-18	Governance structure	25-31	
GRI 102	102-20	Executive-level responsibility for economic, environmental, and social topics	30-31	
GRI 102	102-21	Consulting stakeholders on economic, environmental, and social topics	72	
GRI 102	102-22	Composition of the highest governance body and its committees	28-29	
GRI 102	102-23	Chair of the highest governance body	26	
GRI 102	102-24	Nominating and selecting the highest governance body	27	
GRI 102	102-25	Conflicts of interest	-	Available on Corporate Governance Report
GRI 102	102-26	Role of highest governance body in setting purpose, values, and strategy	25-29	
GRI 102	102-27	Collective knowledge of highest governance body	27	
GRI 102	102-28	Evaluating the highest governance body’s performance	29	
GRI 102	102-29	Identifying and managing economic, environmental, and social impacts	31	
GRI 102	102-30	Effectiveness of risk management processes	31	
GRI 102	102-31	Review of economic, environmental, and social topics	31, 88-89	
GRI 102	102-32	Highest governance body’s role in sustainability reporting	29	
GRI 102	102-33	Communicating critical concerns	29	
GRI 102	102-34	Nature and total number of critical concerns	29	
GRI 102	102-35	Remuneration policies	29	
GRI 102	102-36	Process for determining remuneration	29	
GRI 102	102-37	Stakeholders’ involvement in remuneration	29	
GRI 102	102-41	Collective bargaining agreements	95	
GRI 102	102-46	Defining report content and topic Boundaries	12	
GRI 102	102-47	List of material topics	19, 88-89	
GRI 102	102-50	Reporting period	12	
GRI 102	102-51	Date of most recent report	12	
GRI 102	102-52	Reporting cycle	12	
GRI 102	102-53	Contact point for questions regarding the report	12	
GRI 102	102-55	GRI content index	97	
GRI 102	102-56	External assurance	102-103	

GRI 201	201-2	Financial implications and other risks and opportunities due to climate change	100-101	
GRI 202	202-2	Proportion of senior management hired from the local community	94	
GRI 203	203-2	Significant indirect economic impacts	78-81, 95	
GRI 205	205-2	Communication and training about anti-corruption policies and procedures	96	
GRI 205	205-3	Confirmed incidents of corruption and actions taken	96	
GRI 207	207-4	Country-by-country reporting	96	
GRI 301	301-2	Recycled input materials used	34-35, 47-49, 92	
GRI 301	301-3	Reclaimed products and their packaging materials	34-35, 47-49, 92	
GRI 302	302-1	Energy consumption within the organization	90	
GRI 302	302-2	Energy consumption outside of the organization	90	
GRI 302	302-3	Energy intensity	90	
GRI 303	303-3	Water withdrawal	91	
GRI 303	303-4	Water discharge	91	
GRI 303	303-5	Water consumption	91	
GRI 305	305-1	Direct (Scope 1) GHG emissions	90	
GRI 305	305-2	Energy indirect (Scope 2) GHG emissions	90	
GRI 305	305-3	Other indirect (Scope 3) GHG emissions	90	
GRI 305	305-4	GHG emissions intensity	90	
GRI 305	305-7	Nitrogen oxides (NOx), sulfur oxides (SOx), and other significant air emissions	91	
GRI 306	306-3	Waste generated	92	
GRI 306	306-4	Waste diverted from disposal	92	
GRI 306	306-5	Waste directed to disposal	92	
GRI 308	308-2	Negative environmental impacts in the supply chain and actions taken	66-69, 95	
GRI 401	401-1	New employee hires and employee turnover	94	
GRI 401	401-3	Parental leave	94	
GRI 403	403-1	Occupational health and safety management system	60	
GRI 403	403-2	Hazard identification, risk assessment, and incident investigation	31, 61	
GRI 403	403-3	Occupational health services	59-63	
GRI 403	403-4	Worker participation, consultation, and communication on occupational health and safety	61-62	
GRI 403	403-5	Worker training on occupational health and safety	62	
GRI 403	403-6	Promotion of worker health	63, 75	
GRI 403	403-7	Prevention and mitigation of occupational health and safety impacts directly linked by business relationships	62	
GRI 403	403-9	Work-related injuries	93	
GRI 403	403-10	Work-related ill health	93	
GRI 404	404-1	Average hours of training per year per employee	94	
GRI 404	404-2	Programs for upgrading employee skills and transition assistance programs	73-75	
GRI 405	405-1	Diversity of governance bodies and employees	27, 73, 93-94	
GRI 405	405-2	Ratio of basic salary and remuneration of women to men	94	
GRI 408	408-1	Operations and suppliers at significant risk for incidents of child labor	67-69, 95	
GRI 409	409-1	Operations and suppliers at significant risk for incidents of forced or compulsory labor	67-69, 95	
GRI 413	413-1	Operations with local community engagement, impact assessments, and development programs	79-83	
GRI 414	414-2	Negative social impacts in the supply chain and actions taken	67-69	
GRI 415	415-1	Political contributions	96	
GRI 416	416-1	Assessment of the health and safety impacts of product and service categories	92	
GRI 416	416-2	Incidents of non-compliance concerning the health and safety impacts of products and services	-	Available on Business Report



Topic	Code	Accounting Metric	Disclosure
Greenhouse Gas Emissions	RT-CH-110a.1	(1) Gross global Scope 1 emissions, (2) Percentage covered under emissions-limiting regulations	(1) 5,856,588 TJ (2) 97% (domestic emissions subject to K-ETS)
	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	In the short term, LG Chem plans to reduce emissions through the transition into green/low-carbon fuels. In the long term, we are actively investing in carbon reduction technologies to convert fossil fuel furnace to renewable energy-based e-furnace, and in carbon capture and utilization (CCU) technology. In addition, under the supervision of CEO, each C-suites are conducting assessments and monitoring progress on carbon reduction roadmap on a regular basis.
Air Quality	RT-CH-120a.1	Air emissions of the following pollutants: (1) NOx (excluding N2O), (2) SOx, (3) Volatile Organic Compounds (VOCs), and (4) Hazardous Air Pollutants (HAPs)	(1) 4,136 (2) 181 (3) 956 (4) 274
Energy Management	RT-CH-130a.1	(1) Total energy consumed, (2) Percentage grid electricity, (3) Percentage renewable, (4) Total self-generated energy	(1) 178,426 TJ (2) Korea 29% / excl. Korea 58% (3) Korea 2.9% / excl. Korea 13.8% (4) 1,355 GWh
Water Management	RT-CH-140a.1	(1) Total water withdrawn, (2) Total water consumed, percentage of each in regions with High or Extremely High Baseline Water Stress	(1) 66,881,345 m ³ (2) 45,309,082 m ³ , 6%
	RT-CH-140a.2	Number of incidents of non-compliance associated with water quality permits, standards, and regulations	0 cases
	RT-CH-140a.3	Description of water management risks and discussion of strategies and practices to mitigate those risks	We manage the amount of withdrawal, consumption, and discharge of water used in the manufacturing process. We plan to establish water management strategies through constant monitoring and analyzing water consumption and discharge to minimize water-related risks.
Hazardous Waste Management	RT-CH-150a.1	Amount of hazardous waste generated, percentage recycled	(1) 121,675 tons (2) 85% (incl. incineration with heat recovery) / 67% (excl. incineration with heat recovery)
Community Relations	RT-CH-210a.1	Discussion of engagement processes to manage risks and opportunities associated with community interests	We engage with local communities through employment opportunities and regional development, and employee volunteer activities and partnership programs. We plan to reinforce environmental and safety management, and promote active interaction with the local community, and continue to fulfill our responsibilities as a member of the community.
Workforce Health & Safety	RT-CH-320a.1	(1) Total recordable incident rate (TRIR) (2) Fatality rate for (a) direct employees and (b)contract employees	(1) Employees: 0.7642 Subcontractors: 0.5078 (2) Employees: 0.0056 Subcontractors: 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	We manage employee and process EH&S based on company-wide EH&S policy, and continue our efforts to assess, monitor, and reduce exposure to chronic and long-term EH&S risks through executive meetings under the supervision of the Chief Safety and Environment Officer (CSEO).
Product Design for Use-phase Efficiency	RT-CH-410a.1	Revenue from products designed for usephase resource efficiency	47% (based on consolidated financial statements of FY 2021) 9% (excluding revenues generated by LG Energy Solution)
Safety & Environmental Stewardship of Chemicals	RT-CH-410b.1	(1) Percentage of products that contain Globally Harmonized System of Classification and Labeling of Chemicals (GHS) Category 1 and 2 Health and Environmental Hazardous Substances, (2) percentage of such products that have undergone a hazard assessment	(1) 33.05% (2) 50.88%
	RT-CH-410b.2	Discussion of strategy to (1) manage chemicals of concern and (2) develop alternatives with reduced human and/or environmental impact	(1) We monitor the contents of REACH Annex 17 substances, SVHC, and CMR substances in our products and conduct hazardous substances risk assessments on our products. (2) We plan to classify substances with reduced human and/or environmental impact under the Sustainable Solution standard, and introduce the standard from product design stage.
Genetically Modified Organisms	RT-CH-410c.1	Percentage of products by revenue that contain genetically modified organisms(GMOs)	N/A

Management of the Legal & Regulatory Environment	RT-CH-530a.1	Discussion of corporate positions related to government regulations and/or policy proposals that address environmental and social factors affecting the industry	We report issues and measures related to changes in public policy and regulation to the management on a regular basis. We continue to seek public-private partnerships through identifying policy support and promoting government proposals. We are securing incentives, maintainining existing items and discovering new items with quota tariffs, and promoting policy support activities in connection with major investments and next growth engines.
Operational Safety, Emergency Preparedness & Response	RT-CH-540a.1	Process Safety Incidents Count (PSIC), Process Safety Total Incident Rate (PSTIR), and Process Safety Incident Severity Rate (PSISR)4	(1) 0 (2) 0 (3) 0
	RT-CH-540a.2	Number of transport incidents5	1 case

TCFD

Classification	Recommendations	Disclosure
Governance	a) Describe the board’s oversight of climate-related risks and opportunities.	LG Chem established the ESG Committee in April 2021 to embed “Sustainability” which encompasses both financial (Growth) and non-financial (ESG) values as one of the core values of corporate growth. We appointed two new female outside directors at the general meeting of shareholders in 2022, so as to enhance sustainability competitiveness and promote diversity. In addition, our BOD reviews carbon reduction roadmap on a regular basis in an effort to monitor progress on achieving Net-Zero by 2050.
	b) Describe management’s role in assessing and managing climate-related risks and opportunities.	In December 2021, LG Chem established the position of Chief Sustainability Officer (CSO) to reinforce a systematic and professional approach to achieving sustainability. CSO, along with the CEO, plays the role of a control tower on company-wide sustainability issues. In addition, the C-level executives discuss and make decisions on key sustainability issues, including climate-related risks and opportunities, through monthly management meetings.
Strategy	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	In the short term, potential risks we have acknowledged include increased regulatory costs in response to the ETS, increased investment costs following renewable energy policies, physical risks caused by extreme weather events, and reputational risks arising from changes in customer awareness. In the mid-to-long-term perspective, we perceive increased operating costs to achieve maximum carbon reduction to be a major risk factor, but at the same time, we acknowledge the increased customer needs for low-carbon products as an opportunity.
	b) Describe the impact of climate-related risks and opportunities on the organization’s businesses, strategy, and financial planning.	Climate-related risks and opportunities impact the overall business, ranging from products, services, supply chain, efforts to adapt to and alleviate climate change, R&D investments, business site operations, and to other business activities. To respond to such risks, LG Chem expands the transition to renewable energy for both domestic and global business sites, and further plans to adopt internal carbon pricing for future investments. We continue to increase our R&D investment to gain a competitive edge in sustainability as well. Theseexamples illustrate that climate-related risks and opportunities have a great impact on LG Chem’s business expansion, strategic changes, and financial planning.
	c) Describe the resilience of the organization’s strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	LG Chem has set out diverse strategies to achieve Net-Zero by 2050.
Risk Management	a. Describe the organization’s processes for identifying and assessing climate-related risks. b. Describe the organization’s processes for managing climate-related risks. c. Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization’s overall risk management.	We take action on the following agendas related to climate change: (1) Selection of issue: Increase in regulatory risks due to reduced ETS allocation, customer/ investor demand for elevated carbon reduction goals. (2) Target setting and action plans: We developed a carbon reduction roadmap that minimizes the associated financial risks, and we monitor our reduction progress on a regular basis (quarterly/yearly). (3) Selection of relevant organization: We set carbon reduction target and roadmap under the supervision of CSO, and we determine the relevant financial agenda such as carbon reduction investment costs in consultation with CFO and each business area. (4) Implementation: Reduction actions are actively carried out at business sites and production facilities, while projects that require a company-wide approach such as renewable energy transition and carbon offsets are mainly carried out under the CSO’s supervision. (5) Monitoring and evaluation: Each C-level executive, under the CEO’s supervision, monitors the progress on carbon reduction roadmap on a regular basis. We identify and manage climate-related risks and opportunities according to the following processes: (1) Identification of risks and opportunities: We conduct cost simulations in response to the changes in business environment such as adjustment of emission quotas and introduction of carbon tax. We seek new business opportunities in hydrogen production and CCU technology as major reduction measures. (2) Internal GHG management system: We operate an internal system in which we can monitor monthly emissions data per production facility. (3) Climate response activities: We reduce Scope 1 and 2 emissions by switching to green/ low-carbon fuels and improving energy efficiency, and by encouraging the shift to renewable energy, respectively. In addition, we pursue carbon offset to achieve our target.

Metrics and Targets	a) Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process.	LG Chem has selected key ESG indicators to strengthen our company-wide ESG implementation, and we are actively introducing them into corporate management. We consolidated 20 indicators that are most material to corporate sustainability by analyzing indicators from ESG reporting frameworks, ESG rating agencies, and peer industry. Based on the WEF’s stakeholder capitalism, we categorized the key indicators into four: Environment, Social, Governance (ESG) and Growth. Furthermore, LG Chem seeks to align ESG performance disclosure to global sustainability disclosure standards by keeping a list of indicators that may arise as potential issues in the global sustainability arena.
	b) Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	Scope 1: 5,856,588 tCO2e Scope 2: 4,483,137 tCO2e Scope 3: 1,320,247 tCO2e
	c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	In 2020, LG Chem was the first in the Korean chemical industry to announce a “sustainability strategy centering on achieving carbon-neutral growth by 2050, which is aimed at providing innovative, differentiated, and sustainable solutions for customers, society, and the environment. We have been moving a step closer to our goal for the past two years through a combination of internal and external efforts to reduce our carbon footprint, and we have witnessed changes in our business conditions in the process, motivating us to attain our goal sooner than expected. For us to keep up with our sustainable growth as a global science company, we advanced our carbon-neutral growth goal by 20 years and announced a new target of 2050 Net-Zero. The revised goal includes reducing carbon emissions by a total of 20 million tons compared to 2050 projections. We focus on actively adopting new processes, converting to green materials and fuels, and increasing the use of renewable energy. Since we are aware that global carbon neutrality cannot be achieved only with individual efforts, we are expanding the ecosystem of green industries in cooperation with numerous partners.

United Nations Global Compact 10 Principles

LG Chem actively supports the Ten Principles of the UNGC and participates in UNGC-sponsored activities. We ensure faithful compliance through our various policies and activities built around the Ten Principles below.

Areas	Principle	Page
Human Rights	1) Businesses should support and respect the protection of internationally proclaimed human rights; and	73
	2) make sure that they are not complicit in human rights abuses.	95
Labor	3) Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;	95
	4) the elimination of all forms of forced and compulsory labour;	73
	5) the effective abolition of child labour; and	73
	6) the elimination of discrimination in respect of employment and occupation.	73, 75, 93, 94
Environment	7) Businesses should support a precautionary approach to environmental challenges;	31
	8) undertake initiatives to promote greater environmental responsibility; and	33-45
	9) encourage the development and diffusion of environmentally friendly technologies.	46-51
Anti-Corruption	10) Businesses should work against corruption in all its forms, including extortion and bribery.	96

LRQA Independent Assurance Statement

Relating to LG Chem, Ltd.’s Sustainability Report for the calendar year 2021

This Assurance Statement has been prepared for LG Chem, Ltd. in accordance with our contract but is intended for the readers of this Report.

Terms of engagement

LRQA was commissioned by LG Chem, Ltd. (LG Chem) to provide independent assurance on its ‘2021 LG Chem Sustainability Report’ (“the report”) against LG Chem’s data management procedure to a “limited level of assurance and materiality of professional judgement” using ISAE 3000 and ISAE 3410.

Our assurance engagement covered evaluating the accuracy and reliability of ESG performance data and information on pages 90-96 in the report relating to LG Chem’s operations and activities in domestic and overseas¹⁾ from 1 January 2021 to 31 December 2021.

Our assurance engagement excluded the data and information of LG Chem’s suppliers, contractors and any third parties mentioned in the report.

LRQA’s responsibility is only to LG Chem. LRQA disclaims any liability or responsibility to others as explained in the end footnote. LG Chem’s 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 LG Chem.

LRQA’s Opinion

Based on LRQA’s approach nothing has come to our attention that would cause us to believe that LG Chem has not, in all material respects, disclosed accurate and reliable performance data and information as all errors identified during the assurance engagement were corrected.

The opinion expressed is formed on the basis of a limited level of assurance and at the materiality of the professional judgement of the verifier.

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.

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:

- Auditing LG Chem’s data management systems to confirm that there were no significant errors, omissions or mis-statements in the report. We did this by reviewing the effectiveness of data handling procedures, instructions and systems, including those for internal verification. We also spoke with those key people responsible for compiling the data and drafting the report.
- Checking whether direct (Scope 1) and indirect (Scope 2) GHG emissions, and energy consumptions in domestic were transposed correctly from the GHG inventory which was verified by the third-party assurance provider.
- Verifying other indirect GHG emissions (Scope 3) based on GHG Protocol - Corporate Value Chain (Scope 3) Accounting and Reporting Standard
- Checking whether financial data were transposed correctly from the financial statements.
- Reviewing additional evidences made available by LG Chem at its head office in Seoul.

1) Our engagement excluded verification of direct and indirect GHG emissions, and energy consumptions of overseas sites.

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 LG Chem’s certification body for ISO 9001 and ISO 14001. We also provide LG Chem with a range of training services related to management systems. The verification and certification assessments, together with the training, are the only work undertaken by LRQA for LG Chem and as such does not compromise our independence or impartiality.

Dated: 22 June 2022

Tae-Kyoung Kim
LRQA Lead Verifier
On behalf of LRQA
17th Floor, Sinsong Building, 67 Yeouinaru-ro, Yeongdeungpo-gu, Seoul, Korea
LRQA reference: SEO00000269



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We'd highly appreciate your time to take a brief survey by scanning the QR code.





For further details on this report

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