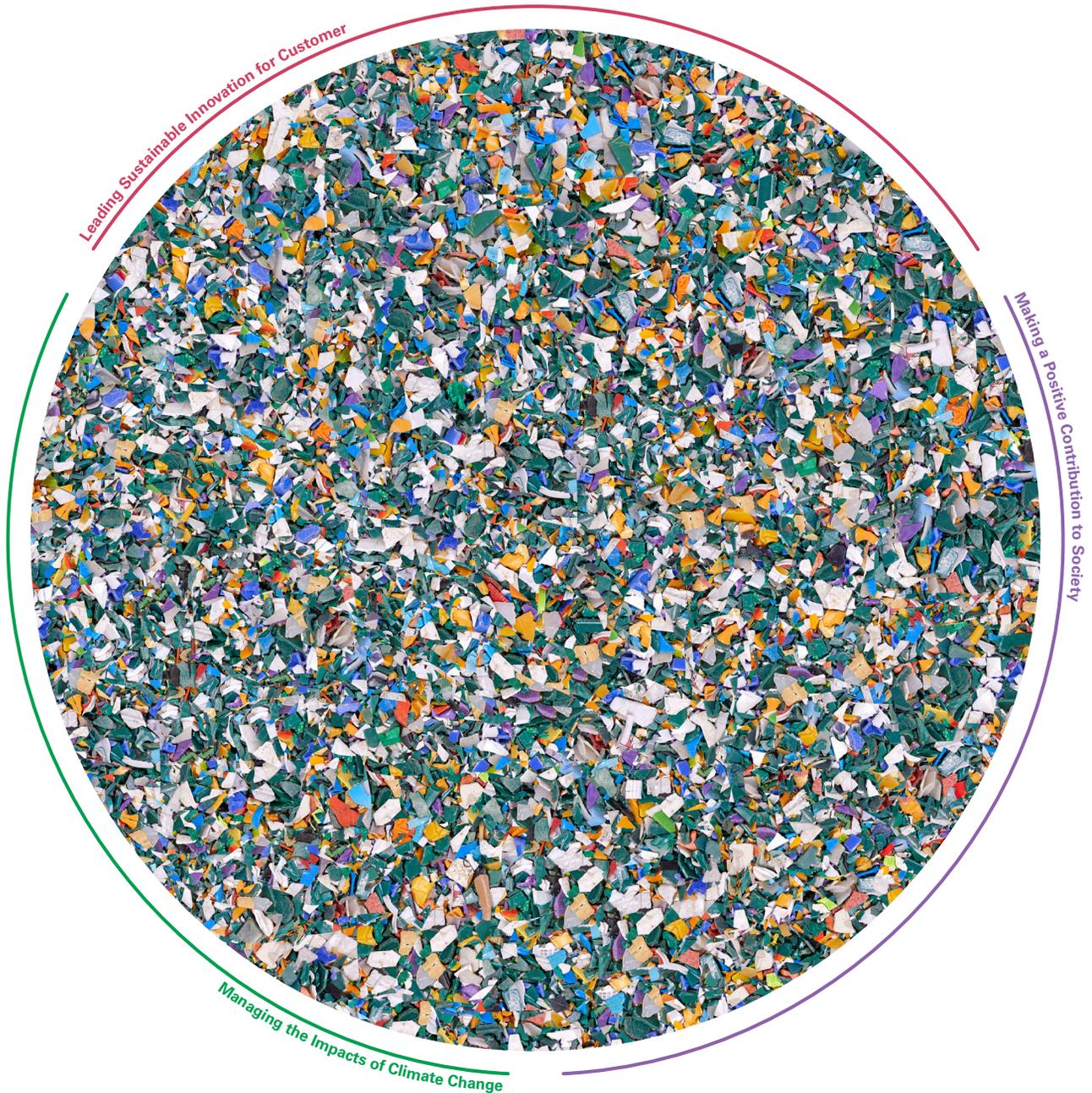


Innovative Sustainability

Deliver advanced, innovative
and sustainable solutions
for our environment and society



About this Report

LG Chem has reestablished its sustainability vision and strategy in 2019. This report focuses on our three strategy directions (customers, environment, and society). With non-financial values becoming increasingly important, we included our current status and plans, including Environmental, Social, and Governance^{ESG} performance, in this report based on global standards such as Sustainability Accounting Standards Board^{SASB} and Task Force on Climate-related Financial Disclosure^{TCFD}. LG Chem will manage and disclose its sustainability strategy, goal, and performance systematically and transparently.

Features of the report

Since LG Chem published its first 2006 Sustainability Report, we have been collecting stakeholders' opinions and containing the most important issues in a Sustainability Report every year. The 2019 Report is LG Chem's 14th Sustainability Report. This report is published in Korean and English every year. You can see our Sustainability Report on our website.

Reporting principles

This report has been prepared based on the Global Reporting Initiative^{GRI} Standards Core Option.

As a member of the UN Global Compact, LG Chem included its efforts to follow the 10 principles including human rights, labor, environment, and anti-corruption and to achieve the Sustainable Development Goals^{SDGs} in this report.

Reporting period

This report contains LG Chem's activities and performances from January to December 2019. Some information covers the first half of 2020.

The quantitative performances of the last three fiscal years are included to show recent trends for easy comparison.

Reporting scope

The reporting scope covers LG Chem Seoul Headquarters, 13 plants, and 3 R&D campuses in the Republic of Korea. Global business sites include all overseas manufacturing plants in China (14), United States (2), Poland (2), India (1), and Vietnam (3) as well as LGCCI. K-IFRS Consolidated Financial Statement Standards were applied for financial information. If non-financial information has a different reporting scope, it is separately written.

Report Assurance

To ensure the reliability of the reporting process and information included in the report, LG Chem engaged with Deloitte Anjin LLC, an independent external assurance provider to conduct assurance review. Specific details can be found on page 104.

Cover Story

Post Consumer Recycled^{PCR} Plastic

LG Chem recycles separated or selected plastic waste used by end-consumers, after the process of shredding and extruding or compounding. When PCR plastic is used, CO₂ emissions are guaranteed to decrease by 40% to 50% compared to general plastic products.

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We connect science to life for a better future.



CEO Message

Dear respected stakeholders,

Since its foundation in 1947, LG Chem has been growing through continuous challenges and innovations. Today, we have become Korea's representative chemical company. According to "Brand Finance Chemicals 25 2020" published by Brand Finance (UK), the brand value of LG Chem is more than KRW 4 trillion. LG Chem is now on a par with leading global chemical companies. We were able to achieve such result and performance thanks to the enthusiasm and devotion of 40,000 employees and numerous stakeholders including customers, suppliers, and communities supporting LG Chem.

I am sincerely grateful for your continuous interest and trust. The year 2020, the time to start a new decade, is called the new abnormal era of hyper uncertainty that cannot be explained with the economic order and norms of the past. The COVID-19 pandemic already led the global economy into chaos we have never experienced before. The unstable financial market and oil prices warn of a crisis. Although we are under the hardest management conditions ever, we have decided on a new direction based on our vision—We connect science to life for a better future—newly announced this year in order to grow as a leading global company. We will strengthen our foundation by focusing on the basics of what we can do and prepare for new opportunity and future through a crisis. We will rank among Global Top 5 Companies and accelerate the 4 initiatives to accomplish our goal.

First, we will strengthen our portfolios by focusing on the markets and customers.

To enhancing efficiency in terms of operational management, we will innovate our business focusing on the markets and customers. There is a limitation in evolving into a global leader only with product and technology-centered business. We will preoccupy the growing markets and proactively discover collaboration models with diverse partners. In addition, we will provide a variety of solutions as well as reasonable prices and outstanding performances that can impress our customers and put forth the corresponding efforts to be recognized for our differentiated values.

Second, we will accelerate performance-centered R&D innovation based on our portfolios.

2019 was the first year of R&D innovation. We reorganized our R&D process from the viewpoint of the markets and customers. In addition, we adjusted our future projects and reorganized platform and analytical science technology based on the business portfolios. We will do our best to develop future technology by focusing on fast growing business fields and strengthen our platform technology to enhance the competitiveness of future business. In addition, we will maximize R&D staff's potential and improve efficiency by utilizing big data and AI as much as possible and promoting open innovation.

Third, we will enhance efficiency throughout the entire value chain.

In order to maximize the efficiency of all assets of LG Chem, we will actively utilize Digital Transformation^{DX} and Lean Six Sigma^{LSS}. We are trying to become an innovative company leading DX trends. We will enhance enterprise-wide efficiency by developing and implementing DX-based innovative projects throughout all fields encompassing production, quality, R&D, and marketing. Moreover, we will decrease error and failure and increase efficiency by strengthening LSS as the tool of innovation activities of all employees. By expanding this strategy to overseas business sites, we will induce global members' participation and produce tangible results.

Fourth, we will create a manpower/leadership/organizational culture befitting a global company.

We will foster local leaders and experts required for global business expansion and provide full support so that talented individuals from all over the world can display their abilities. Breaking out of our comfort zone, we will pursue new challenges and encourage everyone to speak up, discuss, and learn new things. We will create a horizontal, dynamic organizational culture.

Lastly, we will make sustainability the core competency of LG Chem.

Sustainability is not an option but a requirement for corporate survival and the key driver to rank among the Global Top 5 Companies. LG Chem has declared the establishment of a circular economy system as well as carbon neutral growth goals. We will make sustainability our very own differentiated value throughout the entire value chain encompassing raw materials, production, consumption, and disposal.

Furthermore, EH&S should be ensured first before all management activities. The recent accidents that occurred in India and Daesan Complex in Korea taught us a painful lesson. Reflecting on the past, we will reexamine all factors from square one and take fundamental measures including strengthened EH&S standards.

LG Chem has grown by overcoming numerous crises with continuous challenges throughout its 73-year history. We will handle the current crisis in a mature way. As a change agent not afraid to get out of a rug, we will prove our competency and potential and rank among the Global Top 5 Companies. We ask for your continued support and encouragement.

Thank you.

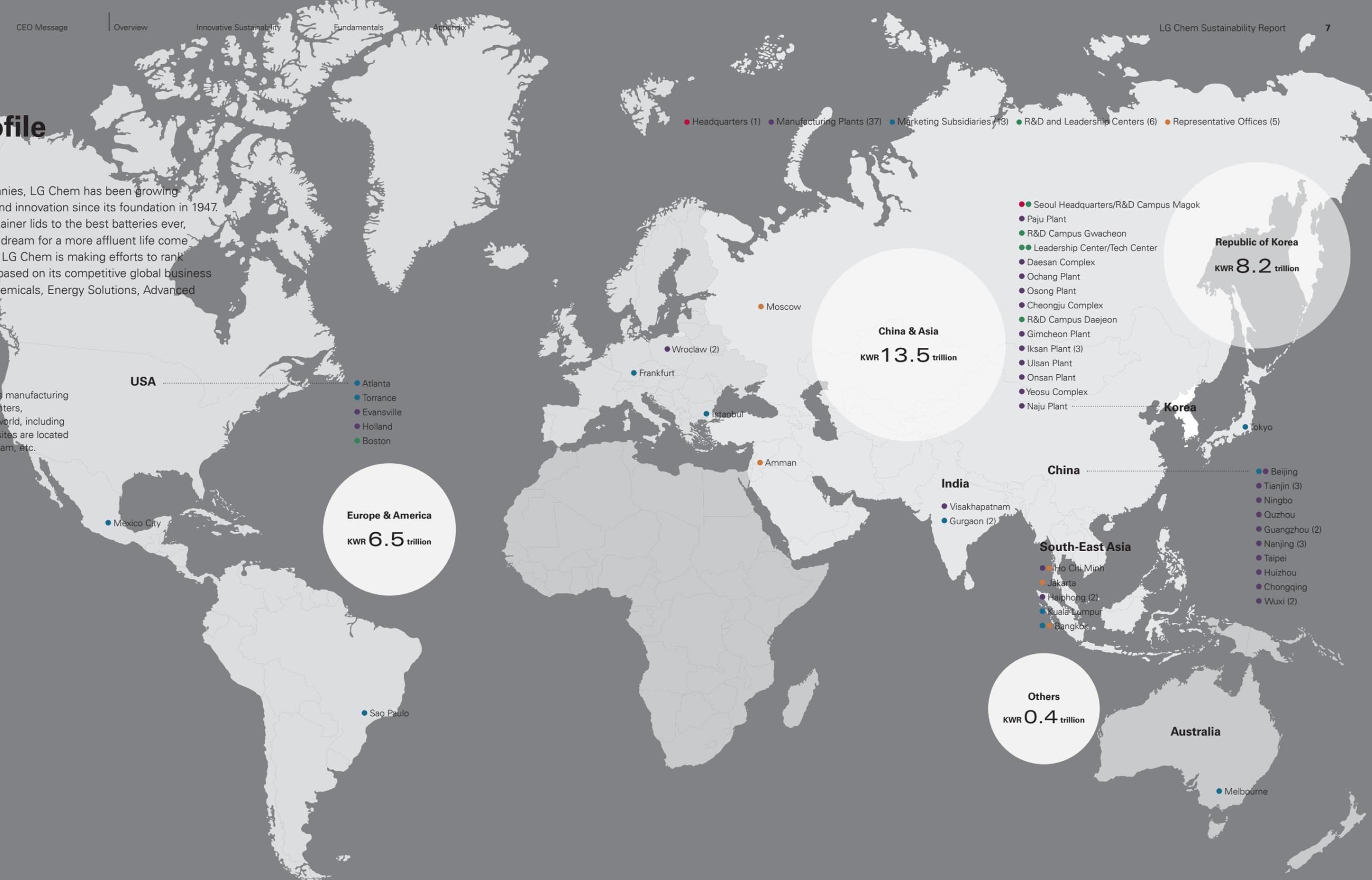
July 2020
Shin, Hak-Cheol, Vice Chairman and CEO of LG Chem

Company Profile

As one of Korea's leading companies, LG Chem has been growing through continuous challenges and innovation since its foundation in 1947. From unbreakable cosmetic container lids to the best batteries ever, LG Chem has been making your dream for a more affluent life come true for the past 70 years. Today, LG Chem is making efforts to rank among Global Top 5 Companies based on its competitive global business portfolios encompassing Petrochemicals, Energy Solutions, Advanced Materials, Life Sciences, etc.

Global Network

LG Chem has 62 business sites such as manufacturing plants, marketing subsidiaries, R&D centers, and representative offices all over the world, including Seoul Headquarters. Major production sites are located in Korea, China, US, Poland, India, Vietnam, etc.



○ **Business Areas**

- Petrochemicals**
- Energy Solutions**
- Advanced Materials**
- Life Sciences**

NCC, PO, PVC/Plasticizers, ABS, Acrylates/SAP, Rubbers/Specialty Polymers
 Automotive Battery, ESS Battery, IT & New Application Battery
 Automotive Materials, IT Materials, Industrial Materials
 Primary Care^{PC}, Specialty Care^{SC}, Aesthetic

○ **Financial Highlights**
(As of the end of 2019)

Sales	Operating profits	Assets	No. of employees
KRW 28.6 trillion	KRW 895.6 billion	KRW 34 trillion	40,234
		Stockholders' equity: KRW 17.4 trillion,	
		Liabilities: KRW 16.6 trillion	

Vision & Value

LG Chem connects science—which is new knowledge combined with its accumulated expertise, technology, and solutions—to life for a better future.

We connect science to life for a better future

Better Future
As a global company affecting the entire industry and human life, we will take the initiative in creating a sustainable future.

Connect to Life
Connecting our long accumulated knowledge, technology, and solutions to new fields organically for a more affluent life—This is the connection of science to life that we pursue.

Science
Science refers to numerous technologies and solutions that we will create and accumulate in the future in all fields surrounding us.

WeConnectScience

C and O in the word "Connect" are linked to each other in order to make the infinity symbol (∞). It means that science opens up infinite possibilities with being connected to human life.

Vision

Science

We have made our numerous dreams come true through science. The dream of building the top chemical plant in the world, the dream of narrowing the gap between what we actually see and what we see through the screen, the dream of making human beings healthier. With science as well as chemistry, we will make our new future dreams come true.

Connect to Life

Science is meaningful when it leads us to a better life. From numerous plastic products that we use in everyday life to various displays, batteries that mobilize cars, and prescription drugs, our technologies are linked to living necessities that improve the quality of our life.

Better Future

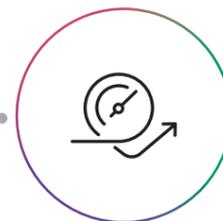
We will take the initiative in creating a better future by revolutionizing sustainable technology for our customers and pushing for high standards of sustainability considering the environment and human rights throughout the entire value chain.

Core Values



Customer Focus

We move customers with value that can change their lives beyond fulfilling their needs.



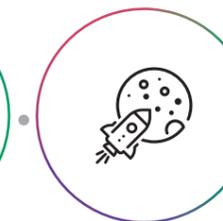
Agility

We constantly learn with an open mind and respond flexibly and quickly to change.



Collaboration

We create synergy by actively collaborating based on mutual respect.



Passion

We grow with the company with passion for work and bold challenges.



Sustainability

We provide innovative and sustainable solutions for the environment and society.

Business Areas

LG Chem is collaborating with various partners based on its 4 business portfolios—Petrochemicals, Energy Solutions, Advanced Materials, and Life Sciences.

Petrochemicals



LG Chem Contributes to Industrial Development with Various Petrochemical Products of World-class Quality.

In the petrochemicals business, we have built a vertically integrated system from basic raw materials such as ethylene and propylene to downstream products such as PE, ABS, and synthetic rubber. The petrochemicals business is LG Chem's core business area with world-class productivity and cost competitiveness. We are consistently advancing and strengthening our business structure and competitiveness in the global market by focusing on high value-added products such as carbon nanotubes.

Market Prospect

The stagnation in the petrochemicals market, which has begun in the second half of 2018, is expected to continue for some years ahead. This phenomenon is attributed to increase in supply and decline in demand resulting from the sluggish growth of the global economy. Major causes of increase in supply include the new operation of Ethane Cracking Center in North America, rise in the self-sufficiency rates of China as the largest exporting target country, and oil companies' entry into the petrochemicals business. Responses to environmental issues regarding plastic products are becoming increasingly important from a long-term perspective. Only the companies that take the initiative in preparing for customer demand for eco-friendly materials and strengthened regulations such as recycling policy can achieve sustained growth.

Business Strategy

In order to rank among the Global Top 5 Companies, the LG Chem Petrochemicals Company is developing its product structure and diversifying local portfolios focusing on customer values. In addition, we are concentrating our competences by structuring our growth strategy such as development of promising materials and new business opportunities. To maximize customer values, we newly formed the Market Intelligence^{MI} Team and Product Planning Team and strengthened our MI competence for sensing market and customer changes. We are developing the product structure focusing on technology-differentiated products and market-leading products. Reviewing our production base's entry into growing markets such as India and Southeast Asia, we will strengthen our business competitiveness from Korea and China to the global market. In addition, we are working on commercializing future promising materials such as carbon nanotubes for rechargeable batteries. In terms of sustainability, we are developing our future growth engine by utilizing internal and external R&D competences and finding new business opportunities.

Energy Solutions



LG Chem Leads the Future Eco-friendly Energy Industry with Differentiated Materials and Technology

As the world's only chemical-based conglomerate among global battery manufacturers, LG Chem is leading the global lithium-ion battery market based on its ability to develop differentiated materials and experience in leading the market. We are strengthening our leadership in the next-generation energy market, securing the world's largest production capacity in the four global production bases based on our advanced technology.

Market Prospect

Given the tightening environmental regulations and improving marketability of electric vehicles, the demand for automotive batteries is continuously increasing. The need for automotive batteries is expected to grow more with the emergence of smart mobility. Aided by the global distribution of renewable energy and power efficiency projects of different countries, the growth of the energy storage system^{ESS} market is accelerating. The demand is expected to increase greatly with continuous improvement in the economic feasibility of energy storage systems. A new market of IT & new application batteries is expected to expand with an increase in the use of IT & new application batteries for cordless products and market growth of cylindrical batteries used for electric vehicles, lightweight electric vehicles (small electric cars, electric scooters, electric bikes, etc.), power tools, and vacuum cleaners.

Business Strategy

The goal of LG Chem is to become the global leader in the energy solutions market by leading the market with differentiated products and technology and revolutionizing product prices. As part of our automotive battery business strategy, we will establish a stable supply system to meet the rapidly growing customer demand and ensure better price competitiveness than internal combustion engine vehicles through continuous cost reduction. We will strengthen our market status as the global leader by developing differentiated products. In the ESS battery industry, we are contributing to the growth of the ESS market by developing world-class safety improvement solutions and establishing a remote after-sales service system. In the IT & new application battery business, we are ensuring product competitiveness for cylindrical batteries and differentiating products for wearable IT devices in response to the increasing demand for electric vehicles and LEVs. In the polymer battery business, we are enhancing profitability by strengthening premium products in the smartphone market and finding new business opportunities in line with the market trend of augmented reality/virtual reality^{AR/VR}, robots, 5G, and digital transformation^{DX}.

Merger & Acquisition

To rank among the Global Top 5 Companies, LG Chem is strengthening its market and customer-centered portfolios on an enterprise-wide level.

In December 2019, LG Chem signed an agreement for the foundation of a joint venture with General Motors^{GM}, the largest American automobile manufacturer, to secure battery production capacity of over 30GWh in Lordstown, Ohio, with each company investing KRW 1 trillion. Currently, LG Chem and General Motors are developing Ultium Battery, the next-generation technology.

In June 2019, LG Chem founded a joint venture for battery production with Geely, China's market leader by investing KRW 103.4 billion each. As a result, we are now able to keep our independent technology and secure stable supply.

Such collaboration models not only embody industrial cooperation; they also lead us to the eco-friendly era. We will strengthen our status as a global market leader based on sustainability in the value chain. In the battery materials business, we will preoccupy the global market to respond to the rapidly growing demand for electric vehicles, without being stuck in our own way of running business. In addition, we are proactively establishing a collaboration model with a variety of partners including materials suppliers so as to ensure differentiated competences.

Advanced Materials



LG Chem Brings the Future Life Forward with its IT & Electronic Materials to Which its Cutting-Edge Technologies are Applied.

In the advanced materials business, LG Chem provides customers with key IT and mobility materials such as cathode materials for automotive batteries and engineering plastic for automotive interior/exterior materials and parts. In line with future trends, we are focusing on developing products that will meet future customer needs and making efforts to ensure business sustainability.

Market Prospect

With environmental issues such as climate change, oil depletion, and air pollution, the e-mobility market is growing, and the demand for eco-friendly materials is increasing.

In the automotive materials industry, the application of lightweight materials and eco-friendly materials (PCR*, etc.) is expected to grow to increase vehicle range as more electric vehicles—the base of e-mobility—are distributed. In the IT materials industry, the demand for OLED panels will gradually increase with the emergence of new form factors such as foldable display. Accordingly, the relevant materials are expected to grow greatly. In the semiconductor materials industry, the demand for memory is expected to grow as the servers of leading IT companies increase and the next-generation semiconductor technology mainly used for mobile devices develops. In the industrial materials business, the demand for cathode materials for rechargeable lithium-ion batteries used for electric vehicles, IT & new application batteries, and ESS is expected to increase with the expanded e-mobility market and tightened eco-friendly regulations.

*PCR: Post Consumer Recycled

Business Strategy

As more and more people become interested in the Fourth Industrial Revolution and environmental regulations are expanding, e-mobility and sustainability areas are growing. LG Chem Advanced Materials Company are making efforts for preemptively providing customers with differentiated customized materials in response to the changing business environment. Based on its competitiveness in PC and PBT engineering plastic, the Automotive Materials Division is expanding business, focusing on customers of European finished cars that lead the e-mobility market. We are also working on establishing a portfolio for recycled plastic products considering global eco-friendly trends. The IT Materials Division is preparing for a growth opportunity without a hitch by converting into OLED materials as a fast growing market, and we will keep expanding our semiconductor material business, which is expected to grow continuously. The Industrial Materials Division is focusing on ensuring the competitiveness of high-capacity/high-stability cathode materials for batteries used for electric vehicles as the base of e-mobility.

Life Sciences



LG Chem Develops Innovative Drugs for a Healthy Life

Life sciences is the new growth engine of LG Chem in its mid- to long-term goal. We have secured differentiated R&D competence and received approval from the US FDA for our new drugs for the first time in the Republic of Korea. We are actively penetrating the overseas market and expanding the pipelines for developing new drugs with active investment in R&D. We are making efforts to become one of the best global pharmaceutical companies.

Market Prospect

The global prescription medication market (except non-prescription medication and medical instrument markets) is expected to grow at an annual growth rate of 6.9% from around USD 844 billion in 2019 to around USD 1.2 trillion in 2024. Such is attributed to an increase in new medicine development resulting from population aging and life sciences technology innovation. In particular, the chemotherapy and immune disorder fields—where new drugs are actively developed—are expected to lead the market. The field of metabolic disorders such as diabetes is seen to grow continuously as well. The costs and time required for new drug development keep increasing. Therefore, activities to enhance R&D efficiency are expected to become the key competitiveness of the red bio industry.

Business Strategy

LG Chem Life Sciences Company is developing innovative drugs focusing on chemotherapy, immune disorders, diabetes, and metabolic disorders. To enhance R&D competence and efficiency, we are pushing for open innovation by developing internal competences at the global level and securing a global network. We are doing our best to expand our pipelines for new drug development. In the long term, we will grow as a bio pharmaceutical company with global competitiveness through innovative drug development and become a next-generation growth engine of LG Chem.

FarmHannong



In 2016, LG Chem took over Dongbu FarmHannong, Korea's leading green bio company, and newly launched FarmHannong to diversify and expand its business to green bio. FarmHannong produces and supplies key agricultural materials such as crop protectants, seeds, and fertilizers. FarmHannong developed a new crop protection material for the first time in the Republic of Korea. The company is making efforts to become a world-renowned green bio company as well as Korea's market leader by making continuous investments in R&D and securing infrastructure for overseas markets. FarmHannong will enhance the productivity of agricultural products and supply safe foods with its high-quality products, services, and differentiated agricultural solutions.

Market Prospect

Green bio technology is regarded as the solution to current global issues such as population growth, population aging, environment, and safety. Accordingly, the green bio market is expected to grow continuously worldwide. Global chemical companies have entered the green bio market preemptively. They are pushing for aggressive M&A to strengthen their market competitiveness. In addition, they are focusing on investment in future technology such as genetic engineering technology, technology to improve agricultural productivity, and solutions to precision agriculture. This trend is expected to accelerate the growth of the green bio market.

Business Strategy

For crop protection as its main business, FarmHannong will go beyond its leading status in the domestic market and expand its business in overseas markets based on the differentiated competitiveness, represented by labor-reducing and labor-saving products (unmanned aircraft products). In the case of 4 new crop protectants that were already launched, the company will expand its business by developing products and forms that suit the target areas, focusing on the growing Asian markets. For Terrado'or (launched in Korea in 2018), a new crop protectant applicable to all over the world, the company will register the product in major countries at the very beginning and cooperate with local partners for business expansion. FarmHannong will develop new competitive crop protection materials targeted at overseas markets through continuous investment in R&D. In addition, the company will grow as a leading company with global competitiveness by improving its overseas business infrastructure. For the seed business, FarmHannong is cooperating with leading overseas businesses so as to ensure excellent genetic resources. The company is securing a variety of technologies to shorten the variety development period. FarmHannong has founded a research corporation in Thailand in 2018, and it has been focusing on developing new varieties that suit the overseas markets. In the medium- to longer-term, the company will accomplish significant results in the overseas markets by concentrating its R&D resources on variety development for global business. For the fertilizer business, FarmHannong is converting it into a technology-based special fertilizer business. The company is strengthening its cost competitiveness by enhancing productivity and plant efficiency. Based on its excellent product competitiveness, FarmHannong will strengthen its market status in the domestic market. In addition, the company will expand its overseas business by focusing on new crop protection materials and special fertilizers in order to rank among Asia's Top 5 Green Bio Companies in 2025.

LG Chem Innovative Sustainability

Sustainability is not an option but a prerequisite for a company's survival. We should proactively participate in addressing global issues including environment, human rights, and ethics as well as compliance with regulations. In addition, we should make sustainability a unique differentiated value of LG Chem throughout the entire value chain encompassing raw materials, production, consumption, and disposal.

—CEO's New Year Message in 2020

Strategy & Highlights

Sustainability Vision & Strategy

In 2019, LG Chem reestablished its sustainability vision and strategy in order to respond to sustainability issues preemptively, win greater trust from stakeholders, and ensure differentiated competitiveness. LG Chem's sustainability vision, "Innovative Sustainability," consists of 3 strategic directions and 9 fields. We decided on our vision of "Deliver advanced, innovative, and sustainable solutions for our environment and society" as our goal.

Strategy Establishment Process

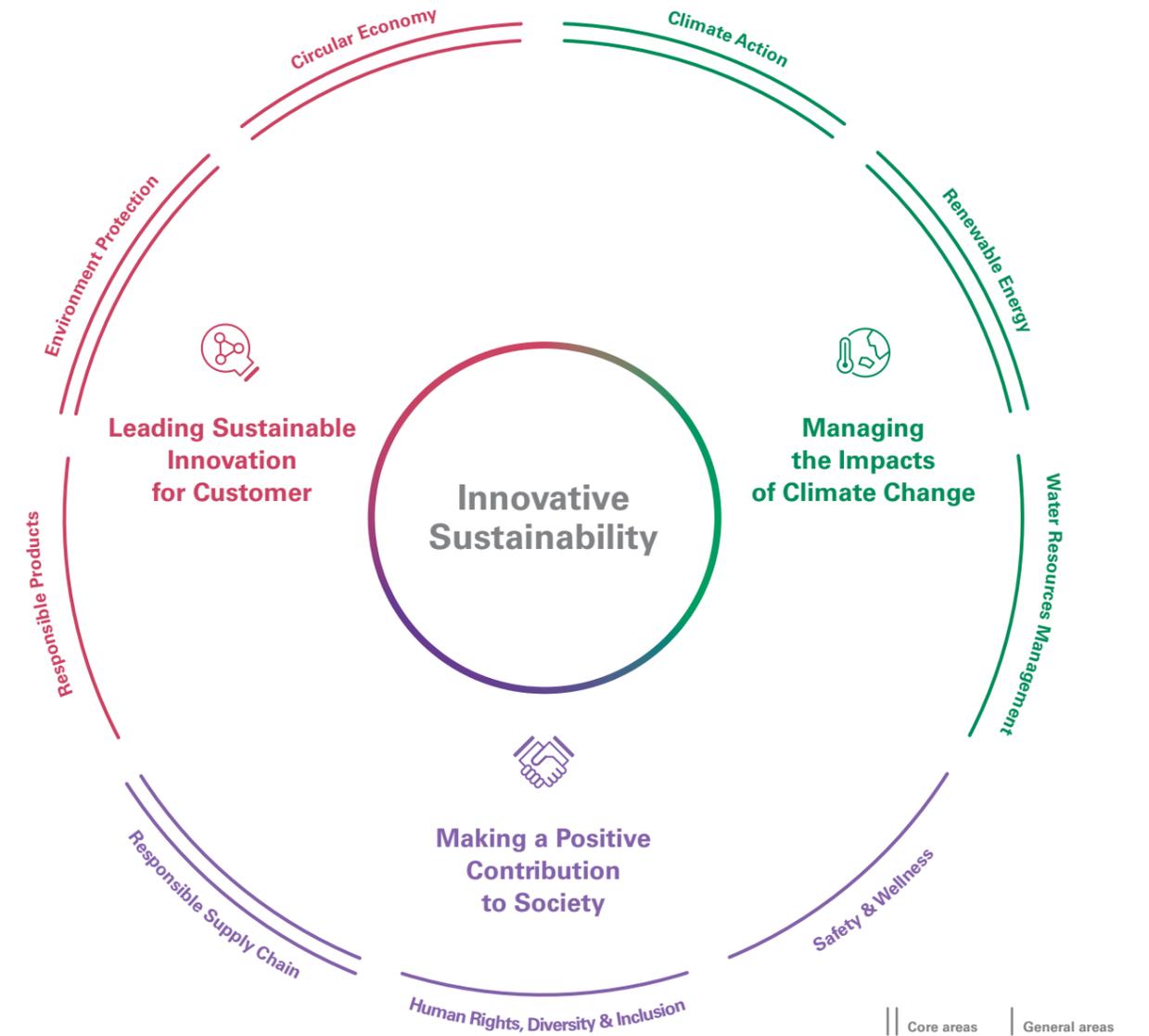
In 2019, all our employees participated in the entire process including the decision on strategic direction, vision and strategy design, and decision on operational direction regarding sustainability, and we continuously communicate with all our employees through the CEO's Message and Sustainability Report.

Decision on strategic direction	Vision and strategy design	Decision on operational direction
<ul style="list-style-type: none"> • 1st interview with management • Reporting of top management meeting in March (direction of sustainability management) • Workshop for related departments: 34 teams in all • Comparative analysis on external environment and internal competence • Survey among leader-level employees • Decided core fields and major tasks 	<ul style="list-style-type: none"> • Established the vision system • Established a goal by core field • Survey among all employees 	<ul style="list-style-type: none"> • Interview with business companies (Reviewed the connection to strategic directions) • Decided the organizational structure for sustainability • Reporting of top management meeting in November (Discussed the vision system, goals, and organization)

Governance

LG Chem has been operating the CSR Committee since 2016. Sustainability issues used to be discussed only by working-level executives. In 2019, we changed our governance structure so that sustainability issues could be discussed at the top management meeting participated in by C-Level and Heads of Business Companies. In addition, the sustainability plan and information are submitted to the Board of Directors every year.

Deliver advanced, innovative and sustainable solutions for our environment and society



Selection of key areas

We selected the key areas and established medium and long-term goals in order to rank among the Global Top 5.

Circular Economy

To establish a closed-loop throughout the entire value chain encompassing raw materials, production, consumption, and disposal

Environmental Protection

To apply 'Zero Landfill' certification mandatory to new business sites

Climate Action

To accomplish Carbon Neutral Growth by reducing greenhouse gases (CO₂, etc.)

Renewable Energy

To promote Renewable Energy 100^{RE100}

Responsible Supply Chain

To achieve responsible sourcing considering the environment, human rights, and ethics in the raw materials supply chain



Leading Sustainable Innovation for Customer



Circular Economy

On March 11, 2020, the EU announced the new 'Circular Economy Action Plan' through the European Commission®. The new 'Circular Economy Action Plan' is one of the main blocks of the 'European Green Deal' and Europe's new agenda for sustainable growth. This Action Plan focuses on circular economy with high potential including battery and plastic industries. Circular economy is a global issue as well as EU's interest. Numerous nations are preemptively establishing new plastic regulations on plastic waste, microplastics, etc. In the battery industry, the battery waste market is expected to grow with tightened environmental regulations and increasing needs for circular economy.

Global initiatives such as Global Battery Alliance^{GBA} and Alliance to End Plastic Waste^{AEPW} are resolving the circular economy agendas. It may be both a crisis and an opportunity in the industrial field. The demand for Post Consumer Recycled^{PCR} plastic is increasing, especially in IT and automobile customers. In addition, business proposals for the reuse of battery waste are continuously growing. A closed-loop based on the circular economy is a very significant challenge in terms of business since we may create a new business opportunity as well as proactively respond to environmental issues.

Goal & Approach



Special Interview



Vice President of Petrochemicals NBP Department, Cho, Dong-Hyun

For the sustainability of the petrochemicals business, LG Chem has established an eco-friendly materials business road map focusing on three fields: carbon neutrality, recycling, and biomaterials. In addition, we are proactively cooperating with external partners and developing new technology. We are also going to establish a closed-loop system through close partnership with the central government, local governments, supply chain, etc.

Some preexisting products are substituted with PCR polymers made of recycled plastic waste resources. In addition, we are going to use recycled products from polymer resin packing materials. We are cooperating with the government, recycling associations, and companies from the plastic waste collection stage. We will apply such products to LG Chem first through technology development and proceed to commercialization after resolving the drawback. We are making efforts to develop eco-friendly products such as biomaterials and biodegradable products. Based on advanced grain fermentation technology and cutting edge catalyst manufacturing technology, bio acrylic acids are mainly used for eco-friendly super absorbent polymers, a raw materials of diapers and other various hygiene products. We are also working on technology development cooperation for commercialization. We are trying new things to establish a sustainable circular economy system. We will enhance product competitiveness through product recycling and bio/biodegradation portfolios and evolve into a total circular economy leader acknowledged by the market.



Team Leader of Energy Solutions Business Development Team 3, Park, Sang-Kyoung

The recycling rate of battery waste is less than 5%, which has a negative effect on the environment in terms of circular economy. With the increasing distribution of electric vehicles, over 10 million tons of battery waste are expected to be produced by 2030. In preparation for such market change, LG Chem is preemptively operating a process scrap-centered circular economy system. Business sites in China have established a closed-loop in partnership with suppliers. Business sites in the Republic of Korea and Poland will establish a closed-loop by 2021. Based on our technology and experience, we will expand our business to battery waste recycling. Reuse of battery waste requires cooperation with a variety of stakeholders such as customers, central and local governments, and suppliers. The demand for the reuse of battery waste from second-generation electric vehicles is expected to grow dramatically from 2025. Therefore, we are establishing a business model for R&D activities on the prediction of residual values and performance of batteries and cooperating with customers. We are conducting a variety of demonstration research studies as well. We are going to create business synergy and pursue social and environmental values by establishing a battery waste circular economy system.



Leading Sustainable Innovation for Customer

Circular Economy
Environment Protection
Responsible Products



Managing the Impacts of Climate Change



Making a Positive Contribution to Society



Circular Economy & Environment Protection

LG Chem is creating new business opportunities and contributing to the circular economy through plastic waste and battery waste recycling. In addition, we are pushing for environmental protection and eco-friendly management by minimizing waste.



Raw materials of PCR plastic

Circular Economy

When PCR plastic is used, CO₂ emissions decrease by **40~50%** compared to general plastic products

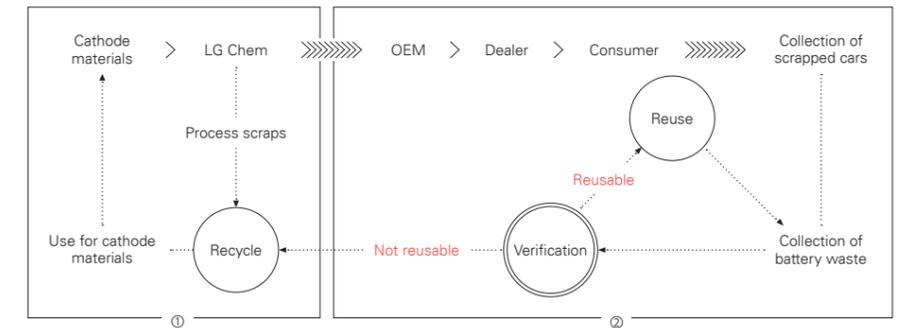
Plastic Recycling

LG Chem recycles separated or selected plastic waste used by end-consumers, after the process of shredding and extruding or compounding. This is called PCR plastic. Many businesses, especially global IT companies, began to use PCR plastic proactively. When PCR plastic is used, CO₂ emissions are guaranteed to decrease by 40% to 50% compared to general plastic products. We are developing customized solutions by using PCR products. Our PCR production capacity reaches 11,000 tons per year.

Battery Recycling & Reuse

As more and more electric vehicles are being used, battery wastes are expected to increase continuously. LG Chem is carrying out a variety of plans to recycle and reuse batteries based on its advanced technology and long experience in the energy solutions business. In particular, we are pushing for the reuse of battery waste for other purposes such as ESS batteries. We are recycling battery waste and process scraps with our optimized recycling technology. We are conducting various research studies and cooperating with partners in order to minimize environmental pollution during recycling and reuse of battery waste, and realize a circular economy with a recovery rate of near 100%.

LG Chem's Circular Economy Process



- ① Recycling: To meet the environmental policies of major countries, we operate a recycling process utilizing non-reusable dead batteries and scraps generated during battery production. We have a strategic cooperation relationship with major partners for realizing a closed-loop. Through this system, we extract raw materials of batteries such as nickel, cobalt, and lithium by crushing and dissolving battery waste or scraps.
- ② Reuse: Battery waste of electric vehicles may be reused depending on their residual lifespan and conditions. We are taking the initiative in establishing a circular economy for batteries by cooperating with various automobile manufacturers and continuously studying battery reuse technologies. When the lifespan of reused batteries ends, we can recycle them on our own.

Best Practice

Yearly Sludge Generation

84% ↓

Waste Treatment Costs Reduction

KRW 2.3 billion

Improving Plant Environment by Reducing Solid Waste

As waste generation and open-air storage increased with plant extension, LG Chem Huizhou Plant^{LGCHZ} needed to treat waste in a timely manner. To resolve this issue, LGCHZ improved polymerization stability and reactor cleaning methods to reduce sludge during the polymerization process. Introducing a new-concept low-temperature sludge dryer, the company reduced sludge generation by 84% per year. As a result, KRW 2.3 billion in waste treatment costs could be saved. In addition, the new dryer reduced risk such as fire and odor compared to preexisting dryers.

Creating Economic and Environmental Value Through Improving the Incinerator

As the inventory amount of waste liquids—a process by-product—increased, LG Chem Yeosu VCM Plant reached the waste liquid storage limit. As a result, employees' workloads and operation costs rose. Furthermore, the waste liquid incinerator shut down frequently, which caused corrosion and leak. We stabilized the tele-monitoring system^{TMS} and reduced total nitrogen in the wastewater by removing the interference phenomena from the TMS analysis facility and changing chemicals for the incinerator. Currently, the incinerator is operating stably, thereby increasing waste liquid incineration and reducing corrosion and leak resulting from shutdown.

Focus

LG Social Campus Social Fellow - ART IMPACT/RVFIN

Social fellow companies supported by LG Social Campus are creating a socio-economic ecosystem in various eco-friendly fields. In particular, they are running a variety of businesses and conducting the relevant activities for circular economy and environmental protection. In 2019, ART IMPACT, one of the social fellows, launched Blue Orb, a fashion brand using eco-friendly materials. Its signature products include eco-friendly fashionable swimsuits made of nylon fiber recycled from nets abandoned in the seas and leather goods made of recycled leather scraps. RVFIN, a social fellow located in LG Social Campus, operates a cup-sharing and catering service named Sulaboux for plastic-free and environmentally friendly campaigns. Sulaboux supports ocean cleanup activities and donates 1% of its profits to environmental organizations.



ART+ IMPACT+



RVFIN

Environmental Management and Protection

LG Chem ISO 14001 certification

About 99.8% based on production quantity



Korea: Yeosu (Hwachi, Yongseong, and Jeongnyang), Naju, Ochang, Paju, Gimcheon, Daesan, Ulsan, Iksan (Automotive Materials, Industrial Materials, and Life Sciences), Cheongju, Onsan, Osong, and R&D Campus Daejeon

Overseas: LGCBH, LGCBT LGCTJ, LGCYX, LGCYZ, LGCHZ, LGCCQ, LGCNJ, LGCNA, LGCNB, LGCMI, LGCEA, LGCBJ, LGCTW, LGCVZ, LGCVH, LGCHC, and LGCWA

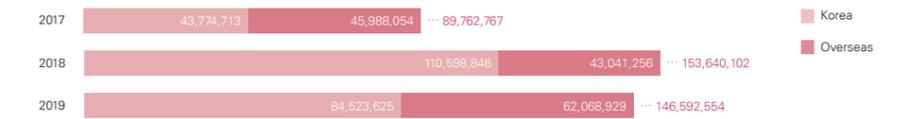
Environmental Management System

LG Chem is establishing and operating a systematic environmental management system with its strategic tasks and goals based on ISO 14001, the International Standards of Environmental Management System. We are measuring the amount of waste, air pollutants, and water pollutants at our business sites. We submit the collected data to government agencies and disclose important information to stakeholders through a variety of communication channels.

Investment in Environment

LG Chem is making an investment in the environment of worksites every year in order to enhance the environment. In 2019, we invested KRW 146.6 billion in the environment.

Investment in Environment of Manufacturing Sites (Unit: KRW 1 thousand)



Promotion of Zero Waste to Landfill

To protect the ecosystem, LG Chem aims to actively promote recycling of waste discharged from its business sites to zero waste to landfill. In the case of LGCMI, the battery business sites in the U.S., it has recycled more than 90% of the waste discharged from the site and obtained the Zero Waste to Landfill certification from the Underwriters Laboratory^{UL}, a global environmental safety certification company, in 2018. LG Chem plans to apply Zero Waste to Landfill as a mandatory certification to new business sites in the future.

Focus

Biodiversity

LG Chem is taking an active part in a variety of activities for biodiversity. In 2017, LG Chem launched Green Maker volunteer groups to preserve the biodiversity of Bamseom Island near its Seoul Headquarters. Through volunteer activities, employees remove harmful plants and clean up Bamseom Island (Ramsar wetlands designation in 2012). Around 500 employees have participated in volunteer activities until 2019 in order to protect the biodiversity of Bamseom Island. In 2018, we opened the Bamseom Ecological Experience Hall in collaboration with the Seoul Metropolitan Government. We are taking the initiative in widely promoting the history and values of Bamseom Island to citizens. In addition to our activities in Bamseom Island near the Seoul Headquarters, Ochang Plant in Cheongju is conducting the Musimcheon Stream Protection Campaign to protect the biodiversity and environment of Musimcheon Stream, a river representing the region.



Bamseom Ecological Experience Hall



Bamseom Protection Campaign



Musimcheon Stream Protection Campaign



Responsible Products

Materials and products commonly used in our daily lives may affect our health and environment. LG Chem is making efforts to reduce such negative effects.



Manufacturing process of Poly Olefin Elastomer^{POE} from Daesan Complex

Product Stewardship

Establishing Product Stewardship System

LG Chem provides customers with eco-friendly, competitive materials and solutions and contributes to a sustainable future for customers. For this purpose, we have decided on Eco-Product Solution Partner as our vision, and we have been carrying out a variety of activities to provide solutions that are effective and valuable in terms of environment and economy throughout the entire product lifecycle from R&D to disposal. As part of our activities, we have been operating the regulations and systems we have established throughout all processes from raw materials procurement to final sale so as to ensure the eco-friendliness of chemical products. We have distributed the Eco-SCM Guideline including domestic and overseas regulations such as EU REACH SVHC¹⁾, CA Proposition 65²⁾, and regulatory laws for conflict minerals. We encourage our suppliers to follow the guidelines. The Procurement Department receives chemical component information from suppliers through CHARMs2.0, a Chemical Hazard Assessment and Risk Management System. Only the materials approved through hazard and risk analysis can be purchased. To manage the eco-friendliness of materials, the Procurement Department and Environment & Safety Department communicate CHARMs2.0 on a regular basis. In addition, the Quality Department and CS Team are communicating with customers for product quality management.

- 1) EU REACH SVHC: Substances of very high concern in EU's new chemicals management system
2) CA Prop 65: California's Safe Drinking Water and Toxic Enforcement Act

Strengthening Preliminary Survey for Eco-friendly Product Development

To determine the direction and level of eco-friendly product design, LG Chem surveys the environmental laws, regulations, specifications, voice of the customer^{VOC}, accidents, etc. of the nations and regions related to its products. We then reflect the results to the Eco-SCM Guidelines. Furthermore, we limit the use of substances that are highly harmful to the environment or human body.

Strengthening Product Stewardship Competence

LG Chem provides training so that employees are aware of the importance of product stewardship and carry out their environmental and social responsibility to the fullest in business activities. We provide working-level staffs of the relevant departments including procurement, development, and quality with a variety of training programs. Training programs include Material Safety Data Sheets^{MSDS} preparation and management, registration process of chemical substances of EU REACH and Act on the Registration, Evaluation, Etc. of Chemicals, and responses to environmental regulations on global products.

Strengthening Product Safety System

LG Chem is strictly managing environmental hazards for all products from raw materials in accordance with the Eco-SCM Guideline. Hazardous substances are divided into 3 phases depending on the risk. We improved our system so that all materials can be purchased after management matters are checked. In addition, we review product regulation guarantees through CHARMs2.0. We are checking the harmfulness and risk of all materials using an MSDS check network. In addition, we issue product environmental guarantees via the system.

Chemicals Management System

LG Chem first created a chemicals management system in 2014 to prevent environmental safety accidents and comply with regulations throughout the entire process from purchase/warehousing to use. In 2019, we renewed the CHARMs2.0 to strengthen product safety as well as our ability to comply with the laws. We block all potential risk in advance using CHARMs2.0 by acquiring chemical component information and reviewing harmfulness and legal response information before ordering raw materials. Such raw materials information is combined with Bill of Material^{BOM} information and regulation information of products. We are utilizing CHARMs2.0 as a platform to obtain and manage the risk information of our products. In addition, we are sharing information with quality management staffs by providing up-to-date information on global product eco-friendliness, safety, and harmful chemicals regulations. In particular, we post legal regulations by nation and mandatory items to be observed in order to prevent violations of the law during business. In 2020, we will improve the chemicals process and apply CHARMs2.0 throughout the production bases in China. We will establish a foundation for applying CHARMs2.0 to all overseas business sites.



Response to Chemicals Regulations

LG Chem has created a database for chemicals used by the company or regulated at home and abroad so as to prevent any violation of global regulations. The database identifies new chemicals, existing chemicals subject to registration, and regulated chemicals in order to guarantee the chemicals' legality as required by each nation and corporate customer. We joined a consortium of the Korea Petrochemical Industry Association to comply with the Act on Registration, Evaluation, Etc. of Chemicals. In 2018, we have registered 40 out of 510 chemical substances subject to registration. We are currently working the on co-registration of 63 chemical substances. In overseas markets, we have registered 39 substances in accordance with the EU REACH Regulation. In addition, we are responding to the chemical substance-related laws of different countries including China, US, and Taiwan.

Eco-friendly Partnership Conference for Partners

LG Chem holds an eco-friendly partnership conference every year to help its suppliers comply with the chemicals regulations. Around 300 persons from 220 suppliers attended the 2019 Eco-friendly Partnership Conference. In this conference, we announced the major contents of Korean chemical laws and the renewed contents of LG Chem's Chemical Hazard Assessment and Risk Management System. In addition, we shared our CSR evaluation, shared growth activities, and support for suppliers through the energy shared growth project. We will make efforts for continuous exchange so that suppliers respond to chemicals regulations faithfully.

Global Chemicals Management

LG Chem is preemptively responding to global regulations—such as establishing the Global Product Environment Regulation Response Manual—in order to reduce the chemical regulation risk in its global business. As part of such efforts, we revised the Development and Management of Eco-Friendly Products as Eco-SCM Guideline. The criteria for product component management, including the prohibition on harmful substances designated at home and abroad, have been subdivided for each materials and regulation. We provide guidelines across product development, production, and supply to respond efficiently to the demands of different countries and customers. Our IT system has been applied to provide up-to-date MSDS of our products in 33 languages. In addition, the demand of global customers and latest legal trends are reflected in the guarantee form issued by the system.

Life-Cycle Assessment^{LCA}

LG Chem evaluates the six environmental impact categories¹⁾ including global warming in accordance with the Ministry of Environment's Environmental Product Declaration Certification Guidelines. As of 2019, the rate of the sales of LCA-conducted products to sales by product²⁾ is 63.6%.

1) Environmental impact categories: A biotic resource depletion, global warming, ozone depletion, acidification, eutrophication, and photochemical oxidant creation
2) The standard of sales by products included internal trade.

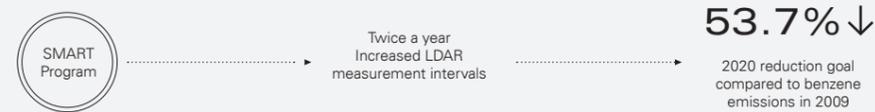
Providing up-to-date
Material Safety Data Sheets^{MSDS}
in **33** languages

Ratio of LCA-conducted products
to sales by product as of 2019
63.6%

Focus

Chemical Emission Reduction Program

Based on an agreement with the Ministry of Environment, LG Chem Daesan Complex is operating the SMART Program to reduce chemical discharges in Seosan. The goal is to reduce benzene emissions by 53.7% compared to the emissions in 2009. To achieve this goal, we strengthened our Leak Detection and Repair^{LDAR} system standards and increased the LDAR measurement frequency.



Best Practice

Eco-friendly Poly Olefin Elastomer^{POE} Product

o **Harmless Hot Melt Adhesives POE for Food Packing**

Hot melt adhesives^{HMA} are also called eco-friendly materials since they adhere without any harmful solvent. Basically, HMAs are harmless due to the characteristics of the POE polymer process. Therefore, they are widely used for food containers, labels, etc. HMAs are generally used when a harmless adhesive is required for food containers and the adhesive and food do not come in direct contact with each other, just like drinking water bottle labels.

o **POE Encapsulant Enhancing Photovoltaic Panel Efficiency**

According to the Paris Agreement signed during the General Assembly of the United Nations Framework Convention on Climate Change^{UNFCCC} in December 2015, the reduction of greenhouse gases is binding and effective on all members from 2020. As a result, the use of renewable energy, including photovoltaic power, is expected to increase. We can easily find photovoltaic systems in our daily life. POE is the material most commonly used as an encapsulant for photovoltaic modules. Glass and photovoltaic encapsulants protect photovoltaic modules from the external environment. Photovoltaic encapsulants should be transparent, so light can go through them as much as possible. In addition, they should be able to block external air and moisture with outstanding adhesive property. They also should be highly compatible with UV stabilizers, etc. With such properties, POE is used as a main ingredient of encapsulants for photovoltaic modules.



POE used for hot melt adhesives



POE used for photovoltaic encapsulants

Quality Management

Enterprise-wide Quality Management System

LG Chem is improving its quality management system to increase customer trust and satisfaction. The Quality System Team was established to enhance the quality system at all sites. This team inspects the quality management system of major business sites to find and fix nonconformities. CEO quality conferences and quality workshops hosted by heads of business companies are conducted to establish employees' awareness of quality. In addition, we provide office/field staff with quality mindset training hosted by the quality managers of business sites.

Advancing Quality Management System and Competence

LG Chem has been implementing the standard development processes it has established, such as Failure Mode & Effects Analysis^{FMEA} and step-wise gate review process, in order to rearrange the quality standards of major quality processes and secure quality stability from the development stage. In addition, we are operating the Chemical Quality Council to improve the quality management system of each business division. The quality council consisting of the top management from all subsidiaries of the LG Group enhances the common quality processes of the Group. To improve the role and competence of the quality organization, we opened the Quality Academy Level I (basic), II (intermediate), and III (advanced) courses to train talented quality workers required for quality improvements. Especially, we are training certification experts for the organized management of the quality system. We have trained 170 auditors of ISO 9001, IATF 16949, and VDA 6.3 certifications so far.

Lean Six Sigma to Improve Efficiency KPIs and Ensure Manufacturing Competitiveness

Efficiency is a key to corporate competitiveness in the business environment with limited resources. To achieve the efficiency goal, LG Chem is pushing for Lean Six Sigma for all employees. LSS is a methodology that combines the quality improvement activity "Six Sigma" and the idea and tools of "Lean Production" Toyota's production-based innovation activities featuring process efficiency and improvement. LSS is conducted in several stages—including prioritization, task implementation, and performance verification—in order to develop and conduct a project pool for accomplishing efficiency KPIs. In 2019, a total of 3,937 LSS projects have been carried out. All domestic and overseas business areas are continuously creating excellent innovation cases. For this, we are cultivating Lean Six Sigma experts specializing in in-house problem solving. We increased Master Black Belts^{MBBs}—the key project leaders in business areas—from 143 to 213, and Black Belts^{BBs} from 1,070 to 1,495. To accomplish our efficiency goal, we are creating an innovative culture for continuous improvements with our competent experts.

Fostering
170
new QMS auditors

LSS experts increased to
213 MBBs,
1,495 BBs

Best Practice ————— Examples of Quality Innovations by Business Companies Through LSS Projects

- **Petrochemicals**
Enhancing production and increasing sales by KRW 1.7 billion by improving the variation of physical properties of POE products through big data analysis
- **Energy Solutions**
Saving loss costs by KRW 500 million per year and improving low-voltage testing errors by developing IT systems
- **Advanced Materials**
Increasing productivity and preventing environmental accidents by introducing an unmanned automated testing system to the cathode materials process
- **Life Sciences**
Reducing white sediments in the finished products, enhancing yield rates, and saving loss costs by KRW 150 million per year by improving the Eutropin Pen ingredient dissolution method

Customer Satisfaction

Solution Partner for the Innovation of Customer Satisfaction

Since market and customer needs keep changing, it is important to differentiate our products and services through continuous development considering changing needs. LG Chem will gain the trust of strategic customers through Solution Partner for innovation of customer satisfaction, which provides customized products and services and contributes to customers' problem solving and performance. We identify the pain points and needs of strategic customers to propose the customer values they want first and utilize all available resources and competences including R&D, production, and service.

Quality Improvement and Quantitative Expansion of Solution Partner Activities

In 2019, we pushed for quality improvement and quantitative expansion of Solution Partner. First of all, we categorized all projects into 4 solution types (customer problem solving, performance improvement, support for growth, and co-development). For quality improvement, we specified 5 activities processes: selecting strategic customers, finding customer issues, clarifying values to provide, providing solutions and customer evaluation. We attempted quantitative expansion for each business area by shifting to central project development and expanded the targets to suppliers as well as customers through Energy Solutions' win-win cooperation with suppliers. In 2019, we have completed 59 projects. As a business partner growing with customers, we will keep creating successful customer satisfaction cases in all fields.

Best Practice

Reducing Cost and Ensuring the Quality Competitiveness of Adult Diapers

We enhanced cost competitiveness by maintaining quality. Specifically, we concentrated our competences on the quality improvement and customized super absorbent polymer^{SAP} proposal through a customer product structure analysis. As a result, we were able to strengthen our partnership with customers.

Targeting the Global Market by Developing Conductive Products with Wide Processing Range

We ensured rigidity and conductivity at the same time by applying self-developed high-purity carbon nanotube^{CNT} to lightweight plastic automotive components. In addition, we encouraged our customers to apply a single material to all production models for efficient inventory management.

Total Care Solution for Juvenile Patients Receiving Growth Hormone Therapy

We provided differentiated customer values by developing patient-centered SMART solutions and applications, such as growth hormone injection education system, communication with customers, customer opinion collection, and provision of administration aids.

Securing the Competitiveness of Supply Chain by Developing and Building a Shared Growth Operation System

Establishing and implementing strategies for integrated operation of suppliers in the battery purchasing/quality sector, building 11 tools for supplier management (includes quality, system/Process, LSS), and strengthening the operation system for securing the competitiveness of suppliers at the level of global customers through the cultivation of professional personnel.



Carbon Nanotube^{CNT}



Eutropin PEN



Managing the Impacts of Climate Change



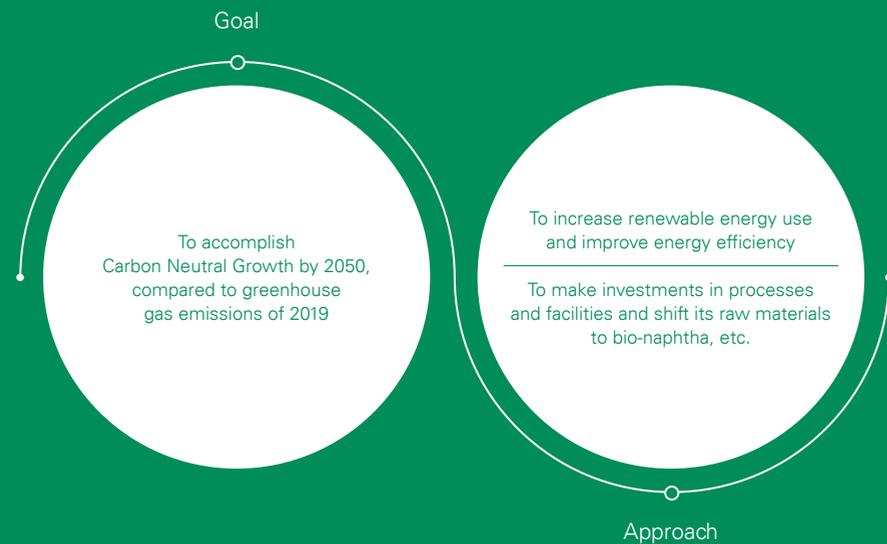
Climate Action

Climate change has been a global issue for a long period of time. It is becoming a very significant issue that may severely affect our business if we do not make active efforts for climate action.

In December 2019, the EU announced the 'European Green Deal'. Carbon neutrality should be realized by 2050, and carbon border taxes will make countries emitting too much carbon reconsider their environment efforts. In addition, incentive systems are reorganized to realize coal-free operation and distribute more renewable energy. The EU has been suggesting a variety of regulations. Carbon emission regulations on automobiles are being tightened. In addition, European nations prohibiting the sale of internal combustion engine vehicles stage by stage.

The US is legislating for climate action, led by its local governments. 24 states of the US have enacted an act to reduce carbon emissions and increase renewable energy. Hawaii has declared that it will accomplish carbon neutral growth by 2045, with California and New York declaring the same by 2050. In particular, California introduced stronger exhaust gas/fuel efficiency standards than the federal government. The California state government suspended the purchase of new vehicles produced by companies not complying with the new standards. A total of 14 states including New York and Washington have applying the adopted standards of California. Leading global businesses have been pushing for carbon neutrality mission and goals they have established. Through a preemptive response and bold investments, they are making efforts to ensure dominance in the market.

Goal & Approach



Special Interview



Vice President of Corporate Affairs Department, Park, Jun-Sung

Climate change is now recognized as a major issue for the sustainable growth of human beings as well as an environmental issue of individual nations and companies. The 'European Green Deal', tightened CO₂ emission criteria of internal combustion engine vehicles, and spread of Global Renewable Energy 100^{RE100} are now business requirements that ask businesses to become aware of and follow climate action. The current industries, especially the financial market, are demanding corporate efforts for climate action and transparent information disclosure through global sustainability standards such as Task Force on Climate-related Financial Disclosure^{TCFD} and Sustainability Accounting Standards Board^{SASB}. LG Chem is strengthening its climate action governance by holding an enterprise-level Energy Committee meeting and operating a relevant department. In addition, we are carrying out energy efficiency activities every year for all global business sites. We are taking the initiative in reducing greenhouse gases through the Shared Growth Energy Project for Suppliers and Green Partnership Project. Above all, we are leading climate action by providing fundamental carbon reduction solutions through the global leading automotive battery business.

This year, we have clarified the sustainability strategy and have established the challenging goal of "2050 Carbon Neutral Growth" for the first time among Korean petrochemicals companies. In order to reduce carbon emissions more than 75% compared to BAU, we are considering diversified plans such as increase in renewable energy, conversion of raw materials, and energy efficiency. Considering climate change to be an opportunity as well as a crisis, we will respond to it by preemptively utilizing all our core competences from R&D to processing technology. In addition, we are going to develop and provide differentiated eco-friendly solutions and communicate with stakeholders transparently in order to take the initiative in resolving global climate change issues.



Managing the Impacts of Climate Change

- Climate Action
- Renewable Energy
- Water Management



Climate Action & Renewable Energy

Considering global climate change issues as a new opportunity for growth, LG Chem has been operating systematic management systems including governance to reduce greenhouse gas emissions and enhance energy efficiency and goal management.



ESS operation management in Ochang Plant

Climate Action

Climate Action System

As part of climate action, LG Chem is making efforts to save energy and reduce greenhouse gas emissions from its business sites. We are minimizing the impact of changes in domestic and overseas energy policies by taking active part in government climate change policies. In addition, we are making efforts to accomplish the industrial greenhouse gas emission goal by strengthening corporate competitiveness and supporting suppliers' investment in energy saving.

Climate Action Organization

LG Chem is establishing and implementing enterprise-wide energy management policy and operating the Energy Committee. The Energy Committee consisting of CEO and plant leaders inspects energy saving and greenhouse gas reduction activities of the year and decides the plan and important matters for the following year. In addition, we are operating an energy committee by business sites in order to manage the annual reduction goals and current energy status. We hold a technology exchange meeting for energy staffs to share energy reduction cases of business sites and reward excellent performances. We are encouraging employees to make efforts for energy saving.

We are operating the Energy/Climate Change Team to respond preemptively to domestic and overseas greenhouse gas regulations and manage our energy usage and saving goals systematically.

In cooperation with the relevant departments, the Energy/Climate Change Team is supporting energy usage and reduction management, operation of the emission trading scheme, responses to climate change information, participation in energy/greenhouse gas policy, etc.

Climate Change Risks and Opportunity Factors

Considering climate change as its major management issue, LG Chem will respond to global climate change issues proactively. We categorized climate change risks and opportunity factors into regulatory aspect, physical aspect, and others and established a countermeasure for each issue. In particular, as a top priority of the Sustainability strategy, we have developed a carbon neutral growth strategy and are working on detailed action plans.

Analysis on the Risks and Opportunity Factors of Main Issues

Aspect	Issue	Countermeasure against risk	Opportunity factor
Regulatory aspect	Emission trading scheme	Operating a system to respond to the emission trading scheme	Implementing CDM projects and securing emission allowances
	Increase in green energy	Establishing renewable energy strategy	Increasing the use of renewable energy and reducing greenhouse gas emissions
	Product energy efficiency regulations	Monitoring energy efficiency regulations	Expanding a business opportunity such as electric vehicles, ESS, etc.
Physical aspect	Increase in average temperature	Strengthening the energy usage monitoring system	Establishing an energy saving system by installing energy efficiency facilities
	Change in precipitation due to heavy rain/drought, etc.	Establishing a natural disaster prevention system and increasing investments in recovery facilities	Mitigating the operational risks through application of a vulnerability testing and adoption system of climate change
	Uncertainty of physical threats		
Others	Corporate reputation	Strengthening external communication such as TCFD and CDP	Improving corporate image as a global chemical company
	Uncertainty of social factors	Introducing a world-class climate action system	

Preemptive Response to Greenhouse Gas Regulations

LG Chem has established a process and a system for the calculation of greenhouse gas emissions and purchase of emission allowances. We are minimizing financial risks resulting from participation in the domestic emission trading scheme. Before the emission trading scheme, we established the GHG and Energy Management System ^{GEMS}. Based on the GEMS, we have prepared a greenhouse gas inventory for business sites. Going through the goal management system and the emission trading scheme, we have upgraded this system to the emission allowance accounting system. The emission allowance accounting system calculates the expected emission trading costs by monitoring monthly energy usage and GHG emissions and reflects the numbers to the products' costs. We reduce financial risks by predicting the emission allowance purchase costs.

In addition, we are implementing internal regulations so that a GHG impact analysis can be conducted for all investments in new construction and extension after 2015 in order to consider all GHG risk factors when deciding such investment. Since 2017, we have established 8 types of guidelines including the Regulations on Response to Climate Change. We have been inspecting and managing systematic work processes and internal role and responsibilities through continuous update in order to respond to the emission trading scheme.

In 2019, we improved our system and automated the entire internal emission allowance management process related to responses to the emission trading scheme. In addition, we enhanced the efficiency of our responses to the emission trading scheme.

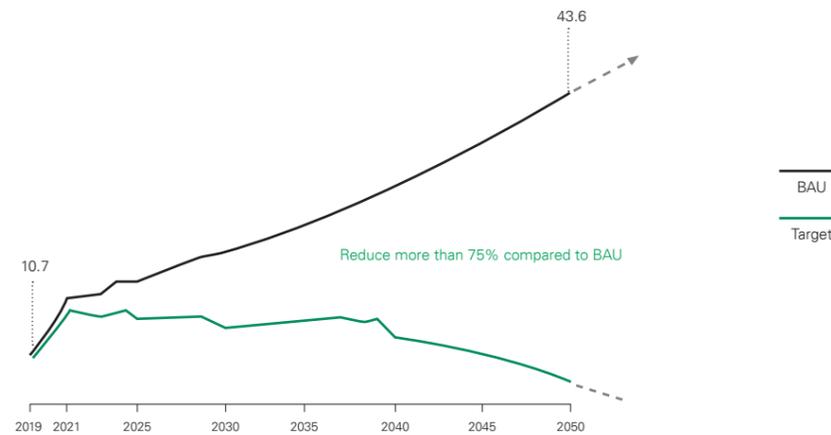
We formed a TFT in preparation for the third planning phase of the emission trading scheme (2021~2025). We are analyzing regulation-related risks and opportunities thoroughly. In preparation for an increase in GHG emissions resulting from investment in large-scale construction and extension, we are focusing on securing external emission allowances by reviewing a forward contract for overseas emission allowances and our own Clean Development Mechanism ^{CDM} projects.

Setting the 2050 GHG Reduction Goal

In accordance with the 2050 Carbon Neutral Growth Strategy, LG Chem has set a goal of reducing greenhouse gases more than 75% compared to 2050 BAU. We have set such challenging goal—same amount of 2019—in spite of our large-scale construction and extension investment plan for business expansion. Based on our goal, we will establish a world-class climate action system in the long term. In addition, we will carry out a variety of activities including increase in renewable energy use, the introduction of new technology such as Carbon Capture, Utilization, Storage ^{CCUS}, and social contribution-associated carbon offset project.

GHG reduction goal: To reduce more than **75%** compared to 2050 BAU

2050 GHG Reduction Goal (Unit: million tons)



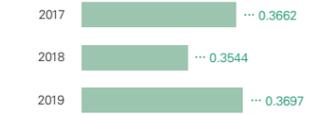
Energy Management

Operating **130MWh** ESS facilities

GHG Emissions (Unit: tCO₂-eq)



GHG Emissions Intensity (Unit: tCO₂-eq/Sales, KRW million)



Energy Management System

LG Chem is upgrading its energy management by establishing an energy management system (ISO 50001) at all the domestic business sites and major overseas business sites. We manage the monthly energy usage of all business sites and set an annual energy saving goal to improve processes, enhance facility efficiency, and introduce new technology. In addition, we are sharing energy saving cases of business sites and applying excellent technology more widely utilizing the energy technology exchange meeting and our internal system.

Increasing Renewable Energy Use

LG Chem is introducing more and more renewable energy and ESS facilities to domestic and overseas business sites. For energy self-sufficiency, we have installed photovoltaic systems in 17 domestic business sites so far. In response to global customers' demand for renewable energy use, Ochang Plant installed an additional 1MW photovoltaic system in 2019. In order to support the basis of the government's renewable energy expansion policy and increase renewable energy supply options, we are participating in the Demonstration Project for Policies of Renewable Energy Usage Recognition. Some business sites in the Americas and Europe purchase renewable energy directly from power companies. In addition, we are reviewing the extended application of renewable energy to overseas business sites including China. For efficient energy use and cost saving, LG Chem has installed ESS facilities with total capacity of 130MWh in 7 domestic business sites, and it has been operating such. ESS facilities are effective in restraining additional power plant construction, contributing to improving the stability of national power demand and renewable energy distribution.



Photovoltaic system in Ochang Plant

Energy Portal

LG Chem is operating an energy portal system to support energy saving and greenhouse gas reduction activities. The energy portal is used to manage energy and greenhouse gas reduction goals and share the major activities and issues for the year. Over 1,000 successful cases of energy saving have been uploaded to the technology DB system to share excellent energy saving technologies. In addition, we are working on a function wherein internal and external reviews of ISO 50001 energy management system can be performed online. We publish the Energy and Greenhouse Gas Newsletter every month to deliver important energy and GHG issues to business sites. We support the relevant departments so that they can understand and respond to such issues.

Certification as Excellent Energy Saving Business

Recognized for its energy saving result of 6% compared to the expected energy usage, LG Chem Paju Plant has been certified as an excellent energy saving business by the Korea Energy Agency in 2019. The Excellent Energy Saving Business Certification measures a business site's energy saving objectively and evaluates its voluntary efforts to improve energy efficiency. The certificate is given to business sites with excellent results. Since it was first introduced in 2018, LG Chem has acquired the certificate for 2 consecutive years.

Energy Shared Growth Project

LG Chem has been cooperating with the Korea Energy Agency since 2012 to help customers and suppliers save energy through facility education, energy diagnosis, facility investment, and performance management. We are conducting a variety of activities so that small and medium-sized businesses can establish an energy management system on their own. We conducted energy diagnosis on 57 customers and suppliers and found around 340 energy saving items from 2012 to 2019. This is equivalent to about 11,000 tons of GHG reduction and KRW 4.8 billion in energy cost saving. In addition, we have made facility investment of KRW 450 million so far for participating companies through shared growth investment and green fund. Recognized for our performance by the Korea Energy Agency, LG Chem was selected as an excellent case of the Energy Shared Growth Project again in 2019. Shinwon Chemical, the participating company, acquired the Energy Challenger (small & medium business with excellent energy management) Certificate in 2018.

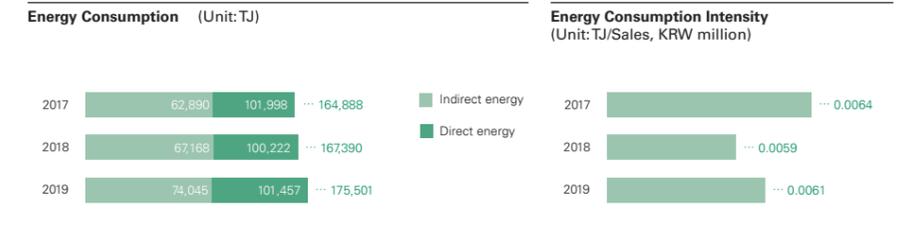


Energy diagnosis for suppliers

Conducted energy diagnosis on **57** customers and suppliers and found around **340** energy saving items

Green Credit Finding Business

LG Chem has built a consortium with the government, and it has been subsidizing a considerable amount of energy-saving facility installation costs for small and medium-sized businesses that have difficulty reducing greenhouse gases on their own. Small and medium-sized businesses reduced fuel costs by installing high-efficiency boilers, saved electric power, and reduced dust using integrated blowers. In addition, we contributed to distributing renewable energy through financial support for photovoltaic systems. Small and medium-sized businesses that have received financial support may enhance their environmental value by saving energy costs and enhancing their production cost competitiveness.



Focus

The power generation facilities with total capacity of **1,032KW**

Reduced carbon emissions by **650tCO₂-eq** per year

Amount returned to local communities for 20 years About **KRW 2 billion**

Green Partnership Project

Through the Green Partnership Project, LG Chem is producing eco-friendly power using photovoltaic systems and donating the profits to the underprivileged and adolescents from low-income families. In 2018, the first Power Plant for Hope Green opened its doors in Jungnang Sewage Treatment Center in partnership with the local government and NGO/NPO. By July 2020, construction of the second power plant will be completed in Cheongju North Transfer Center. The power generation facilities with total capacity of 1,032KW are expected to reduce carbon emissions by 650tCO₂-eq per year. Such is expected to wield positive environmental/social impacts by returning its profits of KRW 100 million to local communities every year for 20 years. In addition to power plants, we are carrying out the Green Remodeling Project, which installs insulation systems and replaces doors and windows to reduce the energy costs of children's welfare facilities. In 2019, we conducted such activities for Geumho Youth Reading Room in Seongdong-gu and After-school Youth Welfare Facility Center in Dongdaemun, Seoul.



Power Plant for Hope Green, Seoul



Green Remodeling



Water Management

LG Chem is managing water resource risks through a systematic management system, cognizant of the importance of water resources management.

Water and Wastewater Management

As global water scarcity is worsening, people's interest in water resource issues has been growing. Considering water resources management as a significant factor, LG Chem establishes water resources management policies and plans for sustainable corporate operation and social development.

Water supplied to LG Chem is categorized depending on the purposes of use after water treatment. Water divided by level is used for production, product cleaning, and utility operation. Enough supply of quality water is directly related to production and product quality. Water costs directly affect corporate finance.

The Utility Department of each business site is provided with water from local water withdrawal stations and suppliers in accordance with the internal standards, monitoring potential regulation risk as well as the available amount of water withdrawal depending on its production plan. In addition, the Utility Department recycles abandoned wastewater to minimize wastewater discharge. It manages water quality with its own standards, which are stricter than the regulations.

LG Chem has established water inventory at all domestic business sites. Based on this, we understand the water balance throughout all processes from water withdrawal stations to water/wastewater treatment and analyze the properties and costs of water by use.

In addition, we analyze the physical, regulatory, and environmental risks of local water resources using a water resource risk management tool and establish a countermeasure against potential water risk.

Best Practice

Decreased COD and BOD in the wastewater by **67%** and saved around **KRW 400 million** every year

Harmful Wastewater Reduction Technology for Eco-friendly Plasticizer Process

The huge amount of alcoholic wastewater generated during the eco-friendly plasticizer process emerged as an issue. This issue occurred when ingredients and water were treated together during the processes of reaction acceleration and neutralization. To resolve this issue, the Process Research Center of the Petrochemicals R&D Center extracted ingredients selectively from water using an extraction agent. As a result, the Research Center could reduce wastewater generation by decreasing COD and BOD in the wastewater by 67%, and save around KRW 400 million every year by recovering raw materials. In addition, we have developed our ability to respond preemptively to environmental issues by applying for 2 patents on wastewater treatment technology and ensuring eco-friendly process technology.

Improving Effluent Water Quality by Reducing T-N in Wastewater Treatment Plant

Due to the absence of a T-N treatment process, Daesan Complex 2 Wastewater Treatment Plant had difficulty responding to the high T-N wastewater generation. We needed to review the entire wastewater treatment process when working on developing higher value-added synthetic rubber products. To resolve this issue, we developed a simulation program to analyze and predict T-N concentrations in wastewater from synthetic rubber products; we maximized efficiency through the operational innovation of the wastewater treatment process. By developing and stably applying a state-of-the-art T-N treatment process, we are able to comply with the in-house management criteria, which are stricter than the legal discharge criteria. In addition, the new treatment process saved around KRW 2 billion in investment costs. It is meaningful since we can mass-produce higher value-added products by stably managing discharged substances.

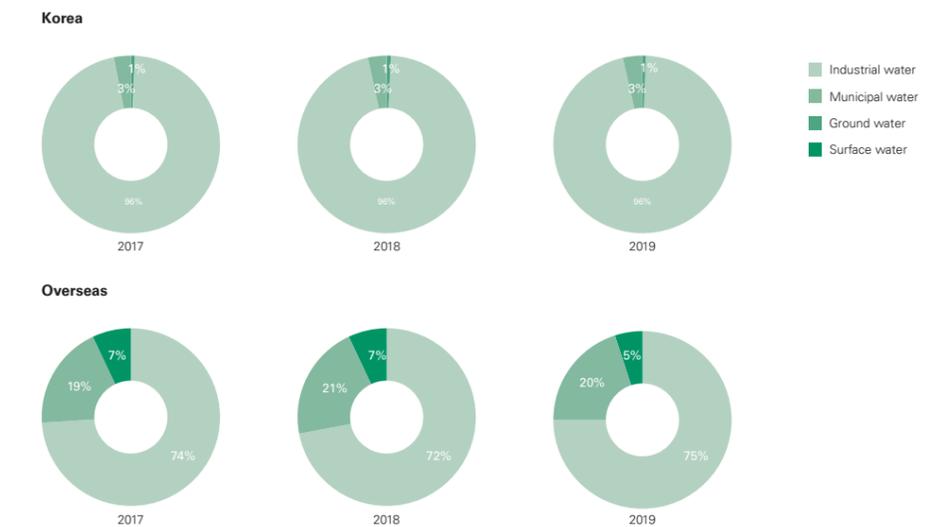
Smart Automation-Based EHS System

The processes of using water carry a variety of EHS risks. In particular, such risks increase when a process requires a high proportion of hand work. LG Chem Osong Plant established an automation-based EHS system to reduce water resources-related risks. We strengthened our ability to respond to unpredictable and unforeseen variables by converting wastewater source process control and automatic wastewater treatment control into unmanned, automated processes. In addition, we succeeded in enhancing operational efficiency by minimizing concentration deviations through the separation of high-concentration wastewater sources and by increasing total nitrogen removal rates using waste liquids. The web-based remote monitoring system enabled us to reduce by 64% the wastewater treatment warning, harmful chemicals, and designated waste and save on wastewater treatment costs.

Water Withdrawal (Unit: m³)



Water Withdrawal by Source





Making a Positive Contribution to Society



Responsible Supply Chain

With changes in systems, markets, customer purchasing patterns, etc. the energy solutions market is rapidly growing every year. Nonetheless, the complicated supply chain of various raw materials of batteries give rise to a variety of responsibility issues due to its opacity and difficulty of tracing. In particular, the risk of human rights of the supply chain, which was triggered by issues of child labor of cobalt mines in the Democratic Republic of the Congo^{DRC}, was expanded to the CSR issue of all the raw materials of batteries including lithium, nickel, manganese, and graphite.

With regard to the responsibility issue of the supply chain of the raw materials of batteries, different stakeholders demand proactive responses such as ensuring traceability throughout the supply chain.

Enhancing the sustainability of the supply chain of raw materials, which is important in a value chain, is crucial to improving business sustainability.

Goal & Approach



Special Interview



Vice President of Energy Solutions Strategic Procurement Department, Lee, Kang-Yeol

LG Chem's key task for sustainable business is responsible supply chain management focusing on the environment and human rights. As a global company affecting a variety of industries including petrochemicals and energy solutions, LG Chem operates its supply chain ethically and transparently on an enterprise-wide level, which is a prerequisite for mid- and long-term business strategy. We have established responsible sourcing policy based on the 'OECD Due Diligence Guidance for Responsible Supply Chains' and our sustainability strategy. In addition, we are working on third party-based audits to ensure objective data. We verify the adequacy of the supply chain management system from the new supplier selection process, and preemptively analyze and manage supply chain issues through regular CSR evaluation and risk improvement inspection. Current supply chain issues are expanded from the well-known child labor issues of cobalt mines to environmental pollution of other raw materials such as lithium and nickel. For more efficient supply management, we are continuously cooperating with global consultative bodies such as Responsible Minerals Initiative^{RMi}. We ensure the transparency of the supply chain and enhance management efficiency at the same time through a blockchain platform for tracing the cobalt supply chain.

Fundamentally resolving supply chain risks is a common task of all suppliers in the supply chain as well as LG Chem. By revising and distributing the Code of Conduct for Suppliers, we are proactively communicating with all suppliers in the supply chain so that suppliers can be sufficiently aware of the importance of the sustainable supply chain and manage issues systematically. We will take the initiative so that all suppliers can conduct responsible sourcing in compliance with international laws and standards.

As the global market grows, and the 'OECD Due Diligence Guidance for Responsible Supply Chains' becomes legally compulsory, responsible sourcing is expected to become mandatory in a wider range of industries. We will push for a preventive management system to respond to all types of risk swiftly without underestimating our current supply chain risks such as threats to human rights and environmental pollution. Ultimately, we will establish our own responsible sourcing system trusted by stakeholders including customers, investor, and suppliers.



Making a Positive Contribution to Society

Responsible Supply Chain
Human Rights, Diversity & Inclusion
Safety & Wellness



Responsible Supply Chain

LG Chem will establish a sustainable supply chain management system by managing suppliers' CSR risk and ensuring the transparency of raw materials procurement.



On-site inspection at cobalt mine

Responsible Sourcing

Due Diligence on Raw Materials Supply Chain

Since international human rights organization Amnesty International raised the issue of child labor in the cobalt supply chain in 2016, LG Chem has been making efforts to realize a responsible supply chain in many different ways. In order to inspect child labor, we conducted third-party audits on cobalt smelting companies and precursor suppliers of China in 2017 and an on-site inspection on artisanal and small-scale mines in the Democratic Republic of the Congo^{DRC} in 2018. We posted the results transparently via the website of LG Chem. We registered as a member of the Responsible Minerals Initiative^{RMI} under the Responsible Business Alliance^{RBA} in 2019. In addition to joining the initiative, we provided support for international efforts to reduce risk in the supply chain. To remove risks in the cobalt supply chain completely, we will complete voluntary total inspection by 2020 and analyze the risk factors of the supply chain. Through this, we are going to realize Clean Cobalt by inspecting a variety of concerns in the cobalt supply chain and applying solutions.

Tightened Code of Conduct and Preventive Process

In 2016, LG Chem established and announced the Code of Conduct for Suppliers. The Code of Conduct for Suppliers describes matters to be followed by suppliers in various fields such as human rights, labor, ethical management, health, safety, environmental sustainability, responsible mineral procurement, and grievance system. Based on the Code of Conduct for Suppliers, we verify the adequacy of the supply chain management system in advance from the new supplier selection process. We continuously manage supply chain risks through regular CSR evaluation and monitoring. The Code of Conduct for Suppliers is disclosed via the LG Chem website <http://www.lgchem.com> and the procurement portal <https://procurement.lgchem.com>. All suppliers are required to comply with the Code of Conduct for Suppliers. In addition to tightening the Code of Conduct, LG Chem is making efforts to establish a risk prevention process to find a variety of risk factors in the supply chain in advance. We made efforts to enhance the transparency of the supply chain by establishing and applying a blockchain based platform that can be neither manipulated nor hacked due to its distributed data storage. We will complete automatic interworking between the blockchain and supply chain tracking data in order to prevent fundamentally a variety of potential risks generated during production of raw materials by 2020.

Responsible Sourcing Policy

In addition to tightening the Code of Conduct for Suppliers, LG Chem established a responsible sourcing policy for raw materials procurement. This policy, in association with the Code of Conduct for Suppliers, specifies a variety of requirements for raw materials suppliers. In addition, we are operating a grievance handling system to respond to supply chain issues swiftly. Through the responsible sourcing policy, we will run a sustainable, responsible business by proactively resolving supply chain issues and contributing to the fundamental reduction of supply chain risks.

Supply Chain Management Related to Conflict Minerals

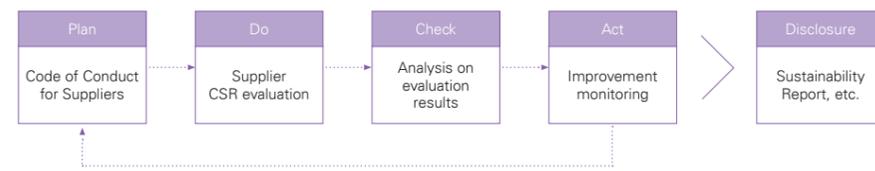
Conflict minerals refer to four minerals (tin, tantalum, tungsten, and gold) mined in the Democratic Republic of the Congo^{DRC} and neighboring nations. LG Chem has established policies to prevent environmental pollution, casualties, and labor exploitation in troubled areas and have been excluding conflict minerals from raw materials procurement. As part of our efforts, we conduct surveys on our suppliers using four minerals to check if they use any conflict minerals and to collect and manage information about smelters. Using an IT system, we are monitoring suppliers as well as the components of raw materials from the procurement stage. In addition, we essentially prohibit the use of conflict minerals as stated under LG Chem's Eco-SCM Guideline distributed to suppliers. Lastly, four companies of the LG Group (LG Chem, LG Electronics, LG Display, and LG Innotek) have formed a consultative body; they have been sharing the conflict mineral management policy every year. We advise the suppliers of the four companies not to use conflict minerals.

Supplier Sustainability Management

Supplier Sustainability Risk Management

As value chain sustainability issues become diversified and increasingly affect businesses both directly and indirectly all over the world, the importance of sustainability risk management is becoming more important. An increase in institutional investors and customers' interest in sustainability could be considered proof that governance, human rights, and environmental issues, which used to be categorized as non-financial values, are shifting to financial values. In particular, there is absolute demand for increased level of social responsibility to be fulfilled by our suppliers because issues that arise in the supply chain have a great impact on the overall value chain. We have been operating the supply chain management system we have established in accordance with the standards of UN, OECD, RBA, etc. We are also communicating closely with major stakeholders such as suppliers, customers, investors, and NGOs.

LG Chem's Sustainable SCM Process



Supplier CSR Evaluation

LG Chem evaluates suppliers every year to check whether they comply with the Code of Conduct. Improvement tasks and implementation results are monitored in connection with on-site inspections. CSR evaluation is carried out in relation to procurement evaluation (new supplier evaluation and periodic evaluation). In particular, in the case of the Energy Solutions Company, 'Sustainability' was introduced as an item in the evaluation of suppliers and 20% was applied as the same core assessment items as 'Quality' and 'R&D'. New supplier evaluation, which consists of 10 CSR items, is conducted on new suppliers. Periodic evaluation is performed on raw materials/facility suppliers. There are 63 evaluation items (as of the first half of 2020) including the prohibition of child labor, protection of workers, compliance with working hours, management of conflict minerals, management of safety, health, and environment approvals, and risk prevention. Supplier evaluation is conducted through LG Chem CSR Self-Assessment Questionnaire SAQ. As a result of an evaluation, the scores fell after a revision of SAQ in 2019. Nonetheless, the scores soon went up, indicating that suppliers' CSR compliance has improved. It was found that suppliers needed to improve some CSR fields including compliance with legal working hours, management of conflict minerals, and management of safety, health, and environment approvals. We are conducting an on-site inspection on suppliers in the high-risk group in order to check their major noncompliances and identify improvement tasks. An on-site inspection was performed on 3 suppliers in 2017, 16 suppliers in 2018, and 26 suppliers in 2019 and will be conducted on over 30 suppliers in 2020.

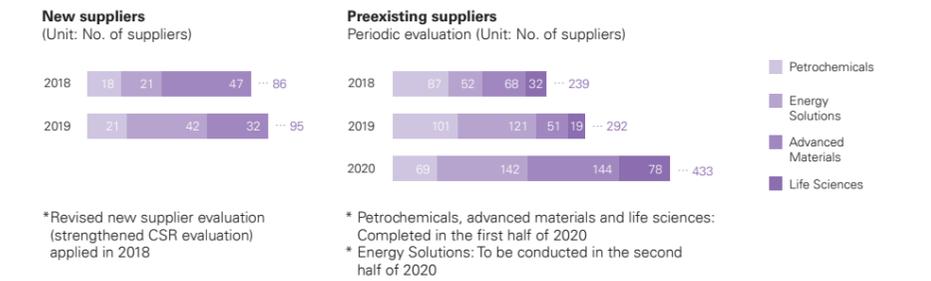
Supplier CSR Evaluation Process



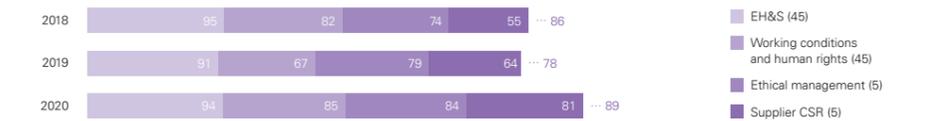
Improvement Monitoring

LG Chem applies the social responsibility clause to its standard procurement contracts so that suppliers can recognize the importance of CSR at the contract signing stage. We make them promise to improve when a major CSR risk is found. We demand and monitor suppliers to make improvement based on the procurement contracts and Code of Conduct.

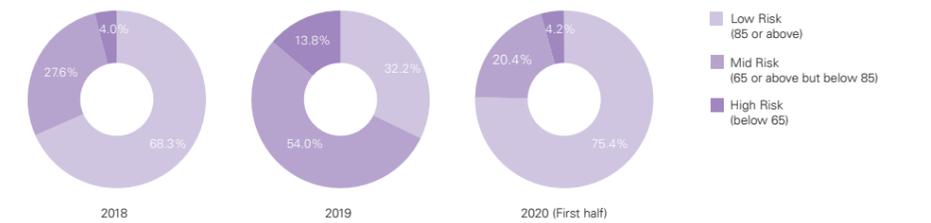
Changes in CSR Evaluation Suppliers



Scores



Risk Groups



* High risk groups increased as assessment criteria were strengthened in 2019

Changes in On-site CSR Evaluation Suppliers (Unit: No. of suppliers)





Human Rights, Diversity & Inclusion

LG Chem respects the human rights and diversity of its employees and all stakeholders and makes efforts to fulfill its responsibilities with respect to human rights throughout its management activities.



Speak-up culture at the Energy Solutions Company

Employee Diversity

Percentage of female employees in 2019

22.4%

LG Chem focuses on diversity and inclusion including gender issues. We are operating various improvement programs for local manpower of overseas business sites and generation gap.

Selecting Talented Female Individuals

To ensure employee diversity, LG Chem removes sexual discrimination from all jobs and recruitment based on its "Gender Irrelevance" policy. As a result, the proportion of female employees is continuously growing.

Cultivating Talented Female Individuals

LG Chem is systematically cultivating talented female individuals to increase the proportion of female leaders.

Female Leadership Training Program

To help female leaders establish their career visions and road maps and increase their influence on the organization, LG Chem operates the Female Leadership Training Program for female High Potential Individuals^{HPIs} and female leader candidates. Through this program, female employees can understand the internal/external environment and establish strategy for high performance based on self-awareness they obtain from individual and group activities. In addition, they learn how to create their own brands through relationship, cooperation, agreement, etc.

Female Communities by Group

We provide group coaching so that junior employees (assistants/senior assistants) can grow as talented individuals and create their own network. Through this, talented female individuals of similar ages/ranks reflect on themselves and empathize with each other. In addition, female employees can think about what they can do in the future as well as their growth goals as a member of LG Chem and as an individual and keep motivated to go forward.

Employees Status by Gender

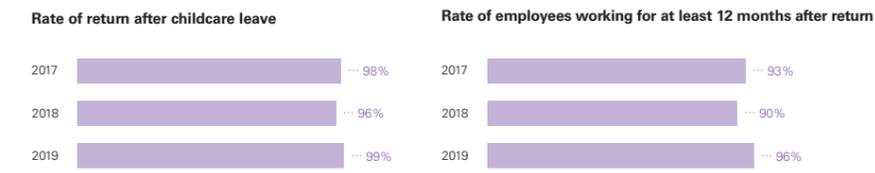


Female-Friendly Programs

LG Chem is helping female employees focus on work by operating the Women's Lounge in the Intranet G-Portal, Sexual Harassment Reporting Center, Employee Assistant Program^{EAP}, etc.

The Women's Lounge cultivates talented female individuals and supports female employees' work and life balance, a sound corporate culture, and the relevant systems. The Female Mentoring Program matches female employees to internal/external mentors one on one. Mentees may ask their mentors for advice on their concerns such as job competence, leadership, and office life.

Childcare Leave Status Korea



Cultivation of Local Leaders for Overseas Business Sites

The number of foreign employees of LG Chem now exceeds the number of Korean employees. Cultivating locally engaged employees as leaders is one of our diversity issues. Many of the current overseas sites leaders (head of site) were employed through external recruitment. Therefore, we are developing a variety of leadership courses and programs in order to cultivate associate/specialist staff as leaders and develop their vision and company loyalty.

Narrowing the Generation Gap

The generation gap that currently exists among LG Chem employees is a major issue that may have a huge effect on our future business. LG Chem has been analyzing and reviewing the generation gap for 2 years to create a speak-up culture. In addition, we have been implementing a variety of projects for narrowing the generation gap. Our leadership, including the CEO and Heads of Business Companies, communicated with associate/specialist staff and answered their questions in a casual atmosphere. During Vision Declaration conducted in May 2020, they communicated with employees in real time through a YouTube channel. Individual business sites operate organizational development programs so that their employees can discuss working styles and corporate culture freely. They are making efforts for a speak-up culture. In addition, we conduct a simple pulse survey on the generation gap and organizational culture on a regular basis and disclose the analysis results to employees.

Prohibition of Employee Discrimination

LG Chem is giving all employees equal opportunities for employment, promotion, compensation, and training in accordance with the clause on the Prohibition of Discrimination of the Global Human Rights & Labor Policy. The policy prohibits all types of discrimination against gender, age, race, religion, labor union activities, disabilities, pregnancy, marriage status, social status, etc. In addition, the HR Management Principles & Employment Rules stipulate that talented individuals should be employed regardless of race, nationality, gender, religion, disabilities, region of origin, affiliation, etc. We proactively operate a hiring-associated internship program for foreigners studying in the Republic of Korea. We contributed to organizational diversity by hiring foreigners. In order to contribute to developing a balanced local economy and reducing youth unemployment rates, we are operating some programs in non-metropolitan areas. Through such programs, we cultivate talented individuals in non-metropolitan areas and help them get a job in LG Chem.

Ratio of the Same Wages Paid to Both Genders

Category	2019
Executives (average basic pay)	0.93
Management positions (average basic pay)	0.91
Management positions (average basic pay and performance-related pay)	0.92
Non-management positions (average basic pay)	0.86

*Ratio of the Same Wages Paid to Both Genders: Locally engaged staffs in overseas business sites are excluded.
 *There is no gender discrimination in remuneration. The numbers are obtained by dividing the sum of the wages of female employees for each position by the sum of the wages of male employees for the position.

Creating Jobs for the Disabled

LG Chem is operating Happy Nuri, a subsidiary for workers with disabilities, to create jobs for the disabled. As of 2019, 179 employees with disabilities are taking care of beautification, steam washing, cafeteria, café, welfare facility, health keeping, and packing at business sites in Ochang, Cheongju, Daejeon, Osong, Magok, Yeosu, and Osan (Tech Center). In addition to Happy Nuri, 161 employees with disabilities are working for LG Chem.

Focus

Participation in Target Gender Equality^{TGE}

In 2020, LG Chem participated in Target Gender Equality, an initiative for increasing female leadership hosted by UNGC Korea. Launched in around 20 countries including the Republic of Korea, TGE is a program for increasing female leadership. Through TGE, we are going to provide a variety of programs to strengthen in-house female leadership.

Corporate Culture

Work-life Balance

LG Chem makes continual efforts to create a corporate culture that strikes a balance between work and home. In 2018, we expanded Flextime, which had been applied only to some divisions in July 2017, to all office workers and engineers. The Flextime System allows individuals to work at different times depending on their work characteristics. Since 2018, we have been operating an improved work system to enhance the quality of life of employees while increasing productivity and reducing unnecessarily long working hours. We adopted the selective flexible working hour system based on 40 hours work on average per week and maximum of 52 hours per week. For every hour of overtime work on weekdays and holiday work exceeding the basic monthly working hours, we offer 1.5 hours of compensative holiday so that employees can refresh themselves. With the introduction of Flextime, we adopted the Working Hour Management System to monitor and manage working hours in the intranet. Employees enter the starting time, ending time, and off hours of their work on the system so that their working hours can be managed in an organized manner. The flexible working hour system is applied when legal working hours need to increase temporarily for periodic plant maintenance, overseas business site extension, prototype production, etc. In this case, the settlement period is determined up to 3 months, and a work plan is established in advance. Employees may work up to 52 hours for a specific week within the average working duration of 40 hours for the period

Value-centered Working Styles

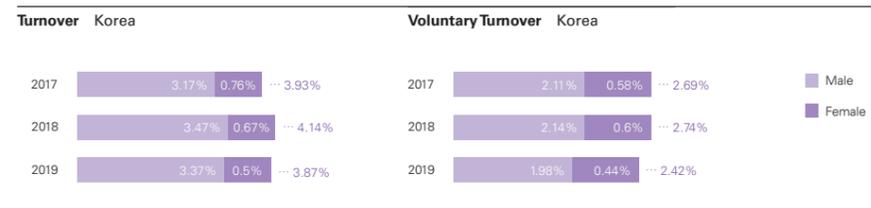
In order to focus on value-centered work, LG Chem is reinventing its working styles by providing enterprise-wide guidelines and conducting various activities according to Business Companies and Divisions.

In particular, we are encouraging actual organizational changes through team-based organizational development programs. We are operating 17 programs categorized into Task and Relation. All programs should be participated in by both leaders and members to empathize with organizational issues and find solutions together.

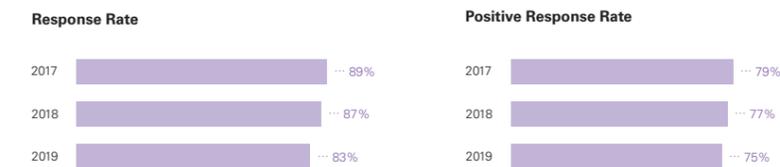
Through the Working Style Innovation Workshop, employees freely discuss the inefficiency factors of the organization with each other and ideate solutions.

Energy Management of Members

LG Chem has been managing the energy of its members systematically through the Wellness Program in 2018. This program was designed to prevent the burn-out syndrome that causes side effects such as no sense of accomplishment and reduced productivity due to extreme stress as well as physical, mental, and emotional fatigue. Members responded to the program positively: "a good opportunity to experience healing and self-introspection" and "a good time to look back on my body and mind's health." LG Chem will continue to take care of its members and prevent their energy from running out and lead innovations in the way we work to improve productivity through qualitative growth.



Employee Satisfaction Survey



*The employee satisfaction survey consists of a 6-point scale from "Very much" to "Not very much" including "Not sure"
 *This survey is conducted by LG Corp. for all LG subsidiaries. Raw data can be classified by organization or gender.

Human Rights

Human Rights Policy

Based on its management philosophy of "People-Oriented Management," LG Chem recognizes that respect for human rights is the most important element in its business. LG Chem joined the UN Global Compact^{UNGC} in 2014, and it has been striving to carry out business activities based on the Ten Principles of the UNGC including human rights. In 2016, LG Chem established and announced the "Global Human Rights and Labor Policy." LG Chem's human rights policy upholds and supports the philosophy and intent of international human rights provided in the labor law of every country and region that operates international standards and businesses related to human rights labor, including the Universal Declaration of Human Rights, UNGC's Labor Principles, UN Guiding Principles on Business and Human Rights, and ILO Fundamental Conventions. LG Chem's human rights policy is applied to all global sites where LG Chem performs business and shared with all stakeholders such as customers and suppliers who are directly affected by the business activities of LG Chem.

Human Rights Education

LG Chem provides education on human rights for its employees through a variety of methods such as online educational platform. We conduct education for the main areas that could carry a risk in human rights including compliance education, education on improvement of awareness on persons with disability, and workplace sexual harassment education more than once a year. Such education sessions are mandatory courses, and all employees must complete them every year.

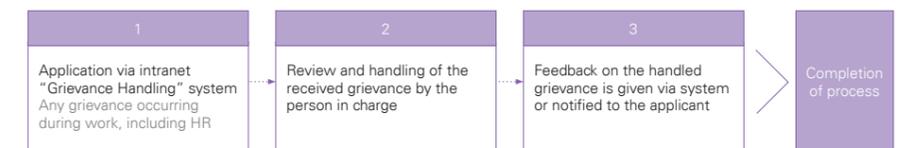
Human Rights Impact Assessment

LG Chem developed a self-assessment checklist for each area to assess human rights impact within the workplace and analyze risks according to the "Global Human Rights and Labor Policy." Based on this checklist, we conduct a survey among the subjects of human rights impact assessment, perform an on-site inspection (third-party inspection) along with self-assessment, and identify the necessary improvements. The main subjects of the assessment index are workers of inside subcontractors who are vulnerable to the violation of human rights. The fields of assessment index include the human rights management system, humane treatment, prohibition of forced labor, prohibition of child labor, prohibition of discrimination, working hours, wage and welfare benefits, and freedom of association and collective bargaining. The main methods for identifying risks include document review, interview, survey, and on-site inspection.

Analysis Results

In 2019, a human rights impact assessment was performed in the Ochang Plant and Cheongju Complex in Korea and Nanjing plant^{LG CJ} in China. A total of 20 subcontractors were inspected; we identified and improved the risks of human rights of subcontractors through worker surveys and interviews as well as document review. LG Chem already has a human rights policy for subcontractors based on the 2016 Global Human Rights and Labor Policy and the Code of Conduct for Suppliers. Nonetheless, we saw the need to improve measures for preventing human rights violations through the application of the policy by workplace, improved execution, monitoring, and grievance handling. We plan to advance the monitoring system of the Global Human Rights and Labor Policy and the Code of Conduct for Suppliers, reinforce the managing system for each subcontractor through preventive measures for human rights, and expand awareness on internal grievance scope and procedures.

Human Rights Grievance Handling Procedures





Safety & Wellness

LG Chem prioritizes environment, health, and safety management to ensure that employees can work safely.



On-site inspection at Yeosu Complex

Occupational Safety and Health

LG Chem OHSAS 18001 certification

About **98.4%**
based on production quantity



Korea: Yeosu, Naju, Ochang, Paju, Gimcheon, Daesan, Ulsan, Iksan (Automotive Material, Industrial Material, Life Sciences), Cheongju, Onsan, R&D Campus Daejeon

Overseas: LGCBH, LGCBT, LGCYX, LGGCGZ, LGCHZ, LGCNJ, LGCNA, LGCNB, LGCTW, LGCWA, LGCWR

EH&S System

LG Chem has built an organized environment, health, and safety management system based on ISO 14001, OHSAS 18001, and KOSHA 18001. We also established an EH&S policy to declare our commitment to EH&S management. We have in-house EH&S regulations and work guidelines for each business site to practice EH&S management. Leaders engage in on-site management activities, with each organization conducting its unique activities to prevent accidents. When an environment or a safety accident occurs, employees are evaluated based on the severity of the accident to apply practical prevention measures.

LG Chem's EH&S Policy

LG Chem perceives that EH&S are the fundamental factors for securing differentiated competitiveness, and it will faithfully practice the following matters for the continual improvement of EH&S performance based on clear goals and bold actions.

EH&S Policy

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

EH&S Governance

The EH&S Council of LG Chem is a body that makes major decisions related to EH&S. The Council consists of the top-ranking EH&S officers of the headquarters and business sites. The Council convenes twice each year to discuss the major EH&S issues of the company, outcomes of actions implemented, and future plans. The Council sets the direction for leading the EH&S policy and reinforces responsibility management. LG Chem has organized an Occupational Safety and Health Committee at each business site consisting of the same number of labor representatives and management representatives to deliberate on and resolve primary OH&S issues. The Committee prevents any risks that can occur at business sites and manages the health of employees. We are also discussing measures to improve EH&S and sharing exemplary business sites through EH&S meetings, team manager meetings, and workshops.

Strengthening EH&S Competence

LG Chem operates EH&S competence courses for employees in the EH&S, and related departments to increase the level of EH&S management. There are five courses: Process Safety Management^{PSM}, chemical substance management, electrical safety, firefighting, and work environment management. About 300 employees completed these courses in 2019.

The Process of Strengthening Safety and Environment Competence

Title of Course	Description	Participants in 2019
PSM competence course	Practical education on preparing process safety reports, including process safety data, process risk assessment, safe operation plan, and emergency action plan	107
Chemical substance competence course	Education on basic theories such as laws related to chemical substances and technical standards for chemical substance facilities, practical education on the chemical substance management system	39
Electrical safety competence course	Practical education on electrical safety laws, earthing, and efficient management of electric ignition sources such as static electricity	51
Firefighting competence course	Practice on the operation and inspection of gas- and water-based fire extinguishing systems including alarm systems, practical education on the initial response to leak of dangerous articles according to the US National Fire Protection Association	37
Work environment management competence course	Practical management of work environment including measurement and improvement, investigation on factors associated with duties that strain the musculoskeletal system, and examination of the trend of occupational diseases	54

Improving EH&S Management Competence Through Performance Sharing Meetings

LG Chem hosts annual performance sharing meetings at domestic and overseas business sites to share the activities conducted to prevent EH&S accidents so that employees can enhance their work competence. The 5th EH&S Performance Sharing Meeting was held in 2019. About 350 employees participated in this meeting, including the CEO, employees from domestic and overseas business sites, and employees of suppliers. This performance sharing meeting presented best practices of new EH&S technologies, exemplary cases of proactive health management, and suppliers that implemented an excellent EH&S system. Also shared at the meeting are field-driven themes and poster sessions of each business site introducing major activities. These meetings contribute to the settlement of the EH&S-first culture by enhancing our pride in EH&S duties and offering a benchmarking opportunity among business sites.

Reinforcing the Health Management of Employees

LG Chem measures the harmful factors in the work environment through an external professional agency every first and second half of the year to remove any health hazards at business sites. We try to ensure that all employees can work in a pleasant environment by establishing in-house standards that are stricter than the legal standards, conducting activities to prevent musculoskeletal diseases, and inspecting local ventilation systems.

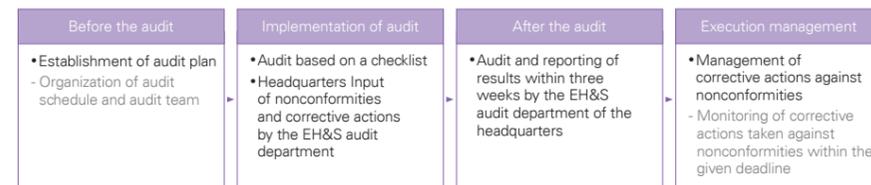
In addition, LG Chem is operating a health care office at each business site to provide personalized medical services to employees. We provide personal health counseling and information by implementing a general health checkup on employees older than 35 years and who have worked for five years or longer. Each business site has a variety of health promotion programs to minimize the latent health risks of employees and create a sound health management culture. A psychotherapy office is in operation for in-depth psychological diagnosis by professional counselors and treatment of employees who need hospital care.

EH&S Management Process

Law Management Process



Audit Management Process



Execution Management Process

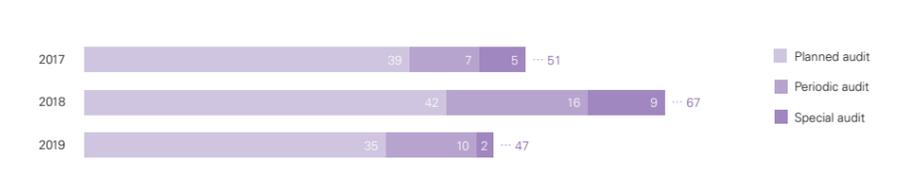


EH&S Audit and Technical Service

EH&S Audit System

The EH&S audit system of LG Chem is subdivided into periodic audit, planned audit, and special audit. The periodic audit encompasses the EH&S management system, process safety, facility safety, work safety, occupational health, firefighting, dangerous articles, and environment. The planned audit includes safety audit on suppliers, facility safety management, emergency response system, and fulfillment inspection. The special audit is conducted on business sites where serious disasters have occurred, or there is a likelihood of such. In 2019, LG Chem carried out 47 EH&S audits at its business sites including 10 periodic audits, 35 planned audits, and 2 special audits. We also devise plans for in-depth audits on business sites that record frequent accidents and system audits for newly constructed or acquired business sites. We will continue to perform random emergency audits to optimize the emergency response system of all business sites.

EH&S audit (Unit: Case)



Expansion of LG Chem Sustainability Rating System LGCSRS

LG Chem has constructed the LG Chem Sustainability Rating System LGCSRS and expanded its application at business sites in Korea in order to evaluate the level of EH&S management quantitatively and clarify the supplement points. The LGCSRS classifies the level of EH&S management system according to 720 items in different areas. Ten business sites in Korea, including Cheongju Complex and Ochang Plant, were evaluated using the LGCSRS in 2019.

In 2020, LG Chem will internalize the system so that in-house evaluators trained through professional education at each business site can institutionalize a voluntary evaluation culture. We are advancing the LGCSRS evaluation tool to reflect the latest trends of the global EH&S management system. We plan to spot the EH&S vulnerabilities of each business site by expanding the scope of the LGCSRS, come up with improvement programs for each item, and build the highest, global-level EH&S management system.

EH&S Competence Management System

LG Chem is advancing its "EH&S human resource management system." By quantifying and evaluating the job competence of organizations and individuals, we operated detailed education and training programs to improve EH&S competence and conduct organized EH&S management activities. The EH&S job competence management system consists of 43 common EH&S domains and 288 detailed items. The competence evaluation results are utilized to minimize the competence gap among organizations or individuals and improve professional competence.

We established the basic system for identifying and analyzing job competence and completed the pilot testing for practical application in 2019. In the future, we are going to finalize the evaluation system and continuously develop the system through company-wide expansion.

Best Practice

Prevention of Facility Leak and Discharge, Reduction of Maintenance Cost
by KRW **1.2** billion

Reinforcing Facility Safety by Changing the Paradigm of Preventive Inspection Using Internet of Things^{IoT}/Artificial Intelligence^{AI}

LG Chem's Daesan Complex has an application to find and remove fundamentally the risk factors in the early stage. In particular, an online monitoring system was created using Digital Transformation^{DX}, and an intelligent sensor AI technology was applied to manage facilities and examine abnormal signs in real time. We prevented the risk factors of key facilities by constructing a monitoring system for the appearance of lubricants; viscosity, moisture, iron concentration, temperature, etc.. We also prevented the operational leak of heat exchangers by implementing a bursting test. In addition, we removed fundamental pollutants and secured process safety by managing the pollution level of lubricant oil. Through such efforts, LG Chem successfully prevented facility leak and discharge and reduced the maintenance cost by about KRW 1.2 billion.

Embodying an Automatic Testing System for Furnace Roller

The cathode materials production process at Cheongju Complex used a high-temperature process based on a furnace* and which involved a high risk associated with facility management. Accordingly, LG Chem rearranged the inspection cycle to prevent rollover accidents of overloaded furnace rollers and established a completely robotic and automatic inspection system using vision testing equipment. The new system has shortened the time for inspection innovatively and removed the possibility of accidents. LG Chem plans to turn this process into an original technology by registering a patent. We will apply this process to other plants and businesses for accident prevention and response.

*Furnace: A process of forming products using heat

Securing Transportation Safety Through the Development of Transportation Information System

LG Chem's Yeosu Complex operates about 1,000 vehicles a day to transport highly flammable and dangerous products. Accordingly, Yeosu Complex established a system to monitor delivery vehicle information in real time to increase transportation safety; thus removing the factors that hinder safe driving. Real-time driving information enabled us to respond to any accidents swiftly. This exemplary case has laid the groundwork for applying DX throughout our logistics and transportation systems.

Focus

Strengthening EH&S Management Standards

In May 2020, workplace accidents occurred in India and Daesan Complex. LG Chem took immediate action to acknowledge and respond to the situation in India. We maintained close communication with the Central and State Governments of India to investigate the cause of the accident. We have established a special Task Force^{TF} to create a channel of communication for residents affected by the incident. Medical and household supplies are being provided as well as emotional support for their psychological stability. LG Chem will take all possible measures to prevent future recurrence, and mid- to long-term support programs will be implemented to contribute to the local community.

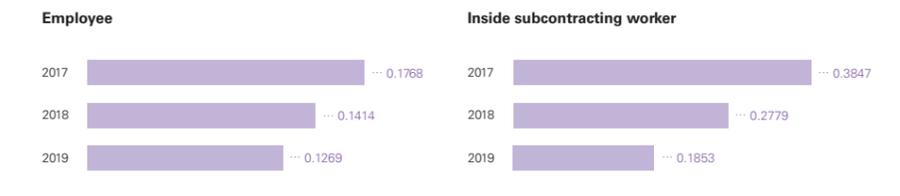
In the case of Daesan Complex, the factory was quick to take immediate measures on-site to extinguish the fire, and additional measures were performed to prevent further accidents and damage. LG Chem will assume responsibility in performing all possible measures to handle the said accidents. Moreover, we will conduct strict inspections and analysis on the cause of such accidents to make a concerted effort for the prevention of future recurrence.

Reflecting on the past, LG Chem has taken fundamental measures to prioritize EH&S in all business activities. LG Chem has aimed to conduct emergency audits on high-risk processes and facilities at all business sites at home and abroad until the end of June 2020. Matters for improvement are immediately handled, and processes and facilities that are difficult to handle in a short time will be suspended until such problems are solved. We conduct a precise audit by organizing a TF consisting of internal EH&S, process technology experts and professional external EH&S agencies. We aim to take strict measures to solve the problems identified in this process. Furthermore, we will reestablish the highest global EH&S standards beyond the scope of regulations related to EH&S. Major members of management participate in special management meetings supervised by the CEO twice a month to perform inspections on performances such as reviewing the progress of emergency and precise audits, reviewing investments related to improvements and their performances, and reestablishing EH&S standards for further settlement. In the case of unsafe processes identified in the design phase, we will make sure that such projects are not promoted regardless of sales/profits and loss.

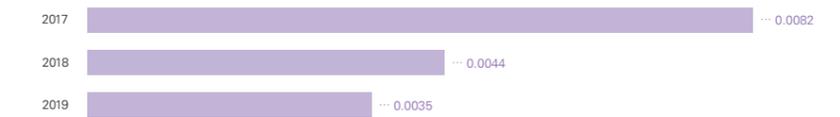
Total Recordable Incident Rate^{TRIR} (Unit: Frequency per 200,000 working hours)



Lost Time Incident Rate^{LTR} (Unit: Frequency per 200,000 working hours)



Process Safety Total Incident Rate (Unit: Frequency per 200,000 working hours)



*Process safety incidents refer to class 4 or higher accidents based on LG Chem's accident class.

Number Of Transportation Incidents (Unit: Case)



*The number of transportation incidents includes minor incidents.

Support to Overcome COVID-19



COVID-19 Prevention Activity

LG Chem took various measures to block the inflow and spread of COVID-19 at the workplace. In addition to periodic disinfection, installation of partitions in the cafeteria, and wearing of masks on commuting buses, all of our employees strictly followed the "social distancing guideline." We introduced a digital collaboration system called "Teams" to expand the scope of telecommuting while minimizing the impact on business. We prevented all employees from going on overseas business trips. Employees who came from overseas had to undergo self-quarantine. We paid for the costs of masks and checked the body temperature of all outsiders visiting our business sites.



Financial Support to Suppliers

LG Chem decided to provide quick financial support worth KRW 100 billion through the "Win-Win Fund" and "Innovative Growth Fund" in operation for small- and medium-sized suppliers suffering from financial difficulties caused by prolonged COVID-19. The "Win-Win Fund" is a KRW 62.9 billion low-interest loan fund created to lend operating funds to suppliers. The "Innovative Growth Fund" is a KRW 43.2 billion zero-interest loan fund created to finance the core R&D tasks of suppliers. We simplified the loan review process so that suppliers can receive fast financial assistance during the first half of 2020. We also financed the facility investment of suppliers through the KRW 150 billion "Investment Support Fund" created together with the Korea Development Bank.

Financial Support for Social Enterprises

LG Chem donated a KRW 200 million relief fund to social enterprises selected for the "LG Social Campus (green social enterprise program)" jointly operated with LG Electronics since 2011. We provided emergency financing to help the LG social fellows selected for Social Campus over the past 10 years to overcome the COVID-19 crisis.



LG Chem Care Gift Box

LG Chem produced and supplied "Care Gift Boxes" worth KRW 300 million to 2,000 youths at children's centers in Daegu, Gyeongsangbuk-do, and areas near business sites. "Care Gift Box" was made by conducting a preliminary survey on recipients and reflecting their opinions. The box consisted of three kits: "Learning Kit," "Health Kit," and "Emotional Support Kit." The "Learning Kit" had a wireless headset and about 10 pieces of stationery. The "Health Kit" had disinfection tissues, hand wash, and functional health food products to help strengthen immunity. The "Emotional Support Kit" is composed of simple board games and sports equipment to relieve the mental stress of youths caused by the prolonged COVID-19.

Implementation of the Blood Donation Relay Campaign

LG Chem carried out the "Blood Donation Relay Campaign" to overcome the shortage of blood donation caused by COVID-19. This relay campaign was started by Yeosu Complex on March 19, 2020 and was spread to 12 business sites in Korea until the end of April, including Ochang, Cheongju, Daesan, and Iksan.

Global Donation of Relief Goods

LG Chem donated various relief goods worth approximately KRW 1 billion, such as masks, sanitary gloves, and protective clothes, to China, Poland, Indonesia, and India.

Voluntary Fund-raising Activity, "Sharing KRW 10,000"

LG Chem had a fund-raising activity called "Sharing KRW 10,000." We raised KRW 100 million in total funds and donated it to small businesses and medical professionals facing the COVID-19 crisis in Daegu and Gyeongsangbuk-do.

The COVID-19 pandemic has led the economy to chaos, causing direct and indirect social issues. LG Chem has implemented realistic measures to fulfill corporate social responsibilities by supporting its employees, suppliers, and communities.

LG Chem Care Gift Box



Implementation of the Blood Donation Relay Campaign



Global Donation of Relief Goods



Voluntary Fund-raising Activity, "Sharing KRW 10,000"



Fundamentals



Research & Development

LG Chem invests heavily in research and development and promotes new growth engines to secure competitiveness. We expanded R&D investments, in particular, we are dedicated to preparing for the company's future in overall fields including energy and bio. Since 2018, we have executed the scale of R&D investments against sales at 4% or higher, with more than 30% invested sustainably in future preparation.

R&D Status

Category	Unit	2017	2018	2019
R&D Personnel	Person	4,760	5,458	5,672
R&D investment costs	KRW 100 million	8,925	10,618	11,323
R&D investment ratio to sales	%	3.5	4.1	4.0
New product sales	KRW 100 million	90,221	103,724	103,042
Future preparation weight	%	24	32	34

R&D Innovations

Super Absorbent Polymer for Ultrathin Diapers

Super absorbent polymer is a substance that can absorb 500 times as much water as its own weight. This polymer is mainly mixed with the pulp in diapers. These days, consumers prefer diapers that are ultra-thin, lightweight, and comfortable. Diapers can satisfy such needs by reducing the use of pulp. The roles of the pulp must be replaced by super absorbent polymer to make a diaper that stays dry on the surface after urination without leaking the urine. LG Chem invented a new super absorbent polymer with outstanding absorption rate and transmittance compared to the conventional pulp.

Manufacturing Technology of Impact Modifier for PVC with Specialized Impact Resistance

Methacrylate-Butadiene-Styrene^{MBS}, the impact modifier for PVC, is a modifier that is added in the PVC manufacturing process to improve impulse strength and processability. The transparent MBS developed by LG Chem is a product that shows excellent impulse strength and processability without lowering the degree of transparency of resin by dispersing uniformly throughout the PVC resin. In particular, our MBS maintained the same impact resistance while reducing the use of MBS by 15% through the differentiation of impulse strength. This technology applies to high value-added medical and thin film PVC products that require impulse strength and processability.

Development of High-Capacity, Long-Life, High-Energy Density Battery Technology

LG Chem has become a global leader of batteries by securing excellent battery products and technologies through active R&D investment.

In the field of automotive batteries, we have been developing EV batteries using materials with high energy density (250Wh/kg or higher). Recently, we succeeded in developing a premium EV battery that can quick-charge to 80% in 25 minutes and drive over 400km in a single charge.

For ESS batteries, LG Chem developed products for electrical grids with energy density of more than 440Wh/L and can be used about 6,500 times during 80% of the service life. For household uses, we invented a product that maximizes convenience of installation. We concluded business agreements with customers to develop ESS using used EV batteries.

For IT & new application batteries, LG Chem developed a premium smartphone battery with high energy density of 700Wh/L, which can be used about 800 times during 80% of the service life. We also developed a battery can be used for EV and ESS with energy density of 730Wh/L, which can be quick-charged to 80% in only 30 minutes and used 1,000 times during 90% of the service life.

Development of Cathode Materials for Third Generation^{3G} Electric Vehicles

There are increasing needs for the development of batteries for 3G electric vehicles, and the high-capacity cathode materials market is expected to grow rapidly to increase the driving distance. Accordingly, LG Chem successfully developed a cathode materials with desirable service life and safety by optimizing the precursor composition and securing a cathode structure stabilization technology. We verified the long-term durability and stable mass-production quality by implementing a technology that controls the strength and quality of cathode particles. We expect to dominate the specialty market by taking an initiative role when the 3G EV market begins to expand fully after 2021.

Development of Thermal Adhesives for EV Battery Modules

Thermal adhesives for battery modules play the role of dissipating heat generated by the battery cell and connecting the battery module. The existing silicone thermal adhesive has excellent cooling performance but poor impact resistance and vibration resistance. Especially, insufficient adhesive strength caused the vibration of the cell and module while driving. LG Chem invented a urethane thermal adhesive that overcame such limitations of the silicone adhesive by increasing adhesive strength by 10 times and mechanical strength by 20 times. We won the IR52 Jang Young-shil Award in the 24th week of 2019. The urethane thermal adhesive will be supplied to global EV battery module makers in Korea, Europe, US, and China.

Development of New Anti-Obesity Medicines

There are over 400 million patients with severe obesity around the world, and the number of obese patients is constantly increasing due to the prevalence of Western eating habits. Many existing anti-obesity medicines are inconvenient or unsatisfactory. As some medicines have even been driven out of the market due to side effects, it is very necessary to make a new anti-obesity medicine that is effective and safe.

LG Chem is conducting research on the mechanism of a new oral anti-obesity medicine using the melanocortin-4 receptor¹⁾, aiming to enter phase 1 of the clinical trial in the United States during 2020. The new anti-obesity medicine of LG Chem caused reduced appetite and weight loss in animal models without any side effects related to the central nervous system or cardiovascular system. We expect to improve the convenience of patients with the new medicine, which shows pharmacokinetic properties²⁾ that are adequate for daily oral administration.

1) Melanocortin-4 receptor: A type of receptor combined with G protein whose mutation is associated with obesity and metabolic diseases

2) Pharmacokinetic properties: Properties related to absorption, distribution, metabolism, and excretion of a drug through changes in drug concentration in the body over time

Development of Polio Vaccines and Hexavalent Vaccines

Polio is still a dreaded disease in developing countries since it can afflict up to 200,000 individuals each year unless eradicated completely. LG Chem is cooperating with the Bill & Melinda Gates Foundation and other international organizations that are trying to eradicate polio globally in developing a commercial polio vaccine by 2021. The polio vaccine can greatly contribute to resolving the global shortage of polio vaccines.

LG Chem is also developing a hexavalent vaccine, which is currently in phase 2 of the clinical trial. The hexavalent vaccine can prevent six diseases with high fatality rates in infants, including polio. Since no hexavalent vaccine was certified by the WHO yet, our vaccine can increase infant immunization rates worldwide by commercializing this vaccine.



Research on Advanced Materials Company



Research on Life Sciences Company

Open Innovation for Early Production of Business Results and New Business Opportunities

LG Chem practices open innovation using diverse channels to produce early business results and find new business opportunities by increasing the efficiency of R&D. In 2019, we invested USD 10 million in all in five promising ventures in the fields of batteries and life sciences through LG Technology Ventures, a venture capital company founded in Silicon Valley, US. We are collaborating actively on patent licensing and joint development essential for producing early business results. We formed a partnership with Korean venture capitals to find partners and reinvigorate investment. We also invest in external funds that keep many promising companies in the portfolio to find new business opportunities, distribute verification risks, and monitor the trend. The "Global Innovation Contest" is a contest for prestigious universities and research institutes worldwide to come up with innovative ideas for promising future technologies. LG Chem is laying the groundwork to secure outstanding R&D talents by cooperating with emerging professors in Korea through a project contest.



The Battery Challenge; a competition to discover new battery technologies from start-ups.

Securing Patent Competitiveness

LG Chem is promoting strategic patent management from product development to commercialization. As part of this effort, we are securing strategic patents in each product development stage and establishing strategies to respond to patents registered by other companies. In particular, we are building mid- to long-term patent portfolios by discovering core patents through Intellectual Property (IP)-R&D activities related to primary future business areas such as green and energy materials. LG Chem possessed about 63,000 intellectual property rights as of the end of 2019, about 38% of patents or 24,000 cases are related to batteries. We are reinforcing our activities to secure patent competitiveness in each business area, and we will endeavor to increase our competitiveness in future business areas such as green and energy materials.

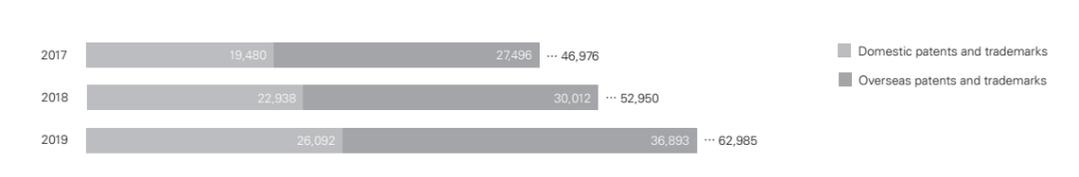
Management of Intellectual Properties

LG Chem is operating a company-wide intellectual property management system. From early R&D to commercialization, our IP workers provide close support in each stage to secure patents and establish response strategies for each stage; thus reinforcing patent competitiveness. By recruiting professional patent attorneys and lawyers within the IP organization and dispatching IP personnel to strategic overseas regions, we foster IP experts in each region and further increase expertise in IP management. In particular, we performed activities to develop an advanced patent management system regarding all procedures, including patent application, analysis, and litigation. We are constantly reinforcing our IP management by diagnosing and improving the system.

Intellectual Property Litigation and Fair Competition

Competition among companies in the battery industry intensifies as the market grows. Latecomers are becoming more likely to infringe on patent rights and technologies. In particular, LG Chem has the world's best technologies and patents related to batteries, and protecting intellectual properties is one of the most crucial matters in its business. The International Trade Commission^{ITC} recently delivered a default judgment to the competitor regarding confidentiality and patent infringement about rechargeable batteries. This lawsuit was intended to compete fairly in the global market and protect the core intellectual properties gained through massive R&D investments. As we expect rechargeable batteries to lead our nation's future, fair competition is vital for advancing the industrial ecosystem. LG Chem anticipates eradicating unlawful and unfair business practices to further increase the competitiveness of the national battery industry through well-intended competition.

Status of Intellectual Property Rights (Unit: No. of rights)



Focus

Sustainability and R&D

The importance of eco-friendliness and sustainability is increasing globally because of global warming and environmental pollution. Moreover, as the global market is reinforcing and expanding sustainability regulations for carbon-neutral growth, global enterprises are developing eco-friendly materials and technologies to create a circular economy and achieve sustainability. Accordingly, LG Chem intends to set sustainability as the core business factor by integrating the Sustainability Value with our business areas in an organized manner.

- **Carbon-neutral growth:** All business sites of LG Chem conduct activities for improving aged processes and F-Cost* to reduce the dependence on fossil fuel. We are seeking a method of applying renewable energy sources such as biomass fuel to rely less on petrochemical energy. In addition, we are developing carbon-neutral technologies such as the technology for making biodegradable plastic using CO₂ emitted by plants.

*Failure Cost: Loss cost caused by failure to maintain quality or defect

- **Circular economy:** Plastic materials are used widely due to low prices and excellent physical properties, but they are hard to decompose. Landfill and microplastic issues are giving rise to the demand for the reduction of plastic waste. LG Chem aims to recycle plastic wastes chemically based on its knowledge in reaction and catalyst processes. Plastic recycling will recollect high-quality fluids such as fuel and monomer for use in the manufacturing process and products. We will also produce products using eco-friendly materials by developing technology to apply biomass fuels from bio-gas, bio-naphtha, and bio-diesel. Our battery business is also developing a technology to recollect valuable metals (cobalt, nickel) from battery waste and process scraps to recycle limited resources in lithium-ion batteries with unstable prices.

- **Reduction of harmful substances:** LG Chem has various activities to reduce harmful substances to protect the environment and keep employees healthy. We optimize our processes to reduce the formation of harmful substances such as residual monomers and unreacted substances and continue to develop green by-product treatment technologies.

Employment

LG Chem is continuously hiring global talents regardless of races, nationality, gender, religion, region, and affiliated group and is cultivating talents with competitiveness through the fair evaluation and global education program.

Employment Status by Region

Category		2017	2018	2019
Global	Total	29,455	34,742	40,234
	Regular worker	29,309	33,355	39,190
	Non-regular worker	146	1,387	1,044
Korea	Total	16,810	18,431	20,162
	Regular worker	16,681	18,092	19,973
	Non-regular worker	129	339	189
China	Total	10,451	12,678	14,219
	Regular worker	10,447	11,658	13,394
	Non-regular worker	4	1,020	825
Asia besides China	Total	655	692	710
	Regular worker	655	692	710
	Non-regular worker	-	-	-
Europe	Total	774	1,706	3,487
	Regular worker	773	1,690	3,468
	Non-regular worker	1	16	19
Americas	Total	765	1,235	1,656
	Regular worker	753	1,223	1,645
	Non-regular worker	12	12	11

*Employment status by region refers to enterprise data that includes overseas sales subsidiaries and branches, and previous data (2017~2018) and has been modified due to recalculation of data from the inclusion of new business sites.

Employment Status by Age in Korea

Category	2017	2018	2019
Total	16,810	18,431	20,162
Under 30	3,635	4,010	4,760
30-50	11,000	11,999	12,792
Over 50	2,175	2,422	2,610

Employment Status by Position in Korea

Category	2017	2018	2019
Administrative (total)	6,138	7,090	7,956
Administrative (male)	5,444	6,214	6,928
Administrative (female)	694	876	1,028

*Administrative: Professional/Manager position or higher

Category	2017	2018	2019
Lower-level manager position (total)	10,672	11,341	12,206
Lower-level manager position (male)	9,217	9,685	10,397
Lower-level manager position (female)	1,455	1,656	1,809

*Lower-level manager position: Specialist/Assistant manager or lower

Category	2017	2018	2019
Executive (total)	121	124	154
Executive (male)	118	120	147
Executive (female)	3	4	7

Employment Status by Occupation Group in Korea

Category	2017	2018	2019
Sales/Production/R&D Administrative (total)	3,730	4,743	5,247
Sales/Production/R&D Administrative (male)	3,318	4,080	4,460
Sales/Production/R&D Administrative (female)	412	663	787

Employment Status of Social Minorities in Korea

Category	2017	2018	2019
The disabled	305	313	340
Patriots and veterans	376	355	366

*Including employees from the subsidiary (Happy Nuri) for the disabled

Employment Status of Social Minorities Overseas

Category	2017	2018	2019
The disabled	8	8	10
Ethnic minorities and class minorities	658	887	1,082

*The employment status of social minorities overseas applies only to LGCCI and overseas manufacturing sites.

New Employment Status in Korea

Category	2017	2018	2019
Total	1,151	2,264	2,654
Male	914	1,776	2,227
Female	237	488	427
Under 30	596	1,137	1,780
30-50	500	1,050	781
Over 50	55	77	93
Local talents	302	665	605

*Excluding graduates of Seoul/Gyeonggi-do/Incheon/Overseas universities from office workers for local talents.

New Employment Status Overseas

Category	2017	2018	2019
Total	4,852	7,634	7,809
Male	3,553	5,491	5,533
Female	1,229	2,143	2,276

*New employment status overseas applies only to LGCCI and overseas manufacturing sites.

Local Employment Status Overseas

Category	2017	2018	2019
Local employment manager	596	807	890
Ratio of local employment manager	69%	80%	74%

*Local employment status overseas applies only to LGCCI and overseas manufacturing sites.

Labor Union Membership Status in Korea

Category	2017	2018	2019
Number of labor union membership	6,889	6,962	7,209
Number of applicable subjects of membership	9,319	10,809	10,889
Percentage of labor union membership	73.9%	64.4%	66.2%
Percentage of collective bargaining applied	100%	100%	100%

*Number of labor union membership in 2018 was modified.

*Employee position among production workers and associates of office workers for the number of applicable subjects of membership.

Labor Union Membership Status Overseas

Category	2017	2018	2019
Number of labor union membership	9,105	10,091	12,905
Number of applicable subjects of membership	9,964	10,609	13,144
Percentage of labor union membership	91%	95%	98%
Percentage of collective bargaining applied	100%	100%	100%

*Labor union membership status overseas applies only to LGCCI and overseas manufacturing sites.

Employee Turnover Status in Korea

Category	2017	2018	2019
Number of turnover	661	763	780
Male	533	639	680
Female	128	124	100

Category	2017	2018	2019
Turnover rate	3.93%	4.14%	3.87%
Male	3.17%	3.47%	3.37%
Female	0.76%	0.67%	0.50%

Category	2017	2018	2019
Number of voluntary turnover	453	505	488
Male	355	395	400
Female	98	110	88

Category	2017	2018	2019
Voluntary turnover rate	2.69%	2.74%	2.42%
Male	2.11%	2.14%	1.98%
Female	0.58%	0.60%	0.44%

Learning & Development

Training Entrepreneurs

LG Chem reorganized the entrepreneur training system to clarify the goals of training entrepreneur candidates. The training system was combined with the Succession Plan, and next-term and long-term candidates were appointed for the company head and division head. In 2020, we will devise Individual Development Plans for candidates of each position (company heads, division heads, department heads, team leaders) to solidify the leadership pipeline, conducting training activities and education.

Enhancing the Leadership of Each Position and Rank

LG Chem implements annual leadership education to enhance the leadership competence of each position. Especially, we rearranged the leadership education program by organically linking the education systems among LG Academy, corporations, and business divisions in 2019.

Different positions such as executives, persons in charge, and team leaders are educated efficiently through this system. We also manage the leadership competence of each rank every four years by operating an MVP course. Furthermore, we utilized the micro-learning system so that employees can access leadership education contents (340 items) whenever necessary. In 2020, we plan to increase the leadership competence of all members by expanding the scope of leadership education to the entire company based on micro-learning and blended-learning*.

*Blended-learning: Education program combining online and offline tools

Global Competence

o Training Candidates for Resident Employees

LG Chem strives to train global talents. An organized training system is in place to reinforce the competence of resident employees (candidates) and local employees.

As we expand global businesses, we are establishing Individual Development Plans so that resident employees can exhibit their competence early and produce business outcomes through stepwise training.

LG Chem produced 14 regional experts in 6 countries through localization course and advanced language course.

In addition, the resident employee training team educated resident employees on competence (business management, leadership, organizational management, business specialization, foreign language) for 4 months prior to personnel appointments. Online education on essential information (understanding the country and local businesses, EH&S, Jeong-Do Management, compliance, stress management) was provided to employees being sent overseas to improve the timeliness and effectiveness of education.

o Training Resident Employees and Local Employees

LG Chem conducts leadership competence education for resident employees and local team leaders in China and Poland. Since 2019, the Energy Solutions Company has supported the soft-landing of resident employees and employees on long-term business trips by providing the On-Boarding* Package upon arrival. The package includes: 1. Understanding of the country; 2. Introduction of the corporation; and 3. Mentoring program. We are establishing a common global training process for resident employees in 2020.

*On-Boarding: Process of helping a new person who joins an organization learn and adapt to the organizational culture

o Improving the Language Proficiency of Employees

LG Chem has online, phone, and video education programs to teach foreign languages to all employees. These programs supports English, Chinese, Japanese, and Spanish, and a total of 7,449 employees received language education in 2019. We also offer short micro-learning contents of about 5~10 minutes for three languages (English, Chinese, and Japanese).

Strengthening the Job Competence of Each Job Group

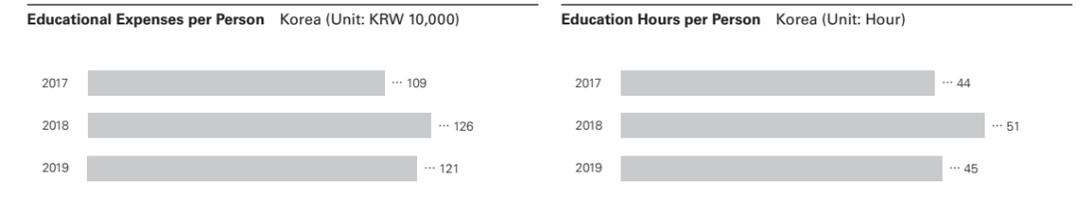
LG Chem operates job education programs such as production, R&D, sales, marketing, procurement, and quality education to increase the job competence of members. We are offering common job courses to increase the job competence of all employees. Educational content is added and supplemented based on the needs of members. Courses in 2019 included "Training of Internal Instructors," "Enhancing Presentation Skills," "Essence of Financing/Accounting," "Smart Working with Excel Program," "Enhancing Negotiation Skills," and "Training of Interviewers." A total of 742 employees have completed the courses.

Enhancing the Soft-landing and Organizational Commitment of New Employees

New employees of LG Chem receive education at LG Academy, corporations, divisions, and business sites for the purpose of boosting the sense of belonging and pride in the company. All new employees are required to complete education at LG Academy and corporations. They also receive separate education depending on their division and business site.

Education for new employees helps them understand the company by learning about the business portfolio, future growth strategy, core values, and systems. This education is intended to support the soft-landing of new employees by teaching various work skills and mindset. There are diverse Augmented Reality^{AR} activities in operation to enhance the acceptability and engagement of the millennial generation.

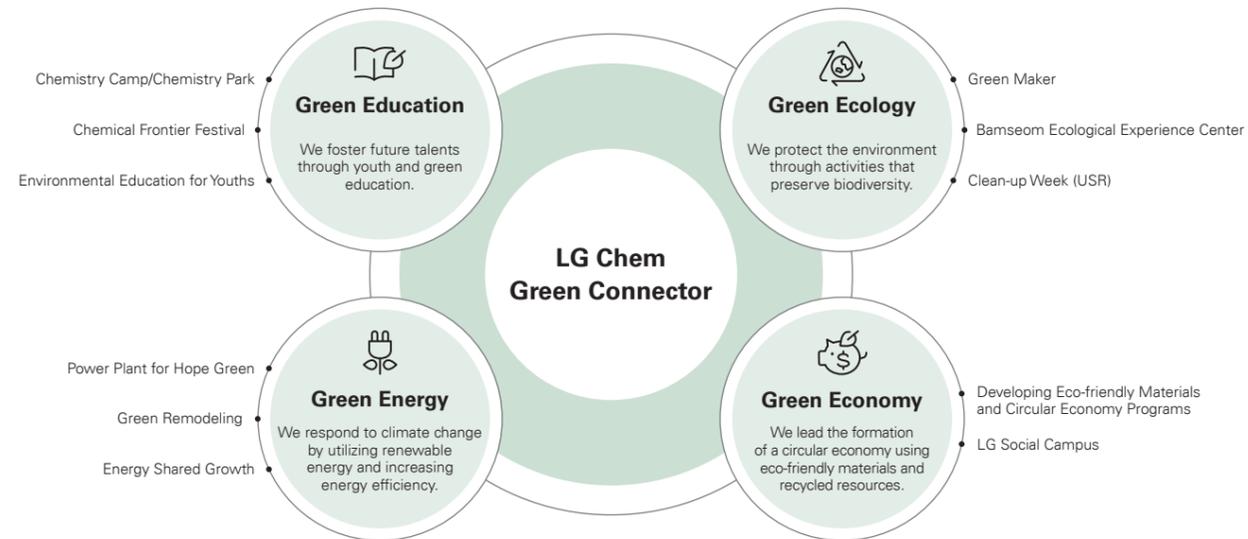
In 2019, 1,269 employees completed new employee education in the first and second half combined.



Training of new employees using AR activities

Corporate Citizenship

Vision and Strategic Tasks of LG Chem Corporate Citizenship



*Green Connector: LG Chem's corporate citizenship activities connect "Green" in various areas



Green Education

4 LG Chem Chemistry Camp

As the representative education project of LG Chem, "Chemistry Camp" started in 2005. About 7,000 youths participated in 61 camps. The Chemistry Camp, a science camp for middle school students, was operated twice in January 2020—each in Daejeon and Yeosu—with a participation of about 100 students. The 3rd and 4th programs for 2020 were canceled due to safety concerns over COVID-19. Chemistry Camp is an experiential science project that increases the access of students in the community to high-quality science education. Especially, we provide practice programs associated with school curricula, expand opportunities to practice what students learn at school, and break down the mental barrier of students who feel intimidated by science and chemistry. Through Chemistry Camp, LG Chem enhances the general scientific knowledge and interest of middle school students and makes science education more accessible.

4 LG Chem Fun Chemistry Park

Besides Chemistry Camp, LG Chem has been operating the "Chemistry Park" since 2015 to arouse the interest of elementary school students in the community about science. We try to enhance the scientific knowledge of elementary school students and increase educational accessibility by conducting experiential science education and curricular science experiments for elementary schools near our business sites. We arranged an "Outreach Chemistry Park" program in 2019 to visit children's centers in the community and provide the same experiential education programs. Undergraduate mentors had a chance to plan out science education for children. The Chemistry Park was held 19 times in 2019 for about 1,300 students, and the program was expanded in many ways. LG Chem will strive to heighten the value of its education projects by cultivating scientific knowledge and increasing their educational accessibility to elementary school students.



Green Energy

7 Green Partnership Project

LG Chem promotes the "Power Plant for Hope Green" with local governments and NGO/NPO. This project is supporting the vulnerable and low-income classes for the next 20 years by supplying green power using photovoltaic generation systems. The 1st power plant of the Jungnang Sewage Treatment Center in Seoul was completed in 2018, and the 2nd power plant will be constructed at the Northern Bus Transfer Center in Cheongju in 2020. Power generation systems with total capacity of 1,032KW are expected to be able to reduce annual carbon emissions by 650tCO₂-eq. We expect to create social/environmental impact by returning an annual profit of KRW 100 million to the local communities for 20 years. LG Chem also runs the "Green Remodeling" project to install thermal insulation materials and replace windows to save on the energy cost of welfare facilities for children. In 2019, we operated the "Open Classroom" at youth welfare centers in Dongdaemun-gu, Seoul, and "Geumho Youth Reading Room" in Seongdong-gu, Seoul.



Green Economy

8 LG Social Campus

"LG Social Campus" is an integrated support platform of LG Chem and LG Electronics to support the socio-economic ecosystem. Social Campus entered its 3rd phase in 2018 to spread the brand further. LG Social Campus has been going on since 2011, securing 146 social-fellow companies until 2019. Human resource programs were operated for 1,200 participants with financial support of KRW 14 billion. Especially, Local Value-up, Social Talk Concert, and Social Film Festival were launched to foster future talents and to increase the socio-economic involvement and understanding of stakeholders. These programs were held for the second time to increase the level of completion and influence. Local Value-up was a program to train local innovators in Yeosu and Cheongju for about 3 months. Participants of Local Value-up completed the program and performance sharing meeting. Social Talk Concert had 11 lectures in 2019 on various themes related to eco-friendliness. The Social Film Festival involved a film contest on the topics of environment and social economy, divided into primary school, teenager, and youth divisions. The festival was finished successfully by announcing the winners at Megabox Central, Seoul. LG Chem will continue working hard to attain a sustainable socio-economic ecosystem.



Green Ecology

15 Brighter Future, LG Chem's Green World

"Brighter Future, LG Chem's Green World" was the first activity of the "Green Maker" Volunteer Group formed in 2017, and it marked its fourth anniversary this year. This project was started to preserve the ecological value of Bamseom Island—which was sacrificed for the development of Yeouido—and to preserve the biodiversity of the ecosystem as emphasized in the UN SDGs. We have been consistently expanding the influence through the activities of employees and opening of "Bamseom Ecological Experience Center." About 500 employees took part in the volunteer activities to preserve biodiversity until 2019. LG Chem operated education programs related to Bamseom Island, environment, and biodiversity at the Bamseom Ecological Experience Center for about 200 underprivileged youths from regional children's centers. The Bamseom Ecological Experience Center is open to the general public, and over 2,000 citizens visited the center to learn about the values of Bamseom Island and biodiversity.



Above: Bamseom Ecological Experience Center Below: Social Talk Concert

Communities

o Yeosu



Surgery to Recover from Upper Eyelid Ptosis

Since 2012, Yeosu Complex has been running a program to help low-income elders in Yeosu undergoing surgery recover from upper eyelid ptosis.

Upper eyelid ptosis is a disease wherein abnormal upper eyelid muscles cause serious inconveniences in daily life, such as difficulty of opening the eyes, poor eyesight, headache, and abnormal walking.

The recipients are selected among applications filed at town or township offices and community service centers in Yeosu. Since 2012, 171 elders have benefited from this program.



Hope House Project

Yeosu Complex is promoting the “Hope House” project in collaboration with the city of Yeosu and Ssangbong Social Welfare Center.

Hope House is a welfare project of the Yeosu city government to build a pleasant home for families in need. A total of 13 houses were remodeled from 2013 to 2019.

o Daesan



Dong Go Dong Rak Program for Local Youth Mentoring

LG Chem’s Daesan Complex strives to foster local talents through “Dong-go-dong-rak,” a program launched in 2014 to grow dreams of students attending nearby high schools. There are diverse programs to help students design their future including college entrance seminars and special vocational lectures, chemical analysis activities, and plant tours to increase interest and understanding in chemistry as well as liberal arts classes for youths, which offer various cultural benefits. As a constructive partner of the community, Daesan Complex will contribute to the advancement of the community by developing win-win programs.

o Ochang



“Sharing Bread of Love” Activity

As a social contribution activity of Ochang Plant, “Sharing Bread of Love” started in 2019 to provide breakfast bread to underfed children in the area.

There are more than 5,000 underfed children in Cheongju.

Our employees visited the Jinggeondari Bread of Love Sharing Center to make dough, bake bread, and pack.

We will continue this activity to help starving children.

o Daejeon



Do! Dream! Child Center

As local governments began to provide subsidies to repair and remodel children’s centers in 2019, we donated our previous fund for repairing and remodeling children’s centers to improve the environment of multicultural alternative school, “R-School.” We continued working with the volunteer groups of each organization to help children at children’s centers grow through cultural, emotional, and knowledge activities. The volunteer group of the management support division formed a new affiliation with multicultural alternative schools. Volunteers affiliated with children’s centers and alternative schools helped underprivileged children grow healthy by operating programs like Junior Engineering Classroom, Cultural Experience, and Christmas Party.



Hi! Chemi! Science Club

Before starting our exchange with the volunteer groups of each organization, we hosted a “Science Club Invitation Event” for networking with four science clubs selected. Our employees spent time for each science club to present experiment plans and resolve scientific and technological curiosities related to experimentation. Various programs were run, such as lab tours. Science clubs and volunteer groups maintained their affiliation with test activities and career mentoring at each school.

o China



School of Love Project

LG Chem China is deeply interested in the health and education of youths in China. Since 2010, it has been carrying out the “School of Love Project” in cooperation with the China Women’s Development Foundation and China Environmental Protection Foundation. This project aims to improve small—and medium—sized school facilities in China to provide a healthier growing environment for Chinese youths. We spent about RMB 3.7 million on the “School of Love Project” as of 2019 and completed repairing restrooms, improving water treatment facilities, and remodeling libraries. We remodeled the library at Daego Central School located in Miaozu County, Hunan Province and donated books and multimedia devices such as PCs, televisions, OHPs, and sound systems in 2019. We revisited Yangguan Middle School in Dunhuang, Gansu Province, where we remodeled the library in 2015 to check the usage and additional needs before donating multimedia devices. LG Chem China will continue this project to ensure that students in China can grow in a healthy environment.



Automotive Battery Innovation Contest for Undergraduates

LG Chem China holds a nationwide contest to foster talented individuals in the field of automotive battery. The “1st Automotive Battery Innovation Contest for Undergraduates in China” was held from November 2017 to June 2018 with the theme “Open Innovation for the Future of Electric Vehicles.” About ten prestigious universities in China organized teams to compete on creativity for six months and the Grand Award and Excellence Award were awarded. Some students were offered internship opportunities. In 2019, LG Chem China hosted the 2nd contest by cooperating with the “Social Practice Plan for Chinese Undergraduates.” 67 teams from 26 universities participated. LG Chem China aims to make the Chinese automotive battery industry attain sustainable development by operating the education system for undergraduates through this contest.



Yeosu Complex | Hope House Project



Daesan Complex | Dong Go Dong Rak Program



Ochang Plant | Sharing Bread of Love

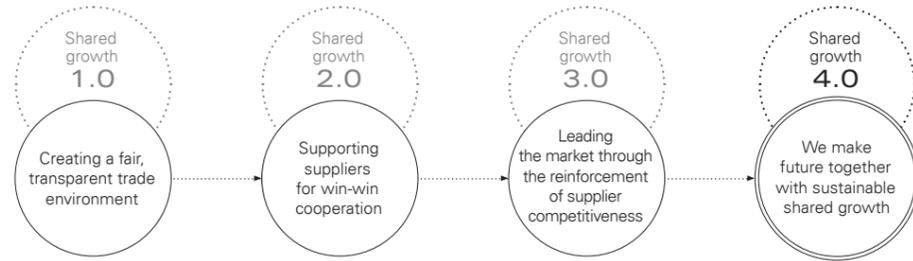


China | School of Love Project

Shared Growth with Suppliers

Shared Growth Direction

LG Chem expanded support to reinforce supplier competitiveness based on a fair trade culture. We strive to enhance sustainability with our suppliers ultimately in terms of economy, society, and environment.



Shared Growth Governance

LG Chem operates the shared growth promotion committee, the company's top legislative organization with the Chief Financial Officer^{CEO} as chairman, for systematic shared growth and coexistence with suppliers. The shared growth promotion committee discusses the main issues of shared growth with key sectors of fair trade, finance, R&D, and sales departments and directly inspects detailed activities. The CSR team also plans and manages enterprise-level shared growth activities such as CSR risk management suppliers, support for suppliers, etc.

Financial Support

For efficient fund management of suppliers, LG Chem operates no-interest/low-interest loan funds for suppliers based on the money deposited in financial institutes. We have been operating the "Win-win Fund" as our representative low-interest loan fund since 2010; in 2019, we created the "Innovative Growth Fund," the no-interest loan fund for win-win cooperation projects such as joint development and joint overseas expansion. In 2020, we added the low-interest loan fund "Investment Support Fund" to support equipment investment costs that could be a burden to suppliers. Furthermore, we are investing contributions in the fields of R&D, HR development, productivity improvement, advancement to overseas market, and energy saving for suppliers by donating win-win cooperation funds as financing for shared growth.

Win-win Fund KRW 62.9 billion	Innovative Growth Fund KRW 43.2 billion	Investment Support Fund KRW 150 billion	Win-win Cooperation Fund About KRW 2 billion
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*Based on the amount as of the end of 2019 for the Win-win Fund, Innovative Growth Fund, and Investment Support Fund.

*Based on the collected amount between 2014 and 2019 for the Win-win Fund.



Shared Growth Promotion Committee



Visit to the supplier sites

Supplier Competence Improvement Activity

o Employment Subsidy Support

LG Chem supports the recruitment and employment of suppliers in many ways to help them secure outstanding personnel and improve competitiveness. To reduce the burden of personnel expenses of suppliers, we not only help suppliers participate in government-organized job fairs using the brand image of LG Chem but also offer a certain amount of employment subsidy to suppliers hiring an employee. In 2019, we lowered the bar for the subsidy to online employment, granting nearly five times higher employment subsidy than the previous year. We are expanding the amount each year to narrow the wage gap between small and medium-sized companies and conglomerates.

o Educational Support for Employees of Suppliers

LG Chem shares its know-how on the design and development of plastic products for employees of suppliers through the "Polymer Processing School." The education courses covering basic knowledge of plastics and comprehensive knowledge of injection molding are contributing to the reinforcement of expertise of supplier employees. Furthermore, we offer online courses on business, IT, language/culture, liberal arts, and leadership through LG Academy, an educational institution designated by the Ministry of Employment and Labor. We expanded the support budget in 2019, allowing more than three times more employees of suppliers to participate compared to the previous year; we plan to expand the budget additionally for more employees to have an opportunity to receive education in 2020.

o Technical Support

LG Chem carries out Solution Partners activities for sharing its technical know-how by providing various services and customized solutions to suppliers, mainly for R&D, production, and technology departments, in order to reinforce their technical competence. We also allow a path to propose win-win cooperation between LG Chem and suppliers through additional developments or projects using the technology or materials possessed by suppliers. We resolve the difficulties of suppliers regarding various experiments and analyses caused by lack of equipment through free technical analysis and support provided by LG Chem R&D Campus Daejeon and Tech Center. We also promote co-development by conducting joint analysis evaluations and seminars with our suppliers.

o Productivity/Digital Innovation Support

LG Chem promotes innovative partnership projects with the MOTIE^{Ministry of Trade, Industry and Energy} and the Korea Foundation for Cooperation of Large&Small Business, Rural Affairs to provide comprehensive support for the improvement of productivity and export competitiveness of suppliers. Accordingly, LG Chem makes an effort to strengthen the competitiveness and self-growth power of suppliers by supporting incidental expenses required for consulting service for the productivity improvement of suppliers, promotion of Smart Factory at establishments, and export (tariff, distribution agency fee, etc.)

o Rank-up Activity

We discover the weak points of suppliers through the inspection of development/mass production systems and processes and find detailed measures for improving their ability to solve issues. We then promote nurturing activities for suppliers for them to meet the global requirements such as quality and productivity improvement and waste elimination through improvement measures.

Supplier Communication Activity

LG Chem hosts regular meetings with suppliers to share business status and issues and listen to the voices of suppliers. The Energy Solutions Company formed a Battery Cooperative Association with various suppliers and prepared a means of communication to strengthen business competitiveness in technology development and more. Our management visits the production sites of suppliers to listen to their difficulties in the process of cooperation and trade and resolve them. In 2019, LG Chem's CEO visited two of the Energy Solutions Company's suppliers that are important for our supply chain and had time to look around the site and communicate. We will continuously try to establish a healthy cooperative culture through supplier meetings and CEO visits to suppliers.

Corporate Governance

Composition and Independence of the Board of Directors

The Board of Directors^{BOD} of LG Chem consists of three executive directors and four independent directors. The ratio of independent directors is kept higher than the majority of the BOD to maintain checks and balances. Directors serve three-year terms but can be reappointed based on their activities and performance.

LG Chem's Board of Directors	Kwon, Young-Soo	Chairperson of the Board of Directors, Chairperson of the Nomination Committee for Independent Directors
		Current Vice Chairman and COO of LG Corp., Former Vice Chairman and CEO of LG U+
	Shin, Hak-Cheol	Chairperson of the Management Committee
		Current Vice Chairman and CEO of LG Chem, Former Vice Chair and Executive Vice President of 3M
	Cha, Dong-Seok	Member of the Management Committee
		Current Executive Vice President and CFO of LG Chem, Former CFO of S&I Corp.
	Ahn, Young-Ho	Chairperson of the Audit Committee, Member of the Nomination Committee for Independent Directors
		Current Adviser at Kim & Chang, Former Standing Commissioner of Korea Fair Trade Commission
	Char, Kook-Heon	Member of the Nomination Committee for Independent Directors
		Current Professor at the School of Chemical and Biological Engineering of Seoul National University, Dean at the College of Engineering of Seoul National University
	Jeong, Dong-Min	Member of the Audit Committee
		Current Partner at Barun Law LLC, Former Chief Prosecutor at Seoul Western District Public Prosecutors' Office, Chief Prosecutor at Daejeon District Public Prosecutors' Office
	Kim, Mun-Su	Member of the Audit Committee
		Current Non-executive Judge of Tax Tribunal, Former Vice Administrator of the National Tax Service

Average term of directors

2 years

Average age of directors

61.6

*Directors are appointed/reappointed for a three-year term in general. For the current Board of Directors, the average term decreased because the term of Jin-Soo Park, a long-term serving director, has expired.

*The term and age are based on March 2020.

Interest between LG Chem and Independent Directors

Name	Records of an independent director working at LG Chem and affiliate in the past	Transactions between an independent director (or company where the independent director is the largest shareholder) and LG Chem and affiliate	Transactions between the company where an independent director is working as an executive and LG Chem and affiliate
Ahn, Young-Ho	None	None	None
Char, Kook-Heon	None	None	None
Jeong, Dong-Min	None	None	None
Kim, Mun-Su	None	None	None

*Based on the day after April 1, 2001, as of the date of new establishment from the spin-off of LG Chem, Ltd.

Expertise and Diversity

The four independent directors have expertise in finance, tax, law, administration, and chemical substances or in chemistry as LG Chem's core business. Each must possess strong understanding of management, chemicals, energy, advanced materials, and life sciences. To enhance the expertise and efficiency of the Board of Directors, LG Chem operates three committees under the Board of Directors: the Audit Committee, the Nomination Committee for Independent Directors, and the Management Committee.

Audit Committee

The Audit Committee conducts audits on accounting, business practices, and directors' execution of duties and has the authority to request a sales report or investigate the company's business or property. All members of the Audit Committee are independent directors.

Nomination Committee for Independent Directors

The Nomination Committee for Independent Directors recommends candidates with strong expertise and competence and who meet the interests of LG Chem with regard to the stakeholders and shareholders and appoints candidates at the shareholders' general meeting. LG Chem does not discriminate based on gender, nationality, or race to secure the diversity of independent directors. To ensure the fair selection of candidates for independent directors, two of the three members are appointed as independent directors.

Management Committee

The Management Committee was established in July 2017 to handle daily business matters delegated by the BOD and finance matters under a certain amount. The determined matters are reported to the BOD more than once semiannually.

Evaluation and Compensation

Independent evaluations on the activity and performance of directors are conducted at the end of each term. The results are reflected in the decision of reappointment. Directors receive compensation within the limit approved at the shareholders' general meeting. Wages for executive directors are calculated considering their performance. Incentives are provided according to the comprehensive evaluation of quantitative indicators like sales and qualitative indicators such as the evaluation of key projects and implementation of mid- to long-term plans. The same wages are paid to all independent directors within the compensation limit approved at the shareholders' general meeting. The upper limit of total wages for the BOD as decided at the shareholders' general meeting in 2019 was KRW 8 billion; the total amount of wages paid was KRW 4.608 billion (excluding the severance pay of KRW 9.127 billion according to the executive severance pay payment regulations). Wages for individual directors and auditors exceeding KRW 500 million are made public through business reports according to the relevant laws.

Compensation for Directors in 2019 (Unit: KRW million)	Number of Persons	Total Payment	Average Compensation per Person
Registered directors (Independent directors and Audit Committee members excluded)	4	4,296	1,074
Independent directors (Audit Committee members excluded)	1	78	78
Audit Committee members	3	234	78

Board of Directors Activity

The Board of Directors officially meet quarterly and host temporary board meetings as necessary. In 2019, the Board held 9 meetings that resulted in 42 approvals and 12 reports. Meetings are mandatory for the BOD except in unavoidable situations. The participation rate was 81% for executive and non-executive directors and 97% for independent directors in 2019.

Board of Directors Activity	2017	2018	2019	
Attendance	Executive and Non-executive directors	100	85	81
	Independent directors (non-executive)	93.1	97	97
Number of meetings	11	9	9	
Number of agenda submitted	Approval	37	36	42
	Report	8	11	12

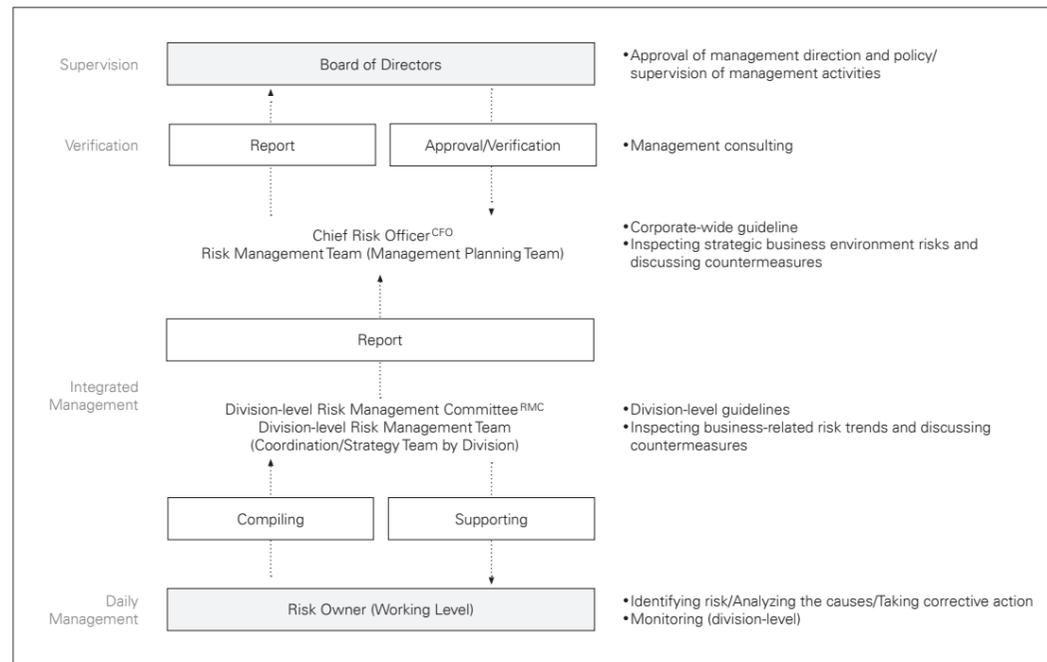
Risk Management

Company-wide Risk Management System

LG Chem applies company-wide risk management divided into stages including daily management of employees, integrated management by a risk management team, and supervision by the Board of Directors.

The daily management stage is executed by employees and monitored by each business division to identify risks, analyze the cause, and make corrections. In the integrated management stage, the Risk Management Committee^{RMC} reviews the risks of each division and provides a guideline for the risk management team to come up with countermeasures.

The corporate guideline and risk response measures are discussed with the Chief Risk Officer^{CFO}. The BOD is in charge of confirming final risk management decisions and supervising company-wide risk management activities.



Risk Identification and Management

Identifying Risks

LG Chem pinpoints risks in various areas by analyzing its mid- to long-term strategies and work processes and conducting interviews. A weekly management system was implemented to cope with the rapidly changing business environment. Key issues of each division are discussed at monthly business management meetings with the CFO. We focus on examining changes in the business environment before establishing mid- to long-term strategies and business plans to prevent and reduce risks.

Follow-up Management of Risks

LG Chem prevents risks from recurring by identifying risks that need to be managed and taking countermeasures through an internal audit. Furthermore, all major projects are evaluated based on sales, profit, and loss data and investments compared with completed investments. For these investments, major risk factors are examined through follow-up inspection to improve the success rate of future investments.

Operation of Internal Control System

LG Chem operates an internal control system based on the Internal Accounting Control System^{IACS} Framework to secure the reliability of financial data, effectiveness, and efficiency in business operations. LG Chem operates the internal control system for the Board of Directors and management to secure the trust of investors and strengthen management's responsibility for risks.

Identification of Major Risks and Mitigating Action

LG Chem identifies major potential risks and applies them to business practices. Risks that require management are categorized into business risk, financial risks, and social and environment risk. We perform activities to measure their potential impacts and prevent them.

Category	Risk Factors	Potential Impacts	Mitigating Actions
Business Risk	Management of order	• Need for systematic management due to an increase in project orders and large projects won	<ul style="list-style-type: none"> • Establishing company-wide management of order system • Strengthening the criteria for review of orders at the company-level (securing profitability, responding to risks, etc.) • Securing profitability through management from the quotation stage • Establishing the response basis to risk of loss
	Expansion of new business and intense competition	• Shifts in industrial and competitive structures due to intensified competition in emerging markets and expansion of new businesses	<ul style="list-style-type: none"> • Strengthening of the high value-added product portfolio • Securing the position of a technical leader by enhancing manufacturing and R&D competence • Raising competitiveness in new businesses through various channels including open innovation
	Changes in production and business environment	• Poor mid- to long-term growth and inefficient resource operation can result from an inappropriate business portfolio	<ul style="list-style-type: none"> • Allocate resources based on fostering projects through company-wide business portfolio inspection • Focusing on the changes in business environment for establishing mid- and long-term strategies and business plans • Responses to each indicator such as oil price and exchange rates • Analysis of short-term business environments and risks with the headquarters and overseas subsidiaries. • Activities to strengthen fundamental competitiveness in underperforming business.
	Strengthening product responsibility	• Damage to corporate competitiveness due to lowered credibility in case of chemical accidents or legal violations	<ul style="list-style-type: none"> • Strengthening materials safety training for employees who handle hazardous materials and develop the substitutes for hazardous substances. • Strengthening the pre-filtering of materials that exceed domestic or overseas legal standards on chemicals • Reinforce quality innovation activities with Lean Six Sigma • Organizing and operating a quality control system by companies and divisions with the aim of strengthening system-based quality control and optimized quality control.
Financial Risk	Investment	• When investment fails to achieve profit gain due to wrong investment or changes in business environment, such is likely to cause financial loss and deterioration of cash flow	<ul style="list-style-type: none"> • Building an investment management system to enhance investment efficiency and respond preemptively to risks • Operating an investment committee for each companies • Examining investment from the corporation and operating the corporate investment committee • Operating a company-wide contract examination committee to manage the general risks of major large projects. • Strengthening change management by checking progress on major investments in progress.
	Finance	• Global business expansion can be exposed to various risks such as market risk, credit risk, and liquidity risk	<ul style="list-style-type: none"> • Risk management of each department according to the policy approved by the Management Committee • Preliminary identification and evaluation of financial risks through collaboration among hands-on departments
Social and Environmental Risk	EH&S Management	• Financial loss and damage to corporate image in case of noncompliance with laws and regulations	<ul style="list-style-type: none"> • Regular and special inspections of safety and environment in all plants at home and abroad • Strengthening company-wide safety and environment management such as the Safety and Environment Committee held by the CEO • Enacting company-wide safety and environmental policies and regulations, integrated risk and performance management through the construction of the EH&S portal
	Response to carbon policy changes	• Increase of operational expenses due to investment in energy conservation and of production costs by purchasing of emission trading rights.	<ul style="list-style-type: none"> • Discussing energy and greenhouse gas issues at the company level through the Energy Committee led by the CEO and strengthening response competence • Making investment decisions for energy reduction based on the priorities for maximum effects • Minimizing financial impact through the preliminary estimation of purchasing cost of emission credits
Water resources management	• Developed nations are expanding the application of the global water management system. Losses from limitation of export may occur due to trade barriers and various regulations related to water footprint regulations.	• Strengthening the water resource inventory management system in domestic and overseas business sites	

Ethics

Jeong-Do Management Principles

Jeong-Do Management is LG's own way of committing to playing fair through ethical management practices. Jeong-Do Management is not simply a standard for ethical management but also an expression of LG's mission to achieve high competitiveness in a respectable, fair manner.

Internalization of Jeong-Do Management

LG Chem conducts periodic education on Jeong-Do Management for employees and suppliers. We produced the Jeong-Do Management "Focus Board"—which describes recently occurring cases—and the "Ethics Dictionary" series, a web drama about Jeong-Do Management, sharing them with Korean and overseas business sites in local languages to strengthen the commitment of all members to Jeong-Do Management.

In addition, we constantly practice "Jeong-Do Management in Daily Life" through work practices voluntarily carried out by field division, "Outreach Activities for Consensus Building" for supporting risk discovery and process improvement, and "Workshop for On-Site Issue Management."

LG Code of Ethics

The LG Code of Ethics provides all LG Group employees with the standards for appropriate behavior and value judgment, which serve as the foundation for all business conducts of LG Chem employees and business sites at home and abroad. The LG Code of Ethics consists of customer responsibilities and obligations, fair competition, fair trade, basic ethics of employees, employee responsibilities, and national and social responsibilities.

Reporting System

LG Jeong-Do Management has a "Corruption Reporting System" to prevent violations of Jeong-Do Management such as corruption and bribery of employees, and anonymous reporting is available. For reports made under a person's actual name, we operate an "Inspection of Disadvantages to Informant" system for the strict protection of the confidentiality of informants to prevent disadvantages. A "Compensation System for Corruption Report" is also in place to reward informants. The win-win board is operated for suppliers to help resolve their grievances.

Response to Corruption

Category	2017	2018	2019
Number of inspection cases	19	29	25
Number of persons punished	5	13	18
Number of closing transactions	16	13	16

*Based on acceptance of bribes and embezzlement under the Code of Ethics

*For disciplinary actions, persons who were subjected to major disciplinary action

Jeong-Do Management Education

Category	2017	2018	2019
Number of trainees	13,566	7,440	19,451

*Results combining online and offline education; data for 2018 has been reduced as no online education was conducted

Compliance

Compliance Management System

Given the increasing demand and legal regulations for corporate social responsibility, the scope of lawful management of LG Chem is also expanding and becoming enhanced. LG Chem has been implementing the compliance management standard since 2012 to promote fair and transparent business practices, ensure the sound development of the company, and gain customers' trust. We also operate the compliance management system to identify domestic and foreign laws that must be followed during business operations and to prevent employees from violating laws. The compliance support and management activities of LG Chem are managed by the compliance officer appointed by the Board of Directors. Evaluation on the efficiency of compliance support and management system is conducted and reported to the BOD every year. The Legal Compliance Team under the Legal Department is in operation to support the compliance officers.

Strengthening Compliance Education

LG Chem develops and operates various compliance education programs for different positions and conducts annual online compliance education. We also carry out online compliance education for employees more than once a year. In 2019, we conducted online education including "Understanding and Awareness of Employees on Compliance" as well as offline education on fair transaction, EH&S, HR, anti-corruption, import/export tasks, conflict materials, and product liability. We enhanced the compliance awareness of employees through the distribution of Competition Information Collection Use Guideline, Vendor Guideline, and various newsletters. Moreover, we produce and distribute the LG Compliance Guideline based on Jeong-Do Management for employees to understand and respond to legal risks that may arise in the process of performing tasks.

Prevention of Compliance Risks

LG Chem not only complies with global standards but also manages compliance of overseas corporations in order to minimize management risks and fulfill its social responsibility. In particular, LG Chem constantly checks and analyzes new legislations and amendments at home and abroad as well as regulations and legal trends. We conduct compliance checks on domestic and overseas sites through risk evaluation with a checklist to secure the effectiveness of the compliance control system. When legal risks are identified through the compliance checks, they are shared with the relevant department managers so that proper measures such as suspension, improvement, correction, or sanction can be taken. Moreover, we have established a recurrence prevention plan to prevent the occurrence of the same or similar violations. When tasks closely related to legal risks need to be performed, they must be run by the Legal Department in advance, and the results must be reported to the compliance officer.

Operating a Fair Trade System

LG Chem is operating a self-compliance program for fair trade to encourage fair trade and competition in all processes of performing tasks. We carry out regular monitoring and inspection for the fair trade compliance status of the company and support the settlement of a fair trade culture through legal consulting and education for employees. With the self-compliance program for fair trade, LG Chem carries out preventive activities to comply with the law. LG Chem also introduced the four business practices recommended by the Korea Fair Trade Commission^{KFTC} to promote fair subcontract transactions among large-, mid-, and small-sized entities and to build a foundation for mutual cooperation. We establish a fair and transparent trade relationship with suppliers by reforming internal standard contracts each year based on the establishment and revision status of the relevant laws and the standard contracts recommended by the Fair Trade Commission.

Self-Compliance Program for Fair Trade

LG Chem tries to establish a fair trade culture throughout the company by conducting self-compliance activities supervised by the team under the self-compliance manager. We provide compliance education by duties including purchase, production, sales, marketing, research and development and for new employees and existing managers. We spread fair trade self-compliance systematically by distributing organized data, such as newsletters and guidelines. An advanced review on fair trade for each department is carried out during the process of establishment and enactment of company rules and guidelines. Considering the internal and external changes of the business environment, organizational reform, and trend of law enactment and revision, LG Chem quickly revises and implements hands-on guidelines to prevent self-compliance blind spots by each field of fair trade, including trade with suppliers such as subcontractors and agencies, cartels, and subsidiary trade, and receives 'Pledge of Compliance with Fair Trade' from employees every year.

Information Security

LG Chem ISO 27001 Certification

Ochang Plant, Cheongju Complex, Daejeon R&D Campus, Magok R&D Campus, and Gwacheon R&D Campus acquired certification

Information Security Management System

LG Chem establishes and applies an information security management system to protect core technology, research and development information, customer information, and personal information we own as well as all trade secrets related to the business.

In terms of outside breach response, we operate a regular security monitoring system by expanding the scope from the office area to the facility area. To respond to outside hacking attacks in real time, we conduct security vulnerability inspection, mock hacking, and simulation exercise for employees on a regular basis to improve the security level and response competence continuously.

We are reinforcing a system for detecting signs of information leak through detailed analysis of information leak paths as well as security measures on IT media, such as PC and email.

In addition, major business sites in Korea including R&D campuses (expanded the scope from Daejeon R&D Campus to Magok R&D Campus and Gwacheon R&D Campus) and Ochang Plant secured international-level security by acquiring ISO 27001 certification, which is an international standard. We are also expanding and applying the reinforced security management system to major overseas manufacturing sites such as Nanjing and Poland.

We are contributing to the improvement of the security management system for suppliers that share critical information with LG Chem by conducting regular consulting and workshop.

Improvement of Security Consciousness

LG Chem conducts online and offline information security education for all employees in Korea more than once a year to improve employees' awareness of security. Security education is being expanded to overseas business sites including China. We are striving to make employees of suppliers recognize the required security compliances and create a culture wherein every member of LG Chem has the correct awareness of security and performs tasks accordingly.

Regulatory Response for Information Protection

LG Chem also responds to increasingly stricter external regulations related to information protection at home and abroad. We carry out protective measures to meet the requirements under the Personal Information Protection Act and the Act on the Prevention of Disclosure and Protection of Industrial Technology. In addition, we constantly identify and improve legal imperfections to prevent any noncompliance with laws of the countries where our overseas corporations are located, such as the General Data Protection Regulations of Europe and the Cybersecurity Act (Network Safety Act) of China.

Tax

Tax Strategy and Response

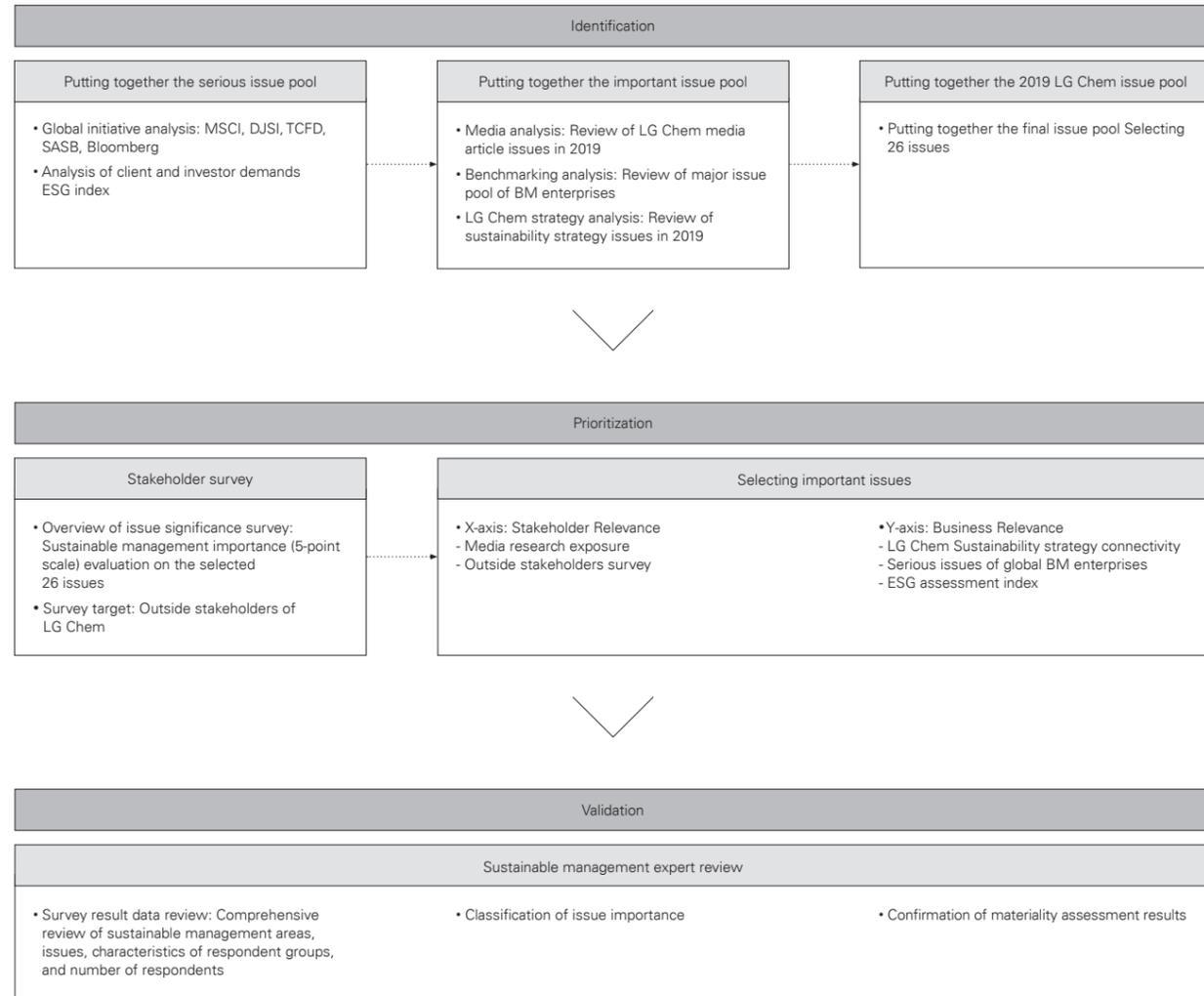
LG Chem understands that tax compliance and management of taxation risks are the key factors in contributing to national finance as well as maximization of shareholder values. Accordingly, LG Chem establishes and operates strict principles and regulations related to tax laws and implement a reasonable transfer price policy that meets the tax laws of Korea and transfer pricing guidelines of OECD. LG Chem faithfully fulfills taxation obligations such as corporate tax according to the tax laws of countries including China, US, Poland, and India as well as the obligation of submitting various materials required by the taxation authorities of these countries. Details of taxation are disclosed externally through business reports. In addition, we respond to anti-dumping cases that are filed for the petition and perform preliminary risk management activities.

Appendix

Materiality Assessment

Materiality Assessment Process

LG Chem considers the business environments and industrial issues at home and abroad and accepts the opinions of stakeholders via online survey to approach materiality issues of sustainable management into three-stage processes: identification of issues, prioritization of key issues, and validation.



2019 Material Assessment Results

We analyzed the “impact on business” and “impact on stakeholders” of important issues and prioritized them. Issues closely associated with three Innovative Sustainability Strategies were regarded as serious issues.



1) Impact on stakeholders: Analysis results of media research exposure, outside stakeholders survey results
 2) Impact on business: Analysis results of LG Chem sustainability strategies, serious issues of global BM enterprises, and ESG assessment indices.

Leading Sustainable Innovation for Customer	3 Circular Economy	Managing the Impacts of Climate Change	2 Greenhouse Gas Emission Reduction and Energy Management
	7 Product Safety and Quality Reinforcement		6 Climate Change Risk Management
	8 Chemical Safety Control		10 Air Pollution Management
	11 Eco-friendly Product & Technology Development		12 Renewable Energy Conversion
	25 Enhancement of Product Efficiency		12 Water Resources Management
Making a Positive Contribution to Society	1 Occupational Safety and Health	Fundamentals	5 R&D and Technical Innovation
	4 Management of Suppliers and Supply Chain		12 Securing Economic Performance and Financial Solvency
	9 Responsible Sourcing		12 Ethical Management and Compliance
	16 Human Rights Management		18 Talents Recruitment and Development
	19 Expansion of Diversity and Inclusion		20 Community Development and Corporate Citizenship
	22 Management of Stakeholders		22 Enhancement of Customer Satisfaction
26 Improvement of Organizational Culture	22 Customer Information Protection and Data Security		

Stakeholder Engagement

Communication with Stakeholders

The root of sustainability management of LG Chem lies in communication with stakeholders. LG Chem communicates with internal and external stakeholders through various channels and by reviewing their opinions and reflecting them to the management policy.

Defining Stakeholders

Stakeholders of LG Chem include all organizations and individuals influenced by sustainable management activities and social responsibility fulfillment.

LG Chem Stakeholders

Stakeholder Group	Expectation	Communication Channel
Stakeholders/Investors and Evaluating Organizations	<ul style="list-style-type: none"> Long-term growth Creating and distributing profits Transparent disclosure of information 	<ul style="list-style-type: none"> Corporate presentations General shareholders' meeting Financial information disclosure Credit ratings
Customers	<ul style="list-style-type: none"> Open communication R&D capabilities Improving product quality and safety 	<ul style="list-style-type: none"> Collecting customer feedback Product liability monitoring
Employees	<ul style="list-style-type: none"> Improving the corporate culture Cooperative labor-management relationship Promoting employee benefits Reinforcing employee safety and health 	<ul style="list-style-type: none"> Employee satisfaction survey Labor-management committee Company magazines Occupational safety and health committee Employee committee
Suppliers	<ul style="list-style-type: none"> Establishing strategic/cooperative partnership Management support and education 	<ul style="list-style-type: none"> Supplier presentations Management/technical support programs
NGO/Local communities	<ul style="list-style-type: none"> Strategic social contributions Community investments 	<ul style="list-style-type: none"> Listening to opinions such as survey CSR cooperation
Academe and Experts	<ul style="list-style-type: none"> Industry-academe cooperation Technological development 	<ul style="list-style-type: none"> Technical consultation Joint R&D
Industrial Associations and Organizations	<ul style="list-style-type: none"> Responding to new regulations Chemical management 	<ul style="list-style-type: none"> Councils and forums on sustainability Industry and business-related associations
Media	<ul style="list-style-type: none"> Performing sustainable projects Future growth potential 	<ul style="list-style-type: none"> Press meetings
Government agencies	<ul style="list-style-type: none"> Fair trade and compliance Shared growth 	<ul style="list-style-type: none"> Advice on industrial policies Government pilot projects

Opinions of Stakeholders

Customer



Hankook Tire & Technology Co., Ltd.
Senior Vice President, Joseph Kim

What are the latest sustainability issues in your industry, and what roles do you expect LG Chem to play?

The tire industry has been dealing with and responding to issues like sustainable natural rubber and microplastics in the last few years. The sustainability issue of the natural rubber supply chain is associated with human rights, environmental protection, transparent management, productivity, quality, and quality of life. Hankook Tire & Technology is resolving this issue by operating a global platform called the Global Platform for Sustainable Natural Rubber^{GPSNR} for the supply chain and automotive industry. Our company conducts research on microplastics for tire wear particles. Hankook Tire & Technology is not only required to manage the sustainable supply chain for natural rubber. The sustainable supply chain also applies to the raw materials supplied by LG Chem. As LG Chem is a major supplier of our company, the sustainability efforts of LG Chem will have a positive effect on our responsible sourcing policy and products. We look forward to seeing a true collaboration on sustainability among companies or among industries.

Hankook Tire seems to be engaging in a variety of activities to strengthen the ESG ecosystem in the supply chain, such as the formation of a partner committee and governance to evaluate and improve the ESG capability. Please share with us any future plans of your company on managing the supply chain ESG.

Hankook Tire established the "Sustainability Guideline for Suppliers" in 2018, and this Guideline was set forth as an essential guideline to be followed when signing all new supply contracts in 2019. The Guideline includes legal compliance, anti-corruption, prohibition of bribery, upholding and protection of human rights, environmental management, and response to climate change. Starting this year, Hankook Tire obliges partners to sign the ethical management pledge and conducts CSR evaluation through the e-purchase system. We are going to reorganize the system later so that tier 2 suppliers can manage social responsibility.

Supplier

POSCO Chemical Co., Ltd.
Head of Energy Material Strategy Group, Hyoje Lee



The responsible sourcing policy will become increasingly crucial for the battery industry. Please explain your ESG management process and critical control issue.

POSCO fully understands the importance of managing responsible minerals stressed by the global community and NGOs. POSCO has been publishing responsible mineral assessment reports since 2014. Raw materials for rechargeable batteries were included in the scope of responsible minerals in 2019. We have established a consistent ground rule and a response policy in keeping with the OECD Guidelines for the cobalt CSR issue.

At the same time, POSCO actively engages in the Responsible Sourcing Blockchain Network of LG Chem to secure traceability and strengthen responsible sourcing through third-party audits.

What do you expect from LG Chem regarding the sound ecosystem and competitiveness of the battery industry, and what are the roles of POSCO Chemical?

POSCO Chemical believes that responsible sourcing is the trend of our time. LG Chem can help our company solidify the responsible sourcing system by sharing information about its policies and programs periodically.

Evaluation Agency

Korea Corporate Governance Service
Senior Research Fellow, Jaekyu Jeong



The importance of environmental/social values as financial management factors is increasing with the growth of global ESG bonds and social responsibility investment, increased interest of institutional investors in ESG, and reinforcement of ESG disclosures. ESG rating agencies played a significant role in creating this trend. How do you think the market perspective on ESG rating has changed?

Whereas ESG rating in the past was merely about introducing or adopting the rating system, in-depth analyses such as operational competence and improvement measures are stressed these days. In other words, companies should pay attention to the ultimate purpose of adopting the ESG system. They must select and adopt an ESG system appropriate for the given conditions while closely communicating with the capital market of potential investors, including shareholders. By doing so, companies would be able to gain public awareness as a leading company that responds proactively to market demands beyond legal compliance.

What would be the critical ESG issues in the future, and what does LG Chem need to prepare?

The latest trend is related to the Task Force on Climate-related Financial Disclosure^{TCFD}. In other words, the trend is evaluating the financial values of non-financial information. The relevant companies would need to follow this trend and disclose related information faithfully. As corporate citizens that follow the UN SDGs, companies must perceive their roles and promote the relevant matters with an active mindset. Governance should be improved as well.

In particular, LG Chem must disclose information transparently and establish a clear stance. Since LG Chem is the best and leading chemical company in Korea, its stakeholders will ask for flawless corporate management. LG Chem should feel proud and responsible at the same time because the society has great expectations for the company to meet the highest level of ESG regarding the rights of shareholders, safety and health of workers, health and privacy of consumers, and fair trading.

The recent safety accident was probably inevitable due to the business characteristics, but LG Chem should remediate the situation swiftly and systematically and come up with a solid measure to prevent recurrence. In this process, LG Chem needs to hear and reflect the opinions of the stakeholders through the active engagement of experts.

Academeia

Korea University
International Business/Professor, Jay Hyuk Rhee



Please tell us about the central ESG issues for companies to guarantee business permanence in the fourth industrial revolution.

With the dawning of the fourth industrial revolution and the recent COVID-19 pandemic, corporate sustainability is influenced by numerous changes in the business environment. The current situation is similar to the past since companies are divided into winners and losers, but the criteria for determining corporate sustainability are changing. The sustainability of an individual company is determined by placing greater emphasis on qualitative growth over quantitative growth. This is why all companies must pay attention to ESG, which distinguishes non-financial performance. Therefore, LG Chem must set up and practice ESG priorities and goals by accounting for industrial and business models, in addition to promoting company-wide ESG.

ESG is taking root as a measure of corporate competitiveness, such as procedural fairness of corporate management, social value, and circular economy. What are the values that LG Chem must maintain to increase its global competitiveness?

Corporate competitiveness is no longer evaluated by the competence in the home country or a certain region because the asymmetry of information among countries and continents is decreasing rapidly due to the advancement of IT and media. The so-called "differential" ESG strategy focused on stakeholders in a specific country or region would be a short-sighted approach. Companies are required to establish and execute standard ESG strategies based on global standards. I expect LG Chem to become a leader in pursuing such universal values. As the global value chain is being rearranged quickly due to COVID-19, there is growing social justification for companies to pursue universal values based on standard ESG strategies.

A consensus was recently formed that "ESG risks=management risks." LG Chem needs to pay attention to various issues related to the environment (E of ESG) in the chemical industry. Instead of simply perceiving the environment as the target of risk management, LG Chem must reinterpret the environment (E) as a means of maintaining and securing new industrial competitiveness. To do so, LG Chem should objectively analyze its business activities in connection with environmental (E) evaluation indicators at home and abroad, sharing the results and improvement measures with the stakeholders.

NGO

Pulkum Environmental Foundation
Managing Director, Woo Yeom



Companies have recently been collaborating with various stakeholders such as NGOs when conducting social contribution businesses. What is the background of such collaboration trend?

The forest fire in Australia and the COVID-19 pandemic are requiring us to reflect on and change the environmental crises (including climate change), global economic structure, and overall lifestyle. The global community has established sustainable development goals^{SDGs} and launched a new climate regime in response to climate change. The Green New Deal Policy aims to make the transition to a carbon-free society. Such measures are driven by global mutual cooperation. Mutual cooperation differs from selfish cooperation, which considers one's interest or that of one's group only. I hope that LG Chem can sustain its mutual cooperation with the stakeholders for social contribution businesses. For example, strict plastic regulations are being implemented globally to enhance the social/environmental values of plastic materials. LG Chem should actively implement plastic waste recycling activities and make constant efforts to create collaboration programs with the relevant organizations.

What would be the roles of the Pulkum Environmental Foundation and LG Chem in maximizing the effects of the Cheongju Power Plant for Hope Green Project?

The Cheongju Power Plant for Hope Green is a 410KW power plant project run by the city of Cheongju, LG Chem, Pulkum Environmental Foundation, Community Chest of Korea, Chungbuk and Sejong Regional Headquarters of the Korea Energy Agency, Clear Cheongju Energy Conversion Governance, and Resident Autonomy Committee. The goal of this social contribution project is to increase eco-friendly/social values. The power plant is to be completed by the end of July 2020, and profits from photovoltaic power will be spent on an educational welfare project for children in the next 20 years (KRW 50 million per year). The Cheongju Power Plant for Hope Green will produce environmental values by reducing greenhouse gas emissions through renewable energy use. We can create social values by promoting the educational welfare project for the future generation. Through the successful operation of the power plant, the Pulkum Environmental Foundation will set an exemplary case of private-government-industrial cooperation leading the development of a sustainable community.

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GRI 410	410-1	Percentage of security personnel who have received formal training on the organization's human rights policies or specific procedures	88	
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SASB Index

Topic	Code		Page and note
Greenhouse Gas Emissions	RT-CH-110a.1	(1) Gross global Scope 1 emissions (2) Percentage of Scope 1 emissions covered under emissions-limiting regulations (e.g., K-ETS)	(1) 5,544,045 tCO ₂ -eq (2) 80% of emission standards applied to business sites in Korea
	RT-CH-110a.2	Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and analysis of performance against those goals	P32-39
Air Quality	RT-CH-120a.1	(1) NOx emissions	1,297 tons
		(2) SOx emissions	203 tons
		(3) VOCs emissions	356 tons
		(4) HAPs emissions	540 tons
Energy Management	RT-CH-130a.1	(1) Total energy consumed	(1) Korea 160,018 TJ/overseas 15,483 TJ
		(2) Percentage grid electricity	(2) Korea 33%/overseas 55%
		(3) Percentage renewable	(3) Korea 0.02%/overseas 13%
		(4) Total self-generated energy	(4) Korea 12,658 TJ
Water Management	RT-CH-140a.1	(1) Total water withdrawn	(1) 70,849,264 m ³
		(2) Total water consumed, percentage of each in regions with high or extremely high baseline water stress	(2) P40-41, There is no manufacturing sites that face high water stress
	RT-CH-140a.2	Number of incidents of noncompliance associated with water quality permits, standards, and regulations	1 (violated the Water Environment Protection Ordinance of Nanjing City by exceeding the rainwater emission T-P limit in January 2019, corrected and paid the penalty)
	RT-CH-140a.3	Description of water management risks and discussion of strategies and practices to mitigate those risks	P40-41
Hazardous Waste Management	RT-CH-150a.1	Volume of hazardous waste generated, percentage recycled	(1) 146,506 tons (2) 74%
Community Relations	RT-CH-210a.1	Discussion of engagement processes to manage risks and opportunities associated with community interests	The major business sites of LG Chem are closely related to each community. LG Chem communicates with the stakeholders of communities via various councils and manages risks and opportunities associated with community interests through private, government, and media activities. For example, the largest business site in Yeosu is located in Yeosu National Industrial Complex. Companies that moved into this Industrial Complex communicate with the community through the Yeosu Industrial Complex Development Council and Yeosu National Industrial Complex Plant Manager Council. LG Chem mitigates any risks that can arise regarding community interests such as CSR, contribution to the regional economy, and EH&S improvement.
Workforce Health & Safety	RT-CH-320a.1	(1) Total recordable incident rate (2) Fatality rate for direct employees and contractual employees	(1) 0.3935 (2) Employees 0.0052/Contract employees 0.0056
	RT-CH-320a.2	Description of efforts to assess, monitor, and reduce exposure of employees and contract workers to long-term (chronic) health risks	P56-61
Product Design for Use-phase Efficiency	RT-CH-410a.1	Revenue from products designed for use-phase resource efficiency	39% (revenue from rechargeable batteries, recycled plastics, and synthetic rubber for energy-saving tires)
Safety & Environment Stewardship of Chemicals	RT-CH-410b.1	(1) Percentage of products containing Category 1 and 2 Health and Environment Hazardous Substances according to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) (2) Percentage of products that have undergone hazard assessment	(1) 36.26% (2) 5.92%
	RT-CH-410b.2	(1) Discussion of strategy to manage chemicals of concern (2) Develop alternatives with reduced human and/or environmental impact	P25-27

Topic	Code		Page and note
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	LG Chem operates the process related to regulations and policy proposals through its Public Affairs Team. First, the team monitors the government policy trends and the enactment and amendment of the relevant laws. It then conducts an internal demand survey on policy proposals and regulations. After investigating and reviewing government proposals, the team fills out a recommendation form and submits it to the government by consulting with the competent government authority.
Operational Safety, Emergency Preparedness & Response	RT-CH-540a.1	(1) Process safety incident count (2) Process safety total incident rate (3) Process safety incident severity rate	(1) 2 (2) 0.0035 (3) Not an internally managed indicator
	RT-CH-540a.2	Number of transport incidents	2
Product Efficiency	RR-FC-410a.1	Average storage capacity of batteries, by product application and technology type	P66
	RR-FC-410a.5	Average operating lifetime of batteries, by product application and technology type	P66

TCFD Index

Recommendations of TCFD	Disclosure Status	
Governance: The organization's governance with regard to climate-related risks and opportunities		
Describe the board's oversight of climate-related risks and opportunities.	2019 CDP Climate Change Information Disclosure: CC1.1a, CC1.1b	The board holds periodic meetings to make decisions regarding climate-related strategies and plans. The Corporate Affairs Department reports the master plan for climate change response and the emissions trading strategy. Climate change performance is reported to members of the board, such as CFO and CEO. Matters related to emissions trading are decided by introducing them at the board meeting.
Describe the management's oversight of climate-related risks and opportunities.	2019 CDP Climate Change Information Disclosure: CC1.2a	The Corporate Affairs Department directly under CEO in LG Chem is in charge of affairs regarding climate-related strategies and plans. The Corporate Affairs Department reports the master plan for climate change response and the emissions trading strategy. Climate change performance is reported to members of the board, such as CFO and CEO. Matters related to emissions trading are decided by introducing them at the board meeting.
Strategy: Actual and potential impacts of climate-related risks and opportunities on the organization's business, strategy, and financial planning		
Describe the climate-related risks and opportunities identified by the organization over the short, medium, and long terms.	2019 CDP Climate Change Information Disclosure: CC2.2c, CC2.3a, CC2.4a, CC3.1c	In the short-term, potential risks include the increased cost of responding to greenhouse gas emissions trading regulations, increased investment cost according to renewable energy policies, physical risks caused by unusual weather, and reputation risks arising from changing consumer awareness. We identify new revenue sources from massive investment in the energy field as major opportunities. In the medium to long term, the primary risk factor is the increased internal operating cost due to maximum greenhouse gas reduction at business sites. Efforts to introduce and develop new greenhouse gas reduction technologies are regarded as opportunities.
Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	2019 CDP Climate Change Information Disclosure: CC2.5, CC2.6	Climate-related risks and opportunities impact products, services, supply chain, efforts to adapt to and alleviate climate change, R&D investment, business site operations, and other business activities. In particular, LG Chem established a sustainable management strategy that includes the expansion of renewable energy usage at domestic and overseas business sites. In terms of opportunities, LG Chem expands EV and ESS businesses and gradually increases its R&D investment to develop green chemical materials. These examples show that climate-related risks and opportunities have a great impact on LG Chem's business expansion, strategic changes, and financial plans for climate-related investment.
Describe the resilience of the organization's strategy, taking into consideration the different climate-related scenarios.	2019 CDP Climate Change Information Disclosure: CC3.1c, CC3.1d	LG Chem set mid-term goals for 2030 according to the 2030 greenhouse gas reduction road map in Korea and disclosed the goals via CDP until 2019. In 2020, LG Chem established the 2050 carbon-neutral growth strategy and set greenhouse gas reduction goals for 2050. We proposed a carbon-neutral growth strategy that maintains the same reduction goals as those in 2019 based on the business characteristics and circumstances of LG Chem. Nonetheless, more aggressive goals will be considered in the future to take into account the 2°C scenario.
Risk Management: How the organization identifies, assesses, and manages climate-related risks and opportunities		
Describe the organization's processes for identifying and assessing climate-related risks.	2019 CDP Climate Change Information Disclosure: CC2.2b	LG Chem identifies and assesses climate-related risks at the enterprise level. Climate-related issues are reported frequently to the CEO, with the Energy Committee led by the CEO discussing climate-related risks and opportunities. If there are mid- to long-term risks in the relevant business areas or government regulations associated with overseas business sites, such matters are discussed at the management meeting with the report of the respective department on response measures. LG Chem also appoints a greenhouse gas officer in charge at each business site to minimize climate-related regulation risks, establish climate change response regulations, and clarify R&R.
Describe the organization's processes for managing climate-related risks.	2019 CDP Climate Change Information Disclosure: CC2.2d	LG Chem selected climate change as the top priority issue of sustainable management to identify and manage risks and opportunities. The Corporate Affairs Department is operating the Energy/Climate Change Team to prepare for regulatory risks by pre-analyzing the impact of facility investment at each business site on greenhouse gas emissions. Any issues related to energy, greenhouse gas, and renewable energy are reported by the Corporate Affairs Department to the CEO. The identified risks are discussed at the Energy Committee or reported by the Corporate Affairs Department during the management meeting or board meeting. Decisions made at the management meeting or board meeting are informed throughout the enterprise.
Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	2019 CDP Climate Change Information Disclosure: CC2.2	When climate-related risks occur at a business site or a department, such risks are handed over to the Energy /Climate Change Team under the Corporate Affairs Department, to be reported to the CEO and management meeting for decisions. Climate-related risks are integrated into our overall risk management system.

Recommendations of TCFD	Disclosure Status	
Metrics and Targets: Metrics and targets used to assess and manage the relevant climate-related risks and opportunities		
Disclose the metrics used by the organization to assess climate-related risks and opportunities.	2019 CDP Climate Change Information Disclosure: CC11.3	LG Chem uses various monthly metrics such as greenhouse gas emissions, greenhouse gas emission unit, energy consumption, and greenhouse gas reduction performance to assess climate-related risks and opportunities. LG Chem also distributes the greenhouse gas impact guideline throughout the enterprise when investing in facility extensions to identify the increase in greenhouse gas emissions at each business site and minimize regulatory risks.
Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas ^{GHG} emissions.	2019 CDP Climate Change Information Disclosure: CC2.5, CC2.6 LG Chem Sustainability Report 2019 P:107	SCOPE1: 5,544,045tCO ₂ -eq SCOPE2: 5,039,204tCO ₂ -eq SCOPE3: 47,213tCO ₂ -eq (Wastewater discharge, waste disposal, water use, employee business trip)
Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	2019 CDP Climate Change Information Disclosure: C4	LG Chem established a per-unit reduction goal for the production of petrochemical products in 2015, and has experience in reducing emissions from 0.50tCO ₂ -eq/ton in 2008 to 0.419tCO ₂ -eq/ton in 2017. Although emissions are increasing due to new expansion investments, we plan to continue to reduce GHG per metric ton of products through the establishment and management of intensity targets. Furthermore, we will propose a long-term goal by 2050 based on the Carbon Neutral Growth Strategy set in 2020 to promote performance management through the establishment of new goals.

Sustainability Initiatives

Major Associations

California Energy Storage Alliance	Korea Business Council for Sustainable Development
PC/BPA Council	Korea Exchange
The Rechargeable Battery Association	Korea Enterprises Federation
Reponsible Minerals Initiative	Korea Management Association
Underwriters Laboratories	Korea Vinyl Environmental Council
UN Global Compact	Korea Petrochemical Industry Association
Korea Fair Competition Federation	Korea Smart Grid Association
Green Company Council	Korea Battery Industry Association
Korea Display Industry Association	Korea Pharmaceutical and Bio-Pharma Manufactures Association
International Institute of Synthetic Rubber Producers	Korea Chlor Alkali Industry Association

United Nations Global Compact UNGC 10 Principles

LG Chem actively supports UNGC's ten principles and participates in UNGC-sponsored activities. We faithfully follow the ten principles through various policies and activities based on the ten principles below.

UNGC 10 Principles and LG Chem's Sustainability Activities

Areas	Principles	Page
Human Rights	1. Businesses should support and respect the protection of internationally proclaimed human rights; and	54-55
	2. Make sure that they are not complicit in human rights abuses.	54-55
Labor	3. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;	72-73
	4. The elimination of all forms of forced and compulsory labor;	54-55
	5. The effective abolition of child labor; and	54-55
	6. The elimination of discrimination in respect of employment and occupation.	52, 54-55
Environment	7. Businesses should support a precautionary approach to environmental challenges;	32-39
	8. Undertake initiatives to promote greater environmental responsibility; and	32-39
	9. Encourage the development and diffusion of environmentally friendly technologies.	32-39
Anti Corruption	10. Businesses should work against corruption in all its forms, including extortion and bribery.	86-87

Our Alignment with the UN SDGs

As a global citizen, LG Chem is making efforts to contribute to the achievement of UN SDGs. Considering the direct and indirect impacts on our business models, we focus on the SDGs relevant to our businesses and engages in a variety of sustainability activities on specific targets.

Our Focused Areas on SDGs

SDGs	Activities	Page
	• Producing crop protection by promoting a seed business	13
	• Providing vaccines like 'Euvax' and 'Eupenta' for infants through UNICEF	12
	• Conducting youth education programs every year • Supporting automotive battery innovation contest for undergraduates	76-79
	• Operating a female leader training program • Participating in Target Gender Equality	51-52
	• Distributing RO Membranes to global seawater desalination projects	12
	• Expanding eco-friendly energy business through automotive batteries • Operating Power Plant for Hope Green in Seoul and Cheongju • Expanding ESS and renewable energy power generation facilities in manufacturing sites	11, 37-39
	• Reinforcing shared growth with suppliers through financial and educational support • Supporting social enterprises by LG Social Campus • Creating high quality jobs domestic and overseas	70-73, 77, 80-81
	• Operating the School of Love project • Conducting the energy shared growth project to help small and medium sized companies	38, 79
	• Prohibiting discrimination and respecting diversity of employees	51-52
	• Conducting education to strengthen product stewardship • Making efforts to recycle wastewater and wastes generated in the manufacturing process	20-27
	• Reducing GHG emission to more than 75% compared to BAU by 2050 • Promoting renewable energy 100 and continuous investments on environment	32-39
	• Conducting ecosystem conservation activities such as Bamseom Protection Campaign and Musimcheon Stream Protection Campaign	23
	• Publishing Sustainability Reports • Conducting global partnerships activities such as UNGC, RMI, and CDP • Enhancing partnerships with various stakeholders	Cover, 102

Assurance Statement

Independent Auditor's Assurance Report

To: LG Chem, Ltd.

Scope

We have been engaged to report on LG Chem, Ltd. ("LG Chem" or the "Company")'s description of material issues derived from its 2019 materiality assessment results in its 2019 Sustainability Report (the "Sustainability Report") are in compliance with the Core options of the Global Reporting Initiative's Sustainability Reporting Standards ("GRI Standards"). The material issues of the Company to which we are reporting are as follows:

GRI Standards	Disclosure	Related Material Issues
301 Materials	301-2 Recycled input materials used	• Circular economy
302 Energy	302-1 Energy consumption within the organization	• Greenhouse gas emission reduction and energy management
	302-3 Energy intensity	• Greenhouse gas emission reduction and energy management
305 Emissions	305-1 Direct (Scope 1) GHG emissions	• Greenhouse gas emission reduction and energy management
	305-2 Energy indirect (Scope 2) GHG emissions	• Greenhouse gas emission reduction and energy management
	305-4 GHG emissions intensity	• Greenhouse gas emission reduction and energy management • Climate change risk management
	305-3 Other indirect (Scope 3) GHG emissions	• Air pollution management
403 Occupational Health and Safety	403-2 Hazard identification, risk assessment, and incident investigation	• Occupational safety and health
414 Suppliers Social Assessment	414-1 New suppliers that were screened using social criteria	• Responsible sourcing • Management of suppliers and supply chain
416 Customers health and Safety	416-2 Incidents of non-compliance concerning the health and safety impacts of products and services	• Product safety and quality reinforcement • Chemical safety control

LG Chem's Responsibilities

The Company is responsible for preparing the Sustainability Report in compliance with GRI Standards. In addition, the Company is responsible for designing, implementing and effectively operating internal controls so that the information contained in the Sustainability Report is free from material misstatement, whether due to fraud or error.

Our Independence and Quality Control

We have complied with the independence and other ethical requirements of the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board of Accountants, which founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior.

The firm applied International Standards on Quality Control 1 and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Our Responsibilities

Our responsibility is to express a limited assurance conclusion on the Company's description of certain information on the Sustainability Report, based on the procedures we have performed. We conducted our limited assurance engagement in accordance with International Standard on Assurance Engagements 3000, Assurance Reports Other than Audits or Reviews of Historical Financial Information, issued by the International Auditing and Assurance Standards Board. That standard requires that we plan and perform our procedures to obtain limited assurance about the sustainability report.

A limited assurance engagement to report on certain description of a company's sustainability report involves performing procedures to obtain evidence about the description of the company. The procedures selected depend on the practitioner's judgment, including the assessment of risks that the description is not fairly presented. Our procedures that we consider necessary include the following:

- 1) Conducting interviews with persons in charge of performing tasks related to the Sustainability Report, such as collecting and reporting relevant data.
- 2) Understanding the Company's systems and processes for managing and reporting the Sustainability Report and related data
- 3) Performing limited procedures such as inquiry, analytical review and review of relevant documentation, if necessary, over the procedures and results of materiality assessment, and certain information in the Sustainability Report subject to our limited assurance engagement.

The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had we performed a reasonable assurance engagement. We assume no responsibility for the performed procedures, assurance report and the conclusion of assurance report for any individual or organization other than the Company.

Inherent Limitations of the Sustainability Report

LG Chem's sustainability report is prepared to meet the common needs of a broad range of users and may not, therefore, include every aspect of the sustainability reporting that each individual user may consider important in its own particular environment.

Due to inherent limitation of internal controls, controls at the Company may not prevent, or detect and correct, all errors or omissions in processing or reporting transactions related to the sustainability report. Also, the projection of any conclusion on a sustainability report to future periods is subject to the risk that controls at the company may become inadequate or fail.

Conclusion

Based on the procedures we have performed, nothing has come to our attention that causes us to believe that the description of the material issues selected by the Company in LG Chem's 2019 Sustainability Report is not prepared in accordance with the set out on GRI Standards with Core options.

Practitioner's Recommendations

The following does not affect the practitioner's limited assurance conclusion but is believed to be beneficial to the users of the Sustainability Report: Based on its sustainable management vision of "Deliver advanced, innovative and sustainable solutions for our environment and society", LG Chem has established three sustainable management strategies: "Leading Sustainable Innovation for Customers", "Managing the Impacts of Climate Change" and "Making a Positive Contribution to Society". In the Sustainability Report, the Company disclosed the process of establishing the strategy, activities and performance in three top priority areas and six general areas based on the strategic direction, and mid- to long-term goals and tasks for the top priority areas.

We recommend that the Company present additional mid-term to long-term goals for the six general areas and fully disclose the progress of its sustainability strategy tasks according to physical and temporal reporting boundaries.

July 21, 2020

Deloitte Anjin LLC

Deloitte Anjin LLC

CEO Jong Sung Hong

Metrics Table

Financial Data				
Category	Unit	2017	2018	2019
Consolidated Income Statement				
Sales	KRW million	25,698,014	28,183,013	28,625,042
Operating Profit	KRW million	2,928,457	2,246,070	895,648
Net Profit	KRW million	2,021,973	1,519,312	376,104
Consolidated Financial Statement				
Current Assets	KRW million	11,205,581	12,088,512	11,869,724
Non-current Assets	KRW million	13,835,640	16,855,625	22,154,702
Total Assets	KRW million	25,041,221	28,944,137	34,024,426
Current Liability	KRW million	6,644,689	7,273,534	8,941,529
Non-current Liability	KRW million	2,057,955	4,348,475	7,699,108
Total Liability	KRW million	8,702,644	11,622,009	16,640,637
Owners of the Parent	KRW million	16,168,527	17,083,044	17,004,977
Non-controlling Interests	KRW million	170,050	239,084	378,812
Total Equity	KRW million	16,338,577	17,322,128	17,383,789
Business Performance				
Sales by Business				
Petrochemicals	KRW million	15,902,538	16,328,513	14,997,932
Energy Solutions	KRW million	4,560,546	6,498,916	8,350,251
Advanced Materials	KRW million	4,085,524	4,178,772	4,115,283
Life Sciences	KRW million	548,457	571,129	622,184
Others	KRW million	600,949	605,683	539,392
Sales by Region				
Korea	KRW million	8,332,634	8,996,392	8,251,763
China	KRW million	8,755,465	9,256,242	9,675,578
Asia	KRW million	4,692,790	4,620,136	3,830,511
America and Europe	KRW million	3,579,312	4,887,673	6,458,573
Others	KRW million	337,813	422,570	408,617
Distribution of Economic Achievement				
Total Annual Remuneration	KRW million	1,508,012	1,624,945	1,766,450
Average Wage per Person	KRW million	90	88	88
Procurement of Raw Materials	KRW million	13,079,956	16,123,353	16,223,224
Total Dividends	KRW million	460,058	460,058	153,608
Taxes and Due by Region				
Korea	KRW million			79,898
Asia	KRW million			143,292
Europe	KRW million			4,843
America	KRW million			-18,847
Others	KRW million			149
Consolidated Adjustments	KRW million			-24,879
Total	KRW million			184,456

Environmental Data				
Category	Unit	2017	2018	2019
Greenhouse Gas Emissions (Scope 1)	tCO ₂ -eq	5,270,020	5,419,174	5,544,045
Greenhouse Gas Emissions (Scope 1) Intensity	tCO ₂ -eq/Sales (KRW million)	0.2051	0.1923	0.1937
Greenhouse Gas Emissions (Scope 2)	tCO ₂ -eq	4,140,987	4,568,698	5,039,204
Greenhouse Gas Emissions (Scope 2) Intensity	tCO ₂ -eq/Sales (KRW million)	0.1611	0.1621	0.1760
Total Greenhouse Gas Emissions (Scope 1+Scope 2)	tCO ₂ -eq	9,411,007	9,987,872	10,583,249
Total Greenhouse Gas Emissions (Scope 1+Scope 2) Intensity	tCO ₂ -eq/Sales (KRW million)	0.3662	0.3544	0.3697
Greenhouse Gas Emissions (Scope 3, Korea)				
Wastewater Discharge	tCO ₂ -eq	19,289	20,108	18,955
Waste Disposal	tCO ₂ -eq	15,390	16,631	19,113
Water Use	tCO ₂ -eq	5,218	6,401	6,379
Employee Business Trip	tCO ₂ -eq	2,640	3,130	2,767
Energy Consumption	TJ	164,888	167,390	175,501
Intensity of Energy Consumption	TJ/Sales (KRW million)	0.0064	0.0059	0.0061
Percentage of Renewable Energy Consumption	%	0.05	0.20	1.20
Amount of Raw Materials Use	Metric Tons	22,176,562	21,942,300	26,677,097
Amount of Renewable Raw Materials Use	Metric Tons	22,347	36,928	86,588
Water Withdrawals	m ³	66,494,272	69,658,198	70,849,264
Recycled Amount of Wastewater	m ³	4,135,209	2,968,302	2,524,962
Wastewater Discharge	m ³	19,852,046	21,012,076	20,583,963
Generated Waste	Metric Tons	279,230	303,935	348,472
Recycled	Metric Tons	206,950	227,767	254,570
Incinerated	Metric Tons	49,494	56,177	67,097
Landfilled	Metric Tons	17,738	15,013	22,675
Others	Metric Tons	5,048	4,978	4,130
NOx Emissions	Metric Tons	1,167	1,265	1,297
SOx Emissions	Metric Tons	132	297	203
Dust Emissions	Metric Tons	205	177	299
HAPs Emissions	Metric Tons	443	546	540
VOCs Emissions	Metric Tons	325	309	356
COD Discharge	Metric Tons	1,417	1,038	950
T-N Discharge	Metric Tons	317	337	328
Harmful Chemical Substances Consumption	Metric Tons	7,717,186	8,762,910	9,761,674
Investment on Environment	KRW 1,000	89,762,767	153,640,102	146,592,554

*GHG emissions and energy consumptions from 2017 to 2018 are modified due to revision of GHG statements.

*Data related to water, wastewater, NOx, SOx, Dust, COD, T-N, Environment Investment Costs have been modified due to the recalculation of past data (2017~2018).

For further details on this report

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Social Data

Topic	Unit	2017	2018	2019
Total Employees	Person	29,455	34,742	40,234
Total Regular Employees	Person	29,309	33,355	39,190
Total Contract-based Employees	Person	146	1,387	1,044
Percentage of Female Employees (Korea)	%	12.8	13.7	14.1
Percentage of Female Employees (Overseas)	%	33	32.9	31.4
Percentage of Female Managers (Korea)	%	11.3	12.4	12.9
Percentage of Female Managers (Overseas)	%	20.7	22.2	22.7
Percentage of Female Executives	%	2.5	3.2	4.5
LTIR (Employees)	Per 200,000 working hours	0.1768	0.1414	0.1269
LTIR (Inside Subcontractors)	Per 200,000 working hours	0.3847	0.2779	0.1853
TRIR (Employees)	Per 200,000 working hours	0.3535	0.3387	0.3935
TRIR (Inside Subcontractors)	Per 200,000 working hours	0.5540	0.3705	0.3425
Fatality Rate (Employees)	Per 200,000 working hours	-	-	0.0052
Fatality Rate (Inside Subcontractors)	Per 200,000 working hours	0.0154	-	0.0056
Process Safety Total Incident Rate	Per 200,000 working hours	0.0082	0.0044	0.0035
Total Number of Suppliers Registered	Number	5,213	4,759	6,563
Number of New Suppliers Registered	Number	564	397	366
CSR Assessment Execution (Periodic Assessment)	Number		239	292
CSR Assessment Execution (New Company)	Number		86	95
CSR Site Evaluation	Number	3	16	26
Company-wide CSR Expenses	KRW 100 million	369	167	171
Company-wide Employee Volunteer Participation Time	Hour	14,989	12,732	13,666
Customer Satisfaction Survey Score	Net Promoter Score	64.3	61.4	66.1
Scope of Customer Satisfaction Survey Data	%	95	94	94
Total Policy Contributions	KRW 1,000	1,725,168	2,098,253	2,311,660
Korea Enterprises Federation	KRW 1,000			341,450
PC/BPA Council	KRW 1,000			323,620
Korea Petrochemical Industry Association	KRW 1,000			239,052
Korea Vinyl Environmental Council	KRW 1,000			202,500
Korea Battery Industry Association	KRW 1,000			175,000

*Percentage of female employees (overseas) and percentage of female managers (overseas) apply only to LGCCl and overseas manufacturing sites.

*Total number of suppliers registered is based on the accumulated number of suppliers with five years' of trading performance.

*Number of new suppliers registered is based on the first-tier suppliers.

*Total employees and Company-wide CSR expenses have been modified due to the recalculation of past data (2017~2018).

This report tried to avoid spot color printing and coating process in order to minimize environmental pollution and waste of resources during the process of printing. It also lessened the use of toxic ingredients by using eco-friendly soy ink and alcohol-free printing.



