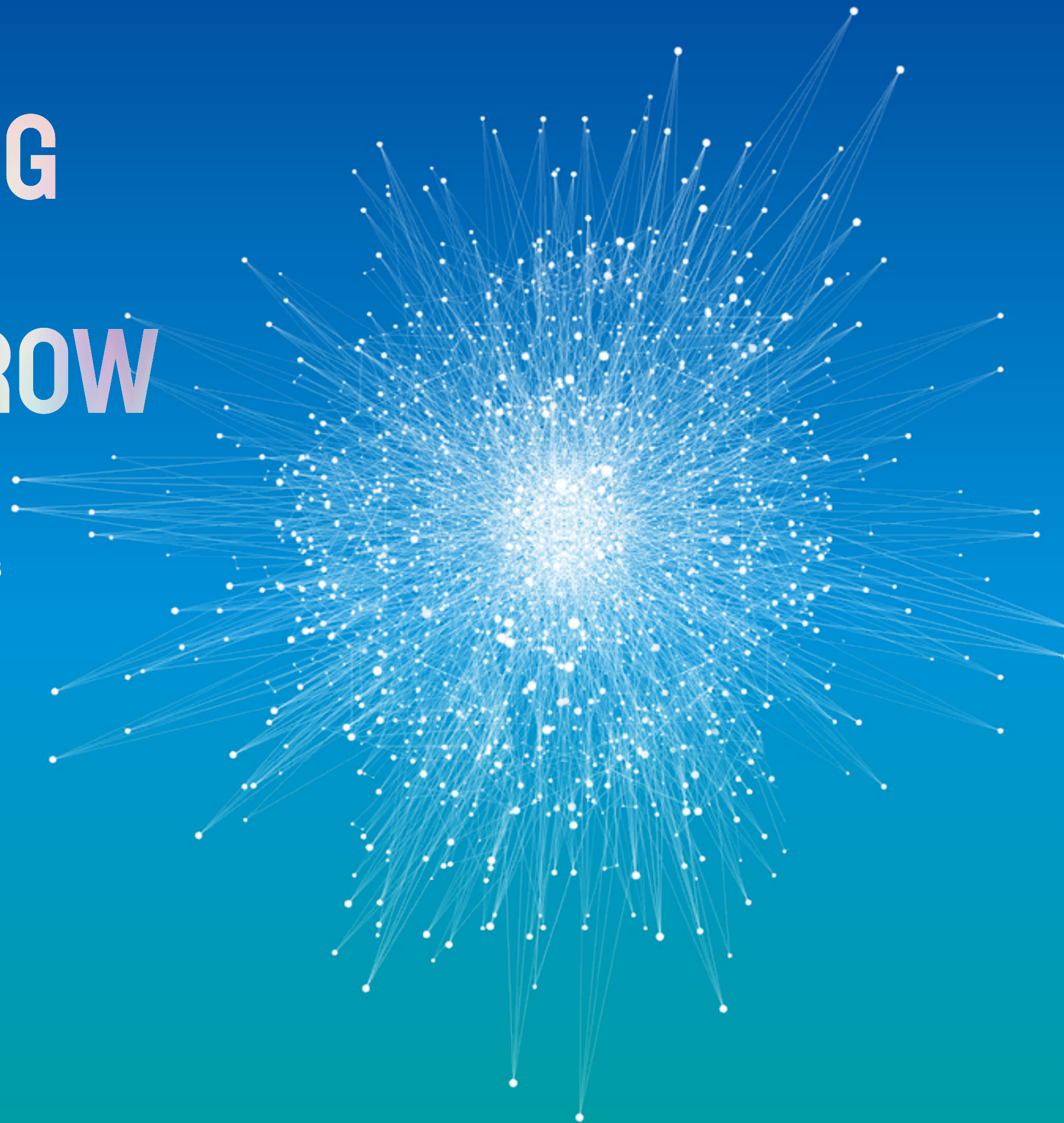


BUILDING YOUR TOMORROW TODAY



Doosan Corporation CSR Report 2018

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About This Report

Overview of the Report

Doosan Corporation has published its annual Corporate Social Responsibility (CSR) Report, which reflects the opinions of its stakeholders, since 2013 to share its activities and achievements during the preceding year. The present 6th CSR report aims to transparently disclose Doosan's key CSR achievements of 2018 to its stakeholders.

Composition of the Report

Doosan emphasizes leading activities and cases under the Business & Impacts section by selecting key issues based on the degree of stakeholders' interest and strategic significance. It introduces key policies, major policies, management methods, activities and data related to corporate social responsibility which can be found in the CSR Management section. Related data is presented in the Appendix.

Reporting Period and Scope

This report presents Doosan's CSR achievements from January 1st to December 31st of 2018. Certain information in this report relates to activities in 2019 if they are deemed to have an important impact on decision-making. It also discloses both the company's plans for 2019 as well as forward-looking statements based on mid- and long-term plans. It presents the achievements and activities of all domestic worksites of Doosan Corporation, and specifies details concerning overseas worksites.

Reporting Principle

This report has been prepared in conformance to the Core Options under the GRI (Global Reporting Initiative) Standards. The current guidelines for reporting can be found on pages → 97-100 of this report.

Independent Assurance

DNV GL has verified the contents and publication process of this report. The assurance statement appears on pages → 102-103.










Cover Story

Dots and lines present Doosan's future-oriented image that extends around the world.

INTERACTIVE PDF

Navigator Botton

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BUILDING YOUR TOMORROW TODAY

Doosan Corporation CSR Report 2018

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Doosan Group

Introduction of Doosan Group

Korea's Oldest Enterprise



Doosan is the oldest Korean company with over 123 years of history and also the fastest growing company in the last 10 years.

Innovating and Changing Global Enterprise



Doosan enhances human lives by pursuing innovation and change continuously, based on its ISB business, required to build and operate the social infrastructure.

People-centered Enterprise

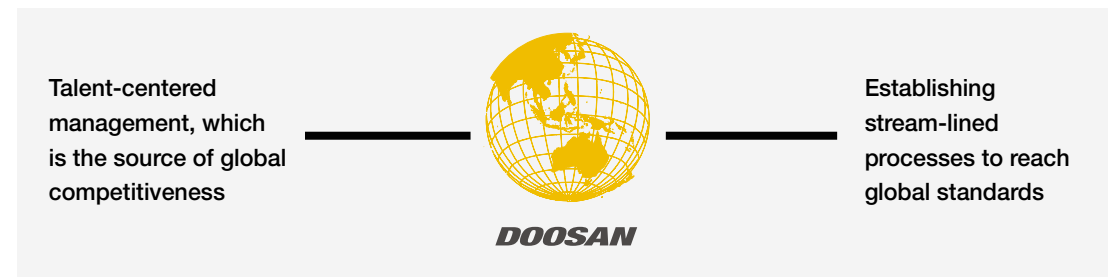


Based on Doosan's philosophy centered on "people," we strive to maximize the value of our customers, shareholders, and investors, and thereby realize a higher level of customer satisfaction.

Doosan Vision

Proud Global Doosan

Doosan intends to become a Proud Global Doosan, through processes suitable for the global standard and talent-oriented management, which is a source of global competitiveness.



Doosan Group	Doosan Corporation							
	Electro-Materials BG	Industrial Vehicle BG	Mottrol BG	Retail BG Duty-free shop Fashion mall	Fuel Cell BG	Bio BU	Digital Innovation BU	
	Affiliated Companies or Subsidiaries							
	ISB ¹⁾	Doosan Heavy Industries & Construction	Doosan Infracore	Doosan Bobcat	Doosan Engineering & Construction	Doosan Mecatec	Doosan Robotics, Inc.	Doosan Mobility Innovation
CSB ²⁾	Oricom	Hancorn	Doosan Magazine	Doosan Bears	Doosan Cuvox	Neoplux		
Auxiliary Organizations								
Doosan Yonkang Foundation			Doosan Art Center			DLI ³⁾		

1) Infrastructure Support Business 2) Consumer & Service Business 3) Doosan Leadership Institute

Doosan's Management Philosophy

Winning Team Doosan

The unique way of Doosan's doing business represents a corporate philosophy, culture, and set of management principles that Doosan has developed with the aim of transforming itself into a "Proud Global Doosan." The unique way of Doosan's doing business consists of the following three elements: the Doosan Credo; the People of Doosan ("The Six Traits of Doosan People"); and the Doosan Credo Change Model, which serves as the foundation through which the People of Doosan realize the Doosan Credo.

1 Doosan Credo

The Doosan Credo

- A philosophy to be observed by Doosan People
- A charter serving as the criteria and frame of reference for all business conduct and decision-making
- Composed of Aspiration and Core Values

Doosan Credo System

Aspiration

Proud Global Doosan Winning Team! Doosan!

Core Values

To establish a Proud Global Doosan, Doosan People practice the nine Core Values of the Doosan Credo on a daily basis, wherever they conduct business in the world. The Core Values include the methods by which Doosan People should operate the company's business, the way they should treat and respect each other, and the ways in which they should work with all of Doosan's partners.

People	Cultivating People	Integrity and transparency
Inhwa	Customers	Technology and Innovation
Profit	Social Responsibility	Safety and Environment

2 A Strong, Competitive Edge & Advanced Processes and Systems

For a continuously strong performance, Doosan strives to secure a Strong Competitive Edge, at the same time as optimizing its way of working through Advanced Processes and Systems. This creates a virtuous cycle in which Doosan's people, the individuals who actually determine Doosan's performance as a company, are trained to pursue these same objectives meticulously. This positive feedback mechanism thus results in a winning team.

3 Doosan People

Regardless of whether they have exceptional capabilities or not, the term "Doosan People" refers to all Doosan employees who incessantly strive to enhance their capabilities while practicing Doosan's Core Values with a mindset of actively contributing to the organization. In addition, Doosan People respect and practice certain fundamental values, while placing great importance on the concept of talent. The intrinsic Traits of Doosan People may be summarized as follows:



CEO Message



For Doosan, a sustainable future starts with challenges, innovation and constant efforts

Doosan was the first to be established among the modern companies of Korea, and has achieved exponential growth over the last 123 years. Over a century of constant challenges and innovation, Doosan has become a top-tier global company with about 40,000 employees in 38 countries.

Doosan continues its sound management based on its solid business portfolio. Despite difficult market conditions, we are maintaining growth and accelerating growth by securing key technologies in new business areas. Furthermore, we have a strong will to increase our value and competitiveness of existing businesses and create new business opportunities through digital transformation.

Doosan's growth over a century is thanks to the unlimited trust and support of our stakeholders. We will continue to be a sustainable company with you for the next century.

We sincerely ask for your continued interest and support as we maintain our commitment to move forward.

Thank you.

Chairman of Doosan Group,
CEO of Doosan Corporation
Jeongwon Park



Letter to Stakeholder



Doosan Corporation will open the doors to a new future through change, innovation and social responsibility management

Dear Esteemed Stakeholders,

Doosan Corporation is diligently communicating with its stakeholders through its annual CSR Report and is committed to corporate social responsibility management by disclosing Doosan's economic, social and environmental performance and activities transparently throughout the year. Since last year, Doosan Corporation is pushing ahead to provide innovative solutions and differentiated values to its stakeholders, based on its new vision and slogan, 'World Best Innovation Partner' and 'Design the Future, Spark the Growth'.

Doosan Corporation was able to extend its success by continuously pursuing innovation and taking up challenges amid various problems such as the ongoing recession and uncertainty in the market.

Electro-Materials BG has increased its portion of overseas sales by strengthening strategic competitiveness in existing businesses such as copper clad laminates and OLEDs, and is continuing to discover and nurture new business items, including the starting of the construction of a battery copper foil plant in Europe. Meanwhile, Industrial Vehicle BG was able to make increased sales sharply compared to last year through an increased domestic market share, strong sales in advanced markets, and strategic alliances with top-tier companies. Through an active response to the rapid increase in demand of hydraulic parts and continuous improvement efforts, Mottrol BG was able to make increased sales sharply compared to last year, while, at the same time, strengthening its global competitiveness by expanding its business into new markets. Retail BG is growing steadily every year, while establishing a stable business environment amid fierce competition in the duty-free market and a rapidly changing business environment. As for Fuel Cell BG, it has set a new performance record since it started electronic fuel business, secured nearly KRW 1.2 trillion in project orders, and established its position as a global leader in the fuel cell market.

Based on these achievements, Doosan Corporation will prepare another tomorrow. In a rapidly changing industrial environment, digital transformation is expanding its application day by day, and the fourth industrial revolution has become a daily routine. Based on a high-growth business portfolio, Doosan Corporation will expand its market share in the traditional industries and accelerate growth in the new business in the stream of changing times. In addition, the company will have a management system that can respond to rapidly changing market conditions, and proactively engage with changes in the business environment and the market. Doosan Corporation will develop products that can lead the market and diversify export markets with new customers by focusing on strengthening both its business and global competitiveness, diversifying its business platforms, and promoting new platforms.

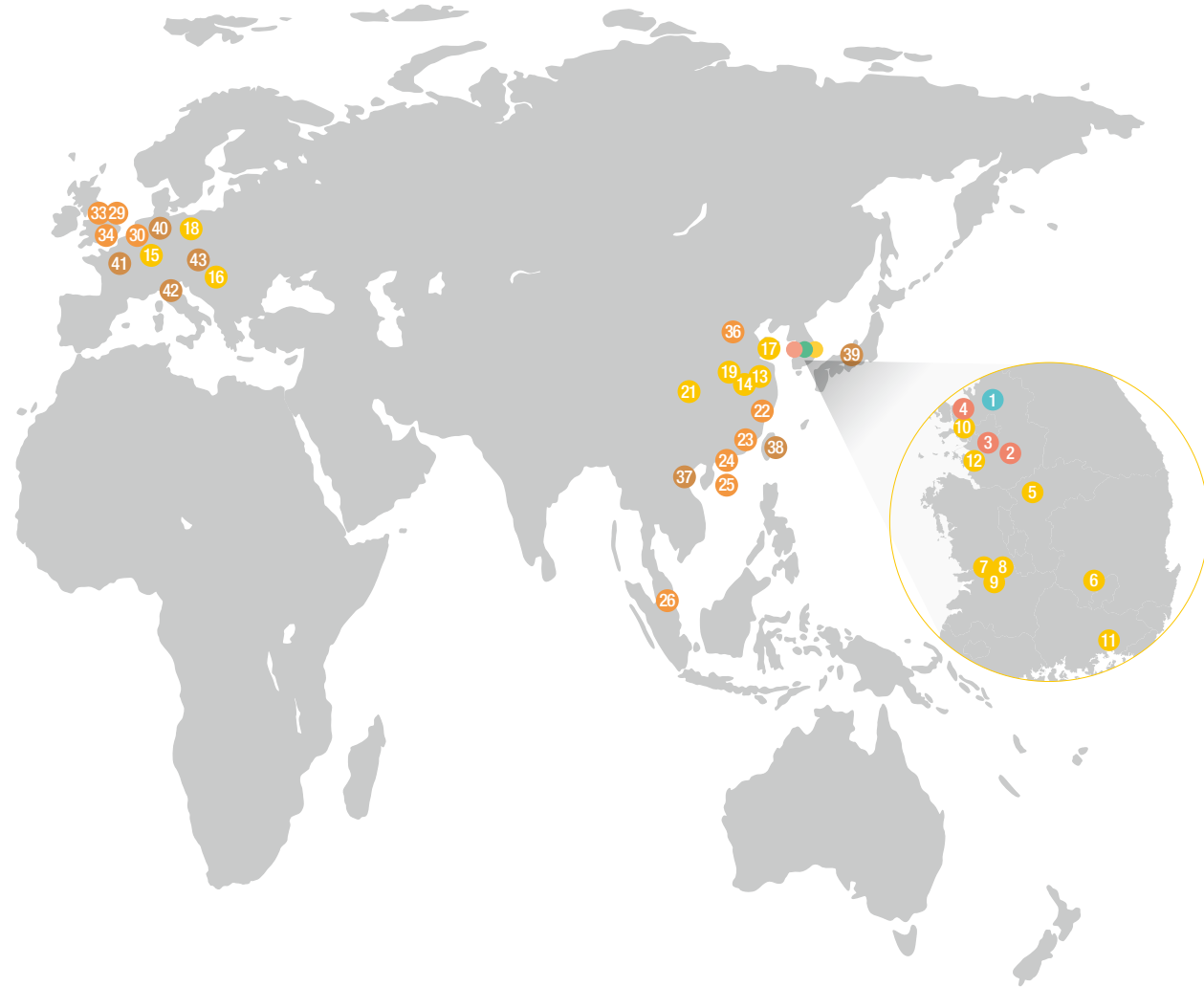
Doosan Corporation will take the lead in pursuing and practicing social values as well as in the economic value of enterprises. The company holds the CSR committee every year to review and share CSR performance and future plans, to check the CSR direction that everyone should move together in. Doosan Corporation has promoted a global CSR roll-out for its overseas subsidiaries in the US, Europe, and China, while making efforts to achieve corporate social responsibility management at its domestic and overseas business sites. The company set up mid- to long-term road maps for each subcommittees to establish key action plans and key performance indicators (KPIs) to prepare the foundation for social responsibility management practices. Doosan Corporation's efforts have been recognized for its achievements such as listing on both DJSI (Dow Jones Sustainability Indices) Asia Pacific and DJSI Korea for five consecutive years, receiving A+ rating of ESG evaluation by the Korea Corporate Governance Service.

Doosan Corporation will grow and develop with its stakeholders as a corporate citizen, who values change and innovation, and places importance on the sustainability of our society. In this regard, I cordially ask you, our esteemed and valued stakeholders, for your everlasting support.

Thank you.

Chairman of the CSR Committee,
CEO of Doosan Corporation
Hyunsoo Dong

Introduction of Doosan Corporation



Introduction of Doosan Corporation

Doosan Corporation, the parent company of Doosan Group, oversees the operations of 23 affiliates involved in diverse business streams, and at the same directly manages its seven BG/BU in over 15 countries.

Date of Establishment: December 18th, 1933

CEO: Park Jeongwon, Dong Hyunsoo, Kim Minchul

Business Areas: Electronic components/materials, forklifts, hydraulic parts, retail, fuel cell, biomaterials

Operating Countries: 15 countries including Korea, China, USA, and UK

Headquarters: 275 Jangchungdan-ro, Jung-gu, Seoul, Korea

Doosan Corporation Highlight

Including overseas subsidiaries of Doosan BGs at the end of 2018

Total assets KRW **6,494** billion

Revenues KRW **3,416.4** billion

Operating income KRW **215.1** billion

Number of employees **5,648** persons



Global Network of Doosan Corporation

Doosan Corporation operates production plants, overseas subsidiaries, and overseas branches in 15 countries worldwide.

Head-quarters	1 Doosan Corporation	Seoul, S. Korea
R&D Centers	2 Electro-Materials	Yongin, S. Korea
	3 Bio	Suwon, S. Korea
	4 Industrial Vehicle	Incheon, S. Korea
	Production Plants	Production Plants_Domestic
5 Electro-Materials Jeungpyeong Plant		Jeungpyeong, S. Korea
6 Electro-Materials Gimcheon Plant		Gimcheon, S. Korea
7 Electro-Materials Iksan Plant		Iksan, S. Korea
8 Bio Iksan Plant		Iksan, S. Korea
9 Fuel Cell Iksan Plant		Iksan, S. Korea
10 Industrial Vehicle Incheon Plant		Incheon, S. Korea
11 Mottrol Changwon Plant		Changwon, S. Korea
12 Fuel Cell Hwaseong Plant		Hwaseong, S. Korea
Production Plants_Overseas		
13 Electro-Materials DSCS		Changshu, China
14 Electro-Materials CFAP ZH		Zhangjiagang, China
15 Electro-Materials CFL	Wiltz, Luxembourg	
16 Electro-Materials DE	Tatabánya, Hungary	
17 Industrial Vehicle DIVC	Yantai, China	
18 Industrial Vehicle DLE	Freiwalde, Germany	
19 Mottrol DMJC	Jiangyin, China	
20 Fuel Cell DFCA	South Windsor, Connecticut, USA	
21 Bio Doosan-Kelun JV	Chengdu, China	
Overseas Subsidiaries	22 Electro-Materials DSC	Shanghai, China
	23 Electro-Materials Shen Zhen	Shenzhen, China
	24 Electro-Materials DSH	Hong Kong, China
	25 Electro-Materials CFAP HK	Hong Kong, China
	26 Electro-Materials DSES	Singapore
	27 Electro-Materials DSEA	San Jose, California, USA
	28 Electro-Materials CFT	Glenside, Pennsylvania, USA
	29 Industrial Vehicle DIVUK	Northampton, UK
	30 Industrial Vehicle DIVEU	Sint-Niklaas, Belgium
	31 Industrial Vehicle DIVAC	Atlanta, Georgia, USA
32 Industrial Vehicle DMHS	Atlanta, Georgia, USA	
33 Industrial Vehicle Rushlift	Northampton, UK	
34 DDI Europe	Crawly, UK	
35 DDI America	Suwanee, Georgia, USA	
36 DDI China	Beijing, China	
Overseas Branches	37 Electro-Materials Vietnam Branch	Hanoi, Vietnam
	38 Electro-Materials Taiwan Branch	Taipei, Taiwan
	39 Electro-Materials Japan Branch	Tokyo, Japan
	40 Industrial Vehicle Germany Branch	Essen, Germany
	41 Industrial Vehicle France Branch	Élancourt, France
	42 Industrial Vehicle Élancourt, France	Lissone, Italy
	43 DDI Europe-Czech Branch	Pilzen, Czech

Main business lines

Materials	Machinery	Energy
Electro-Materials BG Copper clad laminates, panel materials, heat radiation panels	Industrial Vehicle BG Engine-powered, electric forklifts, forklift parts and services	Fuel Cell BG Renewable energy, fuel cell, high/low capacity fuel cell system
Bio BU Pharmaceutical ingredients, Nutraceutical ingredients, Pharmaceutical / Nutraceutical / Cosmeceutical emulsifiers, Cosmeceutical ingredients	Mottrol BG Hydraulic devices, Hydraulic parts for the defense industry	
	Distribution Retail BG Duty-free shop, Fashion mall	Information and Communication Digital Innovation BU Consulting, IT system building and operating, IT infrastructure operations

Design the Future Spark the Growth

10_Doosan Corporation, Preparing for the Future

12_Foundation for Sustainable Growth

36_Digital Transformation & Business Innovation



Doosan is Dedicated to Creating New Values through Change and Innovation

We are implementing the next wave of innovations through "Digital Transformation", by which we aim to revamp our practices in exploring new business opportunities and revolutionize our modus operandi in preparation for the Fourth Industrial Revolution

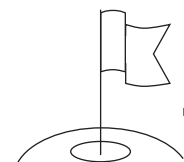
Doosan Corporation, Preparing for the Future

Doosan's strategy responds to our rapidly changing business environment

The primary business domains of Doosan Corporation are electronic materials, forklifts, hydraulic equipment, and bio products, moreover it is striving to increase growth opportunities in all business lines, including energy and retail services. Doosan Corporation is expanding its business platforms for new business lines by enhancing its capabilities for market leading products and technologies, and entering into future high-growth industries based on its new investments and M&A. It strives to become a sustainable company in the era of Digital Transformation, under the vision of "World's Best Innovation Partner". In 2018, Doosan Corporation achieved remarkable results despite the rapidly changing business environment and growing economic uncertainties at home and abroad. Its market capitalization is approx. KRW 2.7 trillion, an increase of about 40% compared to approx. KRW 1.9 trillion in 2009. This is similar to the growth rate of the industrial materials market, to which Doosan Corporation belongs. Doosan Corporation will grow into a leader by providing innovative solutions and differentiated value to its B2B customers and end users, for continued growth and investing in future technologies.



1) Remote Monitoring System: A monitoring system that remotely detects and responds to problems based on the device operating on data in real-time



Doosan's New Slogan for Tomorrow

Design the Future Spark the Growth

Doosan Corporation has established a vision and strategic direction to realize sustainable growth through its continuous growth and development of companies, and has created a slogan that expresses its vision and strategic direction implicitly and enables easy communication with all stakeholders. 'Design the Future' represents Doosan's future-oriented vision for future growth opportunities and 'Spark the Growth' reflects Doosan's efforts and enthusiasm to realize those opportunities. Doosan Corporation strives constantly for growth and development, actively communicates with its stakeholders along with the new slogan, to become a company that contributes to sustainable economic, social and environmental performance based on its capabilities of all BG / BU companies it operates.

1 Pursuing new businesses in response to the current Paradigm Shift

Doosan Corporation pursues new businesses to aggressively respond to the current ongoing paradigm shift in the internal and external business environment

<p>1. Battery copper foil business</p> <p>Entering the market as our new core business to produce battery copper foil, which acts as an electron transfer path for electric vehicle batteries with a rapid increase in demand for electric vehicles, observed recently.</p>		<p>2. Industrial drone solution</p> <p>Provide customer-optimized industrial drone solutions that overcome limitations such as flight time and payload through development of fuel cells for drones that can fly for over 2 hours</p>	
<p>3. Advanced materials for 5G</p> <p>Promote high-tech materials business to cope with 5G communication demand, based on the rapid development of communication infrastructure</p>		<p>4. Fuel cell remote monitoring service</p> <p>Provide advanced services that can predict operating status and failure of a fuel cell, based on AI</p>	
<p>5. Industrial Vehicle total solution</p> <p>Implement total industrial vehicle solutions, based on service platform after rental, export, secondary transaction, and A/S</p>		<p>6. Mottrol Device failure diagnosis and prediction service</p> <p>Provide PHM¹⁾ service to customers by utilizing product development and fault diagnosis/prediction technology, through the use of signal processing and AI</p> <p><small>1) PHM (Prognostics and Health Management) : Failure prognostics and health management</small></p>	

2 Advancement into high-growth new businesses

1. Multifunctional Cobot Solution

Safe, cheap and easy-to-use multifunctional cooperative robots market
 (In 2017, Global Launch of multifunctional Cobot Solution package took place)

2. Sensing Technology

It is a core technology of 5G and can be expanded to all areas of IoT by applying AI and 5G, through the cycle of development starting from simple filming to cognitive technology.

3. Logistics Automation Solution

Hardware-oriented logistics facilities are shifting to software-based holistic solutions, and logistics solution business is promoted by adding software-based integration capabilities to drones, autonomous driving forklifts, and the robot.

3 DT (Digital Transformation) activity for securing competitiveness of existing business

1. Data-driven Operation

Establish a real-time data management/monitoring system to identify the project's progress status in early stages and thus improve quality.

- Improve and standardize processing data
- Improve on defective processes by utilizing manufacturing big data
- Improve productivity through faster production rate

2. RPA²⁾

Improve business efficiency by using robotic software for automation-enabled office tasks according to a set of predefined rules

- Achieved 50% or more improvement in office work productivity on Electro-Materials BG

2) Robotic Process Automation

3. Mobile app Customer Management

Retail BG improves on the shopping experience and provides customized services by unifying customer shopping information management.

- Manage /support shopping activities such as entry, shopping and exit at shops.
- Unified shopping convenience and shopping information management

4 Enablers

1. DT Capabilities

- Establishment of DT organization and hiring professional analysts
- Enhancing DT capabilities through in-house training

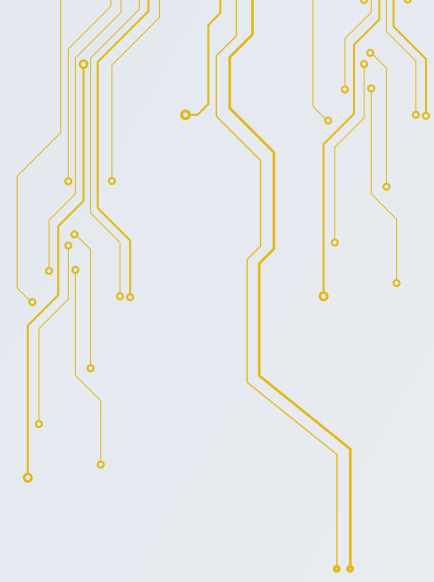
2. New Biz Exploration

- Advanced awareness of emergence and changes in new technologies
- Capture new business opportunities, competitive new technology geared towards sensing, product/service innovation, and new vendor discovery

3. Open Innovation

- Collaborate with external professional networks (Google, Amazon, Microsoft, etc.) to strengthen internal capabilities

Electro-Materials Business Group



Electro-Materials BG plays a leading role in the development of electronic industry by supplying high-quality CCL, a core material for printed circuit boards, in addition to core materials for OLED displays. In addition, it is mass-producing electrodes, a key material for fuel cells to secure competitiveness in the renewable energy business, and preparing for the future electric vehicle market with the sole high-end battery plant in Europe. In particular, we have established a First Mover position in new markets where high growth is expected, and are becoming a global top-tier material company. We are improving our sustainability by building future-oriented portfolios such as 5G, eco-friendly cars, and energy.



Sales in 2018

KRW **8,685** billion

Sales Portion of High-end Products

63%

Global Market

21 countries
137 corporate customers



Suji Institute of Technology

Market Status and Outlook



New application areas of our Electro-Materials BG, including IoT, servers, electric cars, and 5G, are growing rapidly, whereas mobile products, a key application area, are maintaining an annual average growth rate of 2%. In particular, high value-added products like network and semiconductor CCL¹⁾ are expected to grow. In keeping with the era of 5G, new products have been developed to meet the demand for high-performance materials with ultra-high frequency and low loss.

Technology transition in the OLED market is gaining momentum as foldable displays such as mobile and TV display panels make the switch from the existing LED to OLED displays rapidly.

Furthermore, the renewable energy market is expected to grow in advanced countries based on policy changes such as restriction of global carbon emission rights.

Therefore, Electro-Materials BG is expanding its business into a promising industry group (automotive electronic components/energy). It is exploring new markets such as autonomous driving radar/communication board such as ADAS²⁾, as high growth of the electric car market has changed the entire paradigm of automobile industry.

1) CCL (Copper Clad Laminate): Key materials for PCBs (Printed Circuit Boards), essential parts of electronic products

2) ADAS (Advanced Driver Assistance System)

Main Products and Services

Copper Clad Laminate (CCL)

Copper clad laminate (CCL) is the core substrate material of the printed circuit board (PCB), which has built-in semiconductors and electronic parts that carry out various functions of electronic appliances. It is the most important component of electronic products appliances.

Applicable Products: Mobile Phone, Tablet PC, OLED TV



OLED (Organic Light Emitting Diodes)

The Organic Light Emitting Diode (OLED) is mainly used in next-generation displays and lighting as its image response velocity is more than 1,000 times faster than that of the TFT-LCD, creating little or no residual image and emitting almost natural light.

Applicable Products: Mobile Phone, Tablet PC, OLED TV



Business Strategy

5G Material

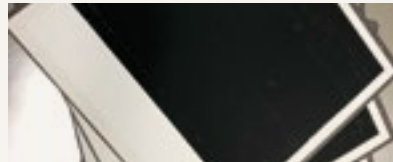
Electro-Materials BG plans to develop new materials for 5G markets such as next-generation high-frequency low-loss products and antenna materials. When base stations and terminals for 5G are released, high-performance materials with ultra-high frequency and low loss are expected to be required. Therefore, Electro-Materials BG is moving fast to become the First Mover based on top-tier loss technology.



Fuel Cell Electrode

The electrode is a key material in fuel cell, and is supplied by Fuel Cell BG to strengthen our competitiveness in the fuel cell business through in-house production of raw materials.

Applicable Products: Fuel Cell



Battery Copper Foil

Battery copper foil is a thin copper film of the cathode part of a secondary battery; it acts as a path of support for electrons of the cathode. It is becoming very important in line with the rapidly rising demand for electric vehicles.

Applicable Products: Electric Vehicle Battery



Electric Vehicle Material

Environmental problems and technological advances have brought the future car market to electric vehicles, rather than diesel or gasoline models. Electro-Materials BG has developed materials for copper foil, high-end flat cable for batteries and high frequency low loss material for radar. It will sign contracts with the Global Tier-1 automakers, and will lead the technology with the sole high-end battery plant in Europe, which is under construction in Hungary.



2018 Key Achievements

Acquire Business Competitiveness

Electro-Materials BG's sales of copper clad laminates for PKG (Packaging) non-memory and Hi-end NWB (Network Board) have increased, whereas sales of OLED has expanded to the Chinese market. It has strengthened development and manufacturing competitiveness to develop and mass-produce 5G products, a key material for the future with improved yields and productivity.

Strengthen Global Competitiveness

Electro-Materials BG's business accounted for 33% in overseas sales, rising 4% from the previous year. In particular, it further expanded the newly entered Chinese market and achieved an additional sales of KRW 22 billion in 2018. In addition, Electro-Materials BG strives to localize our plants by expanding Changshu plant in China to respond to issues such as short-term delivery.

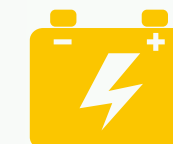
New Business

In 2018, Electro-Materials BG started the construction of a battery production plant in Hungary. The Hungary plant is the only battery copper foil plant in Europe, and will serve as a strategic bridgehead to drive global customer approval from a wide range of customers and win make long-term supply contracts. As this is the first mass production facility for electrodes in Europe, Electro-Materials BG can gain business competitiveness by in-house production of raw materials through synergy with Fuel Cell BG. In addition, it will find and nurture new items in promising industries such as 5G.



Energy Materials

Electro-Materials BG is focusing on developing 2 stack products and producing key materials in-house to strengthen its fuel cell electrode business. The miniaturization of fuel cells allows drones with long-flight capabilities to develop as one of the future markets. Accordingly, Electro-Materials BG has secured potential markets for electrodes for fuel cells and completed mass-production facilities for electrodes.



Industrial Vehicles Business Group

Known for manufacturing Korea's first forklift in 1968, Industrial Vehicles BG has secured more than 50% market share in Korean market, and has grown into a global logistics equipment manufacturer that exports forklifts to more than 100 countries based on its 6 business sites including sales subsidiaries in USA, Belgium, and UK. Industrial Vehicle BG is evolving into a data-based total solution provider by building a digital platform that incorporates ICT technology to enhance sustainability. It plans to secure future growth engines and maximize profitability by strengthening its rental business, purchase of second-hand forklifts, customized forklifts, and service support.

Sales in 2018

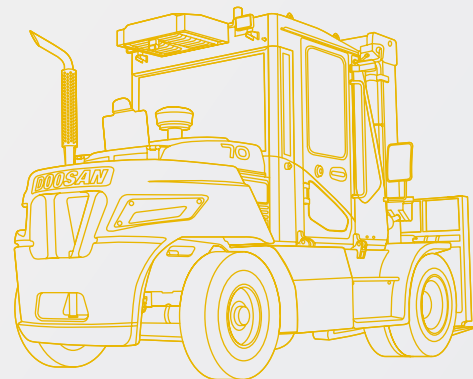
869.6 billion
KRW

2018 Sales of Forklift Truck

25,000 units

2018 PIN UP Design Awards

BEST OF BEST

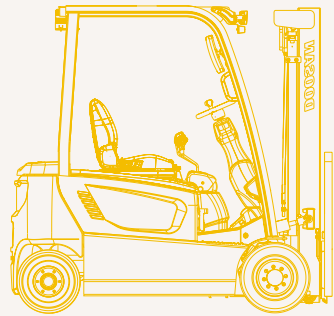


Market Status and Outlook

The forklift market is showing a growth trend in markets of developed countries even in the face of intensifying price competition due to excessive supply. The demand for battery-operated forklift trucks has shown an increasing trend as the regulations on diesel-engine emission gases has been strengthened owing to the growing concern over atmospheric pollution. The demand for small-sized warehouse equipment has also grown as it is suitable for large retail and warehouse businesses. Such market trends are expected to persist along with the shared economy, increasing use of renewable energy and the Fourth Industrial Revolution based on ICT.

Industrial Vehicle BG will strengthen its downstream business such as purchasing, using, and service to provide value to our customers throughout the entire service life of its products, and lead the shared economy and innovation of logistics services based on ICT. By building a digital platform based on ICT technology, Industrial Vehicle BG will grow into a total solution provider that provides customized products and services based on data.





Main Products and Services



Diesel/LPG engine-powered forklifts

Industrial Vehicle BG has a lineup of 1.5 to 25 ton models for diesel and 1.5 to 7 ton units for LPG forklifts. These forklifts enable high-efficiency logistics at various worksites thanks to their climbing capacity and high power output.

Electric seated/stand-up forklifts

Industrial Vehicle BG has a lineup of 1.5 to 5 ton models for seated and 1.3 - 2.5 ton models for stand-up forklifts, and offers two power source options: lead storage and lithium-ion batteries. They are eco-friendly forklifts used for indoor work such as moving food and cold storage, and have low noise and vibration. Lithium-ion battery forklifts have a longer battery life and are easier to maintain than lead-battery electric forklifts, and hence dramatically reduce operating costs for customers and create a safe working environment without the generation of harmful gases during charging and discharging.



Warehouse equipment

Warehouse equipment consists of various lineups including 1.3 to 2.5 ton order picker, pallet truck, stacker, and tow/transporting vehicles that provide excellent mobility in small spaces with compact size and minimal turning radius.



Downstream business

The downstream business, including rental of forklift, purchase of used forklift and maintenance services, provides options for users to quickly and easily access forklifts and meet changing product usage needs from ownership to sharing through a range of customizable products and services supported by digital technology.

2018 Key Achievements

In 2018, Industrial Vehicle BG recorded the highest sales (KRW 900 billion and 25,000 units) in its history so far, thanks to an increase in dealer support, stronger sales channels, as well as a continuous improvement of product competitiveness and successful efforts to develop new markets. By setting up a dedicated production system for industrial vehicles and the MES (Manufacturing Execution System), Industrial Vehicle BG has raised its operational capacity to the next level.



In 2018, the 50th anniversary year of Industrial Vehicle BG, it spent time looking back at achievements and strengthening strategy and vision for all employees. In addition, the company opened Doosan Logipia to innovate the way people use and service forklifts. Industrial Vehicle BG is actively pursuing its 'downstream' business that operates all areas related to forklift products such as rental, service, and equipment management.

In terms of products, BR18S-9, an electric seated forklift with a family look that has the same brand identity as a Doosan Infracore Co., Ltd. machine, won the design award at the Pin Up Design Award for Excellence. BR18S-9 and GC25S-9, engine-powered forklifts, won the Main Prize of the (Automobiles/Vehicles) category at the 2019 German iF Design Award. Our design competitiveness and product competitiveness are recognized internationally. GSE (Ground Support Equipment), an airport logistics business pursued by Rushlift in the UK, won the International Airport Review Awards(IARA).

1. 50th anniversary event
2. Award winning model (BR18S-9) at 2018 PIN UP Design Award
3. Rushlift GSE won IARA

Business Strategy

Industrial Vehicle BG plans to strengthen dealer support and develop stronger sales channels, and continues to explore new markets based on improvement of product competitiveness, which has been the company's driving force of continuous growth over the last 50 years. In 2019, Industrial Vehicle BG will develop technologies and innovate products to improve customer experience, expand its downstream business area to supply customized services and rentals based on ICT technologies such as Big Data and Platform, and continue to drive its future growth engines and maximize profitability. The company aims to become the Global Top-tier 1 Group by 2020 and achieve sales goal of KRW 2 trillion by 2025.



Mottrol Business Group

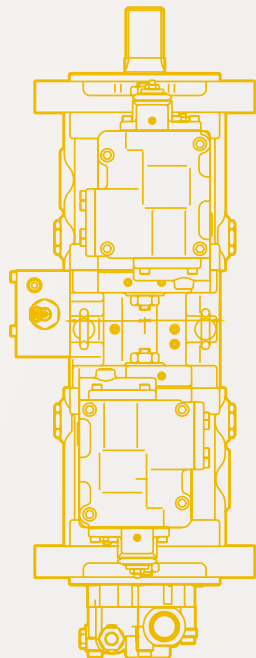
Since advancement into the unexplored hydraulic industry of Korea in 1974, Mottrol BG has grown to be a leader in the hydraulic industry and established a full line-up of hydraulic products including travelling motors, swing motors, main pumps, and main control valves for heavy construction equipment, as well as hydraulic components for defense products that are applied to land, marine, aircraft and guided weapon systems, to consolidate its position as a leading global manufacturer of components.

Sales in 2018

KRW **594.3** billion

Market Share in China in 2018

21.1%



Market Status and Outlook

The heavy construction equipment market, which is a major application area for hydraulic components, showed a steady decline since 2012 due to the global economic slowdown, the European financial crisis, and China's real estate/construction slowdown. However, it has swung upward since 2016 due to China's increased investment in real estate and infrastructure, and the recovery of the European economy. The construction heavy equipment market in China, North America, and Europe is expected to grow due to the steady increase in demand. The emerging markets are also expected to expand due to expansion of investment in infrastructure and rising prices of raw materials such as coal and copper. In the defense sector, BG is expanding its business in the aviation/ maritime sector and investing into development of challenging technologies based on

business needs including reorganization from a force-intensive unit structure to a technology-based unit structure, expansion of budget for core defense capabilities against potential threats, reinforcement of the forces in response to the transfer of wartime operational control and the restructuring of the military, and investment into defense R&D for high-tech domestic development in Korea.

Taking advantage of this positive outlook for the market, Mottrol BG strives to become a leading global manufacturer of components by entering various hydraulic component businesses based on accumulated know-how, creative technology development, and quality improvement activities.

Main Products and Services

Hydraulic Components

As a hydraulic components manufacturer with over 40 years of experience, Mottrol BG has production capacity to manufacture more than 35,000 units of hydraulic products per month; the range of products include travelling motors, swing motors, main pumps, and main control valves for heavy construction equipment. In addition, Mottrol BG carries out quality, environment, and safety management of products through a systematic management. In particular, the travel device for excavators was selected as a World-class Product by the Ministry of Commerce, Industry, and Energy, proving its excellence.

Travel Device

With built-in automatic 2-speed function, built-in hydraulic brake, built-in shockless function at start/stop, and embedded anti-cavitation function, Mottrol's travel device provides powerful output torque, excellent controllability and high reliability.



Swing Device

Mottrol's powerful swing device incorporates relief valve embedded with shock-less function, built-in mechanical brake valve, anti-cavitation function, and reverse swing protection valve, all of which cumulatively ensure high performance and fatigueless operation.



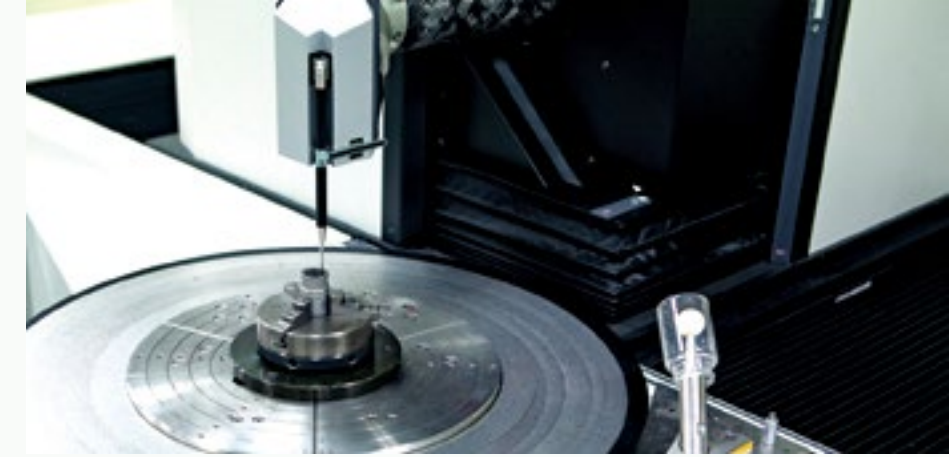
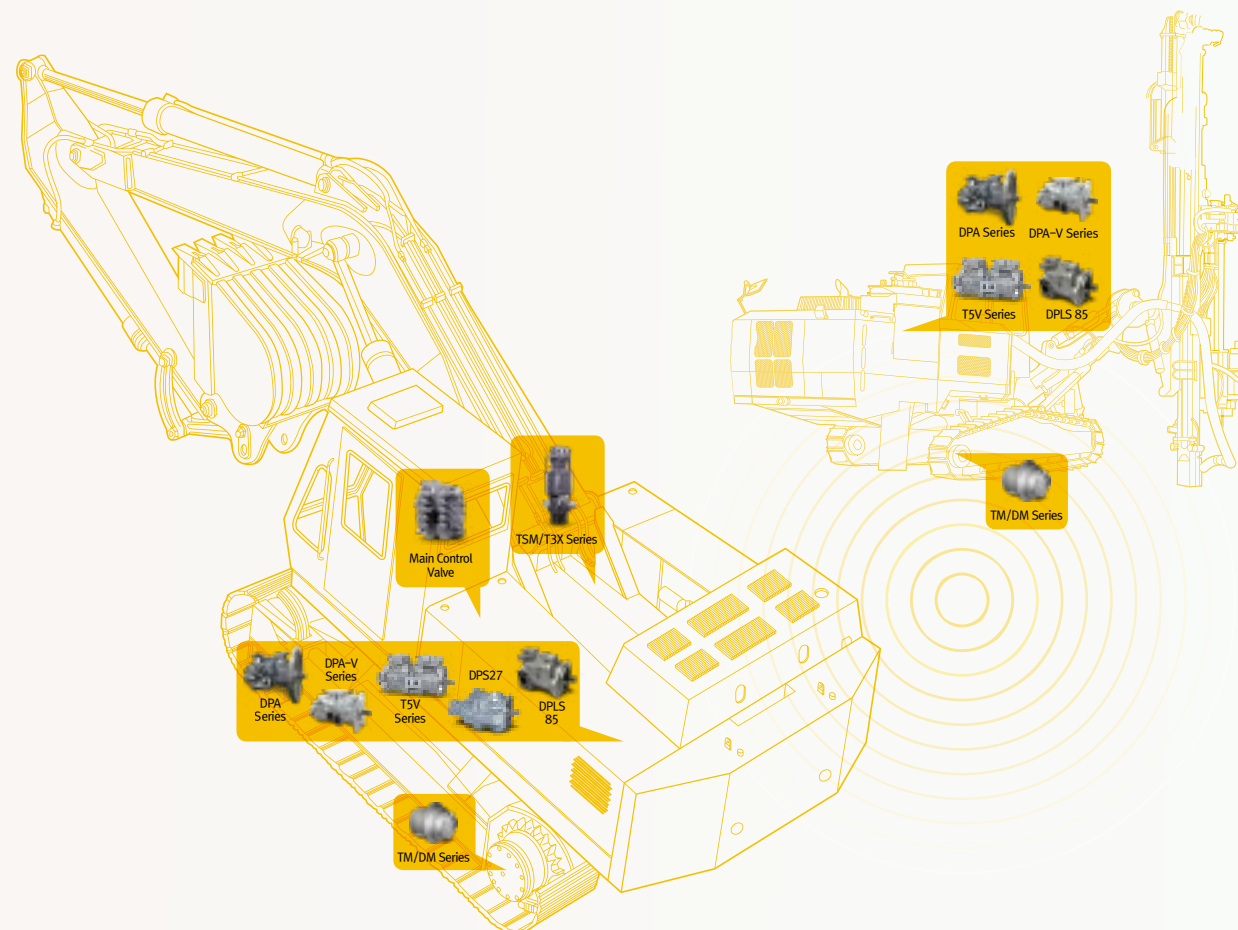
Main Pump

Developed in 2001, the DPA Series pumps have various features. Compared with the T5V series of the same class, total length has been shortened by 30%; also, the new model has adopted the newest low pulsation, low noise technology, and can be applied to various heavy equipment in combination with various control methods (flow control, power control, power shift control, and electronic control). Various attachments are available with an optional high pressure gear pump. The low-noise and high efficient DPA Series swash plate pumps offer a sturdy ground for environment-friendly design.



MCV (Main Control Valve)

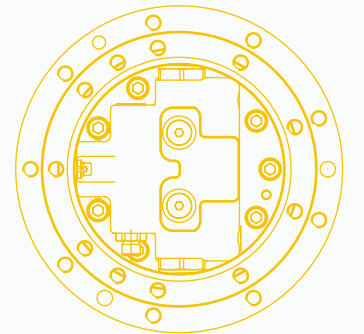
MCV controls the flow route of the hydraulic oil from the pump in order to operate actuators such as travel motor, swing motor, or cylinders. The 2-block type MCV meets customers' diversified requirements with excellent controllability and extendibility.



2018 Key Achievements

Strengthen Business Competitiveness

Mottrol BG's sales recorded KRW 594.3 billion in 2018, an increase of 43% compared with the previous year. In particular, the market share of Mottrol BG in China, which has the largest market size, reached 21.1%, an increase of 3.3% compared with the previous year. This result was achieved through continuous improvement efforts such as expansion of the Changwon and Chinese factories, and automation of the headquarters' processing and cleaning process to meet the sharp growth in demand for hydraulic components.



Strengthen Global Competitiveness

Mottrol BG has secured a bridgehead for new markets/customers by promoting sales of its travel devices through European companies and dealers to expand BG's global market share. Meanwhile, sales of hydraulic components has been strengthened through Indian equipment makers and partners to enter the Indian market. Efforts to expand into overseas defense markets were achieved by exporting hydraulic components for ground equipment to India.

Business Strategy



Existing Business

Mottrol BG plans to continue to develop differentiated new series products and expand its product line-up by improving cost, performance, durability, and reliability compared to existing products. BG aims to expand production at its subsidiary in China and global sourcing including from China to strengthen product competitiveness and secure business competitiveness of hydraulic components for heavy construction equipment. It also plans to accelerate its entry into the Indian market, supply to advanced heavy construction equipment companies to expand global market share and strengthen the excavator and other equipment A/S business. Efforts to expand into overseas defense markets will be achieved by exports of hydraulic components for ground equipment. Mottrol BG will do its best to attract orders in the guided/marine/aviation sector and secure future core technologies.

New Business

Mottrol BG plans to pursue new projects, and develop and commercialize core components for industrial robots by advancing into the robotics sector, a promising high-growth industry, in order to respond to the changing trends of the industrial environment and secure new growth engines.

Retail Business Group

 Duty-free shop  Fashion mall

Based on their wide experience and deep understanding of multinational customers, the Doota Duty Free and Doota Mall - major shopping and tourist destinations in Dongdaemun that make your lifestyle much more enjoyable - are looking beyond the district to step into the global market. Doota Duty Free has grown rapidly since its opening in May 2016, leading to the globalization of the Dongdaemun shopping district. In addition, the store achieved the fifth-largest market share among the city-center duty-free shops within two years of its opening, and was reinvented as a specialized retail service provider through the merger with Doota Mall, an iconic fashion complex of the Dongdaemun fashion & shopping district. Retail BG offers the best customer satisfaction with its differentiated services of Doota Duty Free and Doota Mall.

Sales in 2018

KRW **468.4** billion

Market of City-center Duty-free Shops in 2018

5.4%



Market Status and Outlook

The duty-free market is expected to grow gradually at an annual average rate of 3% in the mid- to long-term. In particular, group tours to Korea have been allowed in six regions of China, and a gradual market recovery is expected as political conflicts are eased. In addition, growth of the online market is expected to continue among duty-free markets.

In 2018, online sales accounted 30% of city duty free shop sales, and the growth phase is expected to continue thanks to increased outbound travelers and the

growth of the Weishang (WeChat's micro retailers) channel. In addition, the duty-free market will be affected by mid- to long-term system changes such as business license/tax payment for dealers and Weishang in accordance with the revision of the China E-commerce Act in January 2019, along with the upward revision of tariff by the China Customs Service in November 2018.

Therefore, Doosan Retail BG strives to continue its growth and development through providing differentiated services and strengthening business competitiveness.



Market Status and Outlook

The Doota Duty Free, which is operating over 700 brands at Doota, a landmark of the Dongdaemun area, works based on a distinctive concept reflecting the unique local features of Dongdaemun and the changing needs of duty-free customers. The Doota Duty Free provides a pleasant and trendy shopping experience to customers by offering the benefits of great prices in a convenient shopping environment as well as young, sophisticated K-style products and thematic zones.



Doota Mall, Korea's leading fashion mall, is visited by over 8.2 million local and foreign shoppers annually. The seven story fashion mall houses over 300 boutique stores that sell a wide range of products, providing a perfect one-stop shopping experience. As a trendy, premium fashion powerhouse, Doota Mall always strives to provide the most pleasant and efficient shopping environment and deliver the highest level of customer satisfaction by keeping facilities up to date. Doota Mall aims to provide customer satisfaction through its innovative business strategies: Doota Mall became the first fashion mall to offer a fixed price system, install information centers for foreign visitors, and deploy floor managers.

2018 Key Achievements

Achieving Quantitative Growth of the Duty Free Business

Despite fierce competition in the duty-free market, Retail BG's Doota Duty Free recorded 5.4 percent market share, achieving 1.8 times greater quantitative growth compared to the previous year. It also established a stable business environment by portfolio diversity and securing diverse customer groups despite the rapidly changing business environment.

D:MAISON OPEN

D:MAISON, opened in 2018, and is a designer brand select shop that carries wide selection of luxurious products directly chosen and parallel-imported by Doota Duty Free MDs. D:MAISON, with its strength in value consumption and trendy curation, realizes customer satisfaction through delivery of differentiated services.

Differentiation Points of Doota Mall

Retail BG opened its 'Pierrot Shopping' under the theme of 'Fun & Crazy', strengthening the differentiated services of Doota Mall in the Dongdaemun area. Pierrot Shopping, which has 32,000 items in a space of 1,425 square meters on the second floor underground of Doota Mall, has prepared dedicated desks and offers four-lingual instructions in order to attract foreign customers and contribute to the revitalization of tourism in the Dongdaemun area.



Business Strategy

Doota Duty Free

Doota Duty Free aims to become one of the top four city-center duty free shops with KRW 1.7 trillion in sales and 8.2% market share in 2023 by strengthening its differentiation and operational capabilities, creating a stable profit structure, and expanding its business to airports and overseas.

Strengthening Differentiation of Doota Duty Free

By opening D:MAISON, a designer brand select store, Doota Duty Free offers its customers with up-to-date luxurious fashion products. It also paved the way for both quantitative and qualitative growth in 2019 through the expansion of the store. In addition, it has expanded late-night content such as late-night contents such as discount vouchers and logistics support to enhance differentiated business activities only for Doota Duty Free.

Doota Mall

Doota Mall plans to strengthen its site attractions through Vertical Change and secure its position as Dongdaemun's number one fashion shopping mall by expanding the small format sites domestically and overseas based on the brand identity of Doota Mall. In addition, Doota Mall aims to implement Vertical Change in the mid- to long-term by reflecting the 'Fast & First Fashion' identity targeting the 20-30 year olds. In 2019, it plans to expand differentiated services by attracting mega merchandise such as Nike.

Expansion of Airport and Overseas Sites Securing Momentum

Doota Duty Free is preparing itself to become an operator for airport duty free shops in the first half of 2020, and has set the stage for duty free shops at major international airports in developing Southeast Asian countries such as Vietnam and Indonesia.

Fuel Cell Business Group



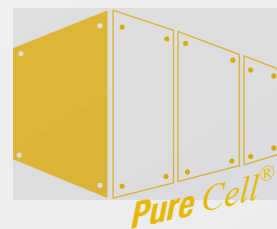
Doosan Fuel Cell BG USA Corporation

Doosan Fuel Cell was established in 2014 when Doosan Corporation made two strategic initiatives in the fuel cell market – acquiring the assets of ClearEdge Power, a fuel cell technology leader in the United States, and merging with Fuel Cell Power, a residential fuel cell leader in Korea. The acquisition of these two companies led to the formation of the Doosan Fuel Cell Group. Fuel Cell BG is on the way to becoming a world-class fuel cell enterprise through production and supply of fuel cell products such as cell stack, reformer, which are key components of the fuel cell system for power generation, building, and housing.

Fuel Cell BG has a line-up of fuel cell products from 600W compact-sized to 440KW medium-sized products. In Korea, we will continue to produce compact fuel cells for residential use, while strengthening our position in the large power generation sector, in line with government policy on renewable energy provisions. In the United States, we will continue to focus on providing cost competitive, clean, reliable energy solutions for customers who need secure uninterrupted power, even during blackouts, for their commercial buildings, industrial plants, data centers, hospitals, and universities.

Orders Received in 2018

KRW **1,167.6** billion

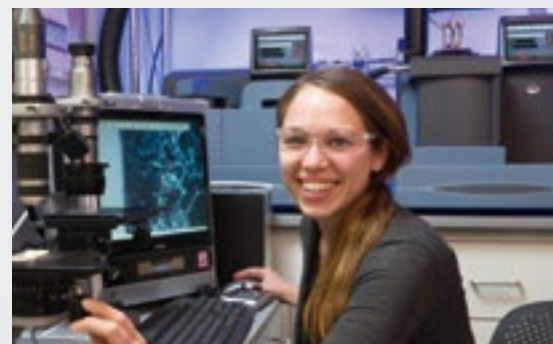


Sales in 2018

KRW **359.3** billion

Patent Applications

Domestic	Overseas
82	37



Market Status and Outlook

Fuel Cell BG produces stationary fuel cells for power generation, housing and buildings. The global stationary fuel cell market is concentrated mainly in Korea, USA, and Japan.

Owing to adoption of the Renewable Portfolio Standard (RPS) system and the government's incentive policies, the Korean stationary fuel cell market has shown obvious growth mainly in fuel cells for power generation. It is forecast to grow based on the hydrogen economy promotion roadmap announced by the government in 2019. USA and Japan have steadily expanded their fuel cell market in commercial and household items, respectively, thanks to tax benefits

and incentive policies. Private and public sectors in Europe, including those of Germany, have started to invest in technology development on fuel cells and hydrogen, accelerating expansion of the market. Meanwhile, China has begun to emerge as the largest potential market for fuel cells, with the government announcing large-scale investment plans to usher in the hydrogen economy.

Fuel Cell BG plans to take the lead in producing stable and clean high-efficiency fuel cells through continuous technology development and investment based on market status and policy direction.

Main Products and Services

PAFC

Phosphoric Acid Fuel Cell

Phosphoric acid fuel cell, which uses phosphoric acid as an electrolyte, is supplied for power generation in facilities and buildings.



Feature

- Industry's longest stack life of 10 years
- Can be used with various fuels such as hydrogen, city gas and LPG
- Power supply even in the event of a fault on a standalone power grid
- Adjustable power output according to demand
- High output in small space
- Installable in indoors and outdoors, on the roof, etc.



Korea
In operation : 104MW (238 Units)
Under installation : 108MW (245 Units)
Contract concluded : 31MW (71 Units)



England
Under installation : 1.2MW (3 Units)



USA
In operation : 36MW (89 Units)
Contract concluded : 29MW (64 Units)

PEMFC

Polymer Electrolyte Membrane Fuel Cell

A polymer electrolyte fuel cell is a cell type that uses a polymer membrane that can serve as an electrolyte to permeate hydrogen ions.

Feature

- Free start/stop and real-time on/off operation
- Can adjust amount of power generation in the system according to the power demand
- Installable in indoor and outdoor spaces
- Smaller installation area and time compared to other energy sources
- Equipped with safety device inside and outside of the system
- Completed green technology certification of cogeneration facility technology using high-molecular electrolyte fuel cell for building (GT-17-00321, Ministry of Trade, Industry and Energy)



2018 Key Achievements

Received Order of KRW 1.2 trillion

In 2018, Fuel Cell BG recorded orders of KRW 1.2 trillion (including fuel cell equipment and long-term service contracts) from Korean power companies and USA energy operators. This is the largest amount since its entry into the fuel cell business. BG won contracts to supply fuel cell devices of 106 MW or more to Korea Southern Power, Korea Western Power, and Daesan Green Energy in Korea, and also made a contract to supply fuel cells worth 5MW for idle sites in South Windsor, USA, where Fuel Cell America is located. In addition, Pyeongtaek Energy Service, which purchased 7 units (3MW) in 2013, awarded Fuel Cell BG a contract to supply 3MW worth of devices of the same size.



Ground-breaking ceremony for Daesan Hydrogen Fuel Cell Power Plant

Orders received for large scale byproduct hydrogen fuel cell project

Daesan Green Energy is a special purpose company (SPC) consisting of Korea East-West Power and Hanwha Energy as its major shareholders. It started construction of a 50MW fuel cell power plant in June 2018 by utilizing hydrogen generated as a byproduct by chemical process; the plant is being established in Seosan, Chungnam Province. Fuel Cell BG has signed a contract to provide device and service to the plant for 20 years. This plant is the first and the largest byproduct hydrogen fuel cell plant for commercial use.

Business Strategy

KRW 1.3 Trillion in Orders in 2019

The fuel cell market for power generation is led by Korea and USA, and Fuel Cell BG has set a goal to achieve over KRW 1 trillion in orders in 2018 and 2019 each. Especially in 2019, it plans to achieve KRW 1.3 trillion in orders from Korean power companies and USA energy operators, and to consolidate its position as No.1 fuel cell supplier in Korea and strengthen its presence in the USA market.

Global Market Opportunities

Fuel Cell BG seeks entry into global markets outside of Korea and the United States, which are major markets. As with the Daesan Green Energy Project, which was launched in 2018, Fuel Cell BG will identify and develop byproduct hydrogen fuel cell plants that utilize unused or discarded hydrogen at chemical and steel plants, while considering additional opportunities in developing countries like China. It plans to pursue marketing activities to supply fuel cell as an alternative power source for advanced countries where aging of existing power grids has resulted in greater demand for decentralized power sources around city centers. In addition, it is reviewing the possibility of a new and renewable energy solution linked with solar power, wind power, and ESS (Energy Storage System).

Hydrogen Economy Activation Roadmap

The hydrogen economy activation roadmap, announced in 2019, is a major driver for the mid- to long-term growth of Fuel Cell BG. Fuel Cell BG plans to secure its line-up of various products in the fuel cell market for power generation in the mid- to long-term by developing SOFC¹⁾ products. BG also aims to participate in hydrogen power generation through development of hydrogen fuel cell.

1) SOFC(Solid Oxide Fuel Cell)

Bio Business Unit



Bio BU provides differentiated values to customers by developing and supplying bio-materials such as medical emulsifiers that are essential to the human body, as well as raw materials based on natural materials and specialized technology for skincare products.

The production process is closely monitored through the GMP¹⁾ system, at every step, from sourcing of raw materials to making of the final products. Meanwhile, the company guarantees a safe and healthy workplace for employees, and obtained the PSM²⁾ and ISO 14001 certifications in the process. Bio BU has replaced toxic solvents with environment-friendly ones, and uses minimal amounts of solvents in its production processes.

1) Good Manufacturing Practice 2) Process Safety Management

Sales in 2018
KRW **31.2** billion

Ecocert Certified Products
4 products

REACH Registered Products
4 products



Market Status and Outlook

The cosmetics industry is expected to grow steadily driven by expansion of online distribution channels as well as new consumer trends whereby customers show a preference for natural and functional materials and anti-aging products/therapies.

The pharmaceutical industry is also expected to continue its growth based on the trend of customer focus on improving quality of life as well as increasing spending on health care. In particular, the pharmaceutical market has grown due to the expansion of the market and the increase in medical

demand in the Pharmerging¹⁾ area. In addition, the health functional food industry is expected to grow due to factors such as aging world population, increased awareness and interest in 'self-care', and change in regulatory policies for online media development and health-functional food. Bio BU is committed to providing customers with a wide range of products and services and improving their quality of life in line with these industry developments and trends.

1) Pharmerging: It is a new coined word that combines "Pharma," which means pharmaceutical, and "Emerging," which means emerging market; the term 'pharmerging' refers to group of countries having a low position in the pharmaceutical market but having a rapid pace of growth, including BRICs countries such as India, Russia and Brazil as well as emerging markets in the pharmaceutical industry such as Thailand, Egypt, South Africa, and China.

2018 Key Achievements

Completion of Soy PC plant

Since the completion of the facility for mass-production of high-purity Soy PC In March 2018, Bio BU has been developing and supplying materials for cosmetics and medicine to its customers. Bio BU will continue to find potential domestic and foreign customers, and expand its business to focus on the pharmaceutical market by securing cGMP¹⁾ and DMF²⁾ certifications.

Expanding Big Overseas Markets for Cosmeceutical Ingredients

In 2018, ceramide, the leading cosmeceutical ingredient for Bio BU, achieved more than 30% increase in sales year-on-year powered by its success in entering large overseas markets. In particular, Bio BU has set the foundations for advancing into the global market including contracts with new large global customers such as Aenova and Johnson & Johnson. It has also successfully made inroads into and expand sales in China, one of the major markets, by developing materials for ceramide-based mask packs that incorporate its formulation technology. These achievements proves that the quality and competitiveness of Doosan's ceramide products have highly been recognized in the competition-intensive Chinese market as well as in the advance markets of USA and Europe. Bio BU will continue to expand its market share by strengthening its product competitiveness and promotion.

Development and Timely Delivery of Phospholipid for Powdered Milk

In response to the need to replace existing egg-based phospholipid products, raised due to the egg insecticide crisis and bird flu, Bio BU has successfully developed a new phospholipid ingredient from milk for customers in a timely manner, thus preventing risk of sales loss and securing new growth engines.

1) cGMP(Current Good Manufacturing Practice)

2) DMF(Drug Master Files)

Main Products and Services

Pharmaceutical Ingredients

Features

- Hydrophobic substances are homogeneously distributed in water, and medicinal soybean oil is emulsified in for application as intravenous injection.
- Safest material made of natural substances derived from egg yolk
- Selected as a world class product by the Ministry of Knowledge and Economy

Main Product

Fat emulsions for pharmaceutical use (DS-PL95E)

Nutraceutical Ingredients

Features

- Improves cognitive skills that tend to deteriorate due to aging
- Recognized for efficacy in preventing dementia by the U.S. FDA/ designated as a vital health food ingredient by the Korean Food and Drug Administration
- Moisturizing effect on the skin

Main Product

Phosphatidylserine (DS-PS series)

Multipurpose Emulsifier

Features

- Safe material used in a wide range of products from infant food to medicated syringes
- Offers assistance for adsorption of effective substances into the body.

Main Product

Phosphatidylcholine (DS-Soy PC series)

Cosmeceutical Ingredients

Features

- Secures the same structure as natural substances on the skin
- Excellent moisturizing effect on the skin
- Prevents adsorption of fine dust (PM2.5)

Main Product

Ceramide (DS-Ceramide)

Business Strategy

Existing Business

For cosmeceutical ingredients, Bio BU plans to focus not only on functional ingredients, but also on the development of base materials such as natural emulsifiers and preservatives for cosmetics based on its advanced fermentation and refinement technologies, with a view to developing high value-added ingredients consistent with market trends. This will also help to diversify its product portfolio and expand business areas at home and abroad.

For pharmaceutical ingredients, Bio BU aims to enter new markets by securing global certification, strengthening binding with large customers, and promoting acquisition of pharmaceutical manufacturing standards for manufacturing facilities. It plans to develop differentiated ingredients to enter new market for raw materials and expand its markets share at home and abroad.

As for health functional food ingredients, Bio BU plans to secure effectiveness data of PS¹⁾, and to expand market share through material marketing and ODM completion business. In addition, it will expand its product portfolio by securing effectiveness data and developing new ingredients for health functional foods other than PS ingredients.

New Business

The cosmetics, pharmaceuticals, and food industries are expected to constantly grow due to demands for natural raw materials and differentiated functional high-value-added materials. Bio BU focuses on developing high value-added products by securing additional technology platforms such as fermentation, synthesis, and formulation, other than existing extraction and refining technologies. Bio BU also plans to make aggressive investments in DT (Digital Transformation) technology, including the development of proteins and enzymes using AI, to find new businesses, shorten the period of product development, reduce costs, and increase the chances of development success. In addition, through efforts to diversify business and increase market share, Bio BU is preparing to take a new leap forward as a technology-based material company that provides differentiated products and benefits to customers.

1) PS(Phosphatidylserine): Component of nerve cell membrane in the brain, contributing to the improvement of brain recognition and the prevention of dementia

Digital Innovation Business Unit



Market Status and Outlook

AI, RPA¹⁾, Big Data and other intelligent technologies are changing the whole society in areas such as industrial and national systems. Beyond one-to-one compatibility of products and services, all systems, industries and stakeholders are connected to the network, and it is recognized that interactions such as information exchange, learning, and judgment are essential. It is expected that drones and robots that can interact with the environment and people will be developed, and AI technology will be applied in the digital factory area, which will be developed as an advanced artificial intelligence plant. In addition, RPA technology will be expanded mainly around simple repetitive tasks to realize shortened work hours and minimum wage increase. New convergence services will be reviewed, and data utilization and protection will be strengthened along with the implementation of the regulatory sandbox and regulation-free special zones through ICT regulation reforms.

1) RPA(Robotic Process Automation)

Digital Innovation BU is in charge of providing a comprehensive range of IT services to all Doosan Group companies all around the world, including IT consulting, system integration, business systems, and IT infrastructure services. It utilizes SI and additional service businesses, and provides IT services to enable the globalization of Doosan Group. Digital Innovation BU supports Digital Transformation of Doosan Group including development of new business models, organizational structure, and improvement of company-wide structure under the new name of Digital Innovation BU.



Main Products and Services

Digital Innovation BU is in charge of providing a comprehensive range of IT services, including IT consulting, system integration, business systems, and IT infrastructure services, to all Doosan Group companies.

<p>Digitalization Service</p> <p>Utilizing digital technology to support customers' business innovation and creating new revenue value opportunities</p>	<p>Platform/IT Infrastructure Development and Operation</p> <p>Building an open innovation system for internal and external collaboration and maintenance of IT infrastructure for system operation</p>	<p>Application Development and Operation</p> <p>Application development and digital service based on UI/UX¹⁾</p> <p>1) UI/UX : User Interface / User Experience</p>
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2018 Key Activities and Strategies

In 2018, Digital Innovation BU provided total IT services to Doosan Group affiliates, including digitalization services, application development and operation, and platform/IT infrastructure development and operation. Digital Innovation BU plans to strengthen its infrastructure and train specialist personnel in order to support the Digital Transformation of Doosan Group companies. BU strives to provide IT services that actually contribute to the reinforcement of customer values. In addition, Digital Innovation BU plans to provide services from the perspective of customer experience and design through Way Of Working (WOW) as well as new technology services such as AI, Deep Learning, and RPA to facilitate the Digital Transformation of Doosan Group affiliates.



1. DDI Europe
2. DDI Headquarter
3. DDI China

Sales in 2018
KRW 225.1 billion

Global Competence
Overseas assignments in
14 regions

Ratio of overseas sales
28%

Expertise
No. of certificates
673

DIGITAL TRANSFORMATION & BUSINESS INNOVATION

What does 'DIGITAL TRANSFORMATION'(DT) Mean?

While there may be differences in interpretation, DT may be broadly defined as an effort by companies to adapt to rapidly changing industrial environments and gain competitiveness by utilizing the latest digital technologies. The most important consideration in this regard is the direction of change and innovation from the perspective of companies. Doosan Corporation's answer to these questions is 'opportunity'. Doosan Corporation plans to develop new technologies that add DT to its existing business and thereby secure opportunities to lead the future market. Doosan Corporation introduces activities and efforts to strengthen corporate competitiveness through DT innovation, including dedicated organization and expertise, base technology and capabilities, and new investments and efforts to advance into high-growth businesses based on M&A.

1. New Organization for Promotion of DT

- Recruiting a group CDO(Chief Digital Offer) and establishing a group-wide organization for digitalization
- Establishing new dedicated team for Digital Transformation
- DT task assignment/ performance by BGs
 ⇒ Selection of Digital Master / Digital Change Agent



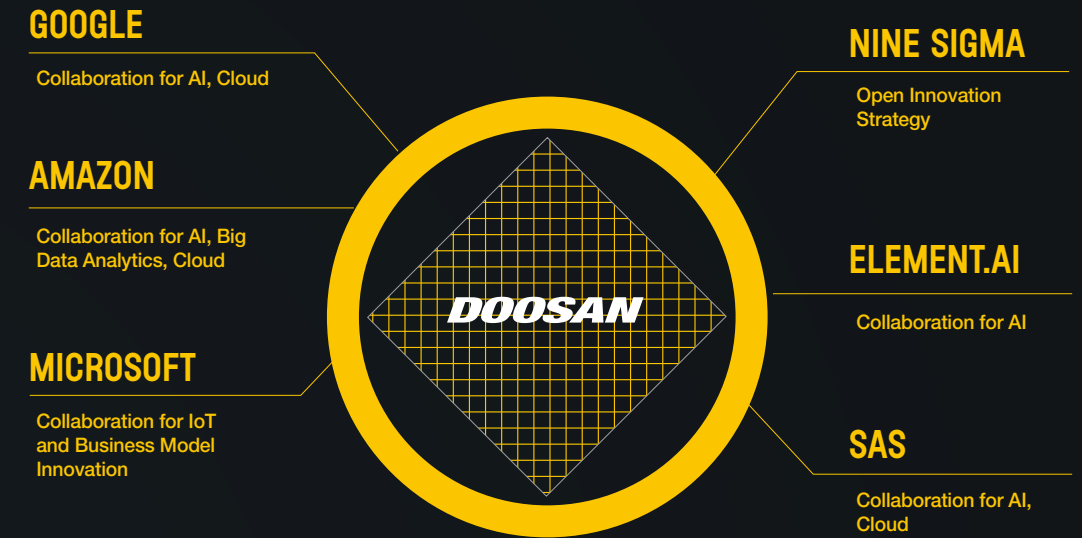
2. Recruitment and Development of DT Specialists

- Strengthening data analysis expertise
- Recruitment of data analysts and AI specialists
- Nurturing human resources through in-house training
 - Basic data course
 - Data specialist course
- In-house online data course at all times
 - 8 courses in 2018



3. Collaboration with External Professional Networks to Enhance DT Capabilities

DT innovation cannot be achieved only by the enterprise. It is a product of collaboration created by convergence and connectivity between different industrial groups and technologies. As such, Doosan Corporation is strengthening its DT competencies through collaboration with outside professional networks of various industrial groups.



4. Establishment of Business Directions for BGs

Doosan BG/BUs establish their end-to-end images and specify their mid-and long-term goals based on Digital Transformation.

Business Division	DT Directions	Main Activities
Electro-Materials BG	<ul style="list-style-type: none"> • Expanding business opportunities based on enhanced customer connectivity • Enhanced intelligent manufacturing utilizing Data / AI 	<ul style="list-style-type: none"> • Provision of proactive solutions for customers • Smart Factory based process prediction / automation
Industrial Vehicle BG	<ul style="list-style-type: none"> • Expanding connectivity-based businesses, products and services across value chains 	<ul style="list-style-type: none"> • Downstream platform • Development of automated forklifts and operating platform
Mottrol BG	<ul style="list-style-type: none"> • Innovation of business model based on DT technology • Promoting digital operation excellence 	<ul style="list-style-type: none"> • Fault diagnosis and prediction of product life • Robot / automation based smart factory
Retail BG	<ul style="list-style-type: none"> • Utilizing virtualization and AI to provide a unique shopping experience and enhance customer convenience 	<ul style="list-style-type: none"> • Customized shopping recommendations • Smart shopping
Fuel Cell BG	<ul style="list-style-type: none"> • Digital-based eco-friendly energy total solution • Product / service platform innovation 	<ul style="list-style-type: none"> • Advanced RMS¹⁾ based on AI • Cloud-based platform operation

1) RMS (Remote Monitoring System): A monitoring system that remotely detects and responds to problems based on device operating data in real-time

Business & Impacts

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Doosan Corporation Contributes to Building a Sustainable Society

We will realize the sustainability of Doosan Corporation's value, leading to the creation of value in our society through implementation of social responsibility initiatives as well as solid economic performance.

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Challenges and Scope of Innovation for the Future

Why it is Important

The key to corporate competitiveness is technology and innovation. Leading the areas of technology and business innovation determines not only business success but also survival of many businesses. It is time to focus on the challenge of radical innovation and the future, away from the way how the company is satisfied with the current market and focused on short-term performance.

How we respond

Doosan Corporation is strengthening its business competitiveness, based on preemptive market trends and technology development. In particular, it is not only strengthening competitiveness of existing businesses, but also identifying new industries that are expected to grow rapidly in various areas. Doosan Corporation will do its best to be a sustainable company that provides innovative solutions and differentiated value to its customers through continuous investment and development of future technologies.



Link to Materiality

- Securing a new growth engine
- Development of eco-friendly products and services
- Expansion of R&D investments

Link to UN SDGs



Market Leader in the Field of Battery Copper Foil, Core Material of Electric Vehicle Battery

Environmental Regulations and Expansion of Electric Vehicle

In December 2018, the European Union (EU) announced its goal of reducing greenhouse gas emissions per car by 95g/km until 2021 (about 37% reduction when compared to that of 2015), and further reducing it by about 38% until 2030 (compared to that of 2021). In Europe, automakers have announced their plans to release electric vehicles to cope with these emission regulations. Expansion of electric vehicles is expected to be accompanied by the explosive growth of the battery industry and a surge in demand for battery copper foil¹⁾, which form the core components of batteries.

1) Battery copper foil: The thin copper film of the cathode part of battery (secondary battery) that acts as a path of support and electrons of the cathode

Advances and Leaps into the Battery Copper Foil Market

Demand for battery copper foil, the core material of electric vehicle batteries, is expected to grow at a CAGR of 44%, from 75,000 tonnes in 2018 to 975,000 tonnes in 2025.

Electro-Materials BG recognized this market shift early and has continued to conduct research and development on battery copper foil since 2014 when it acquired Circuit Foil, a Luxembourg-based copper foil manufacturer.

As a result, Electro-Materials BG completed the development of high-efficiency, high-end battery copper foil products to improve the mileage of electric vehicles and to increase the density and weight of batteries. In 2018, it started the construction of a 50,000 ton-per-year battery copper foil production plant in the Tatabánya industrial complex in Hungary. The Hungary plant is capable of producing annual battery copper foil that can be supplied to 2.2 million electric vehicles at the time of the construction completion, thus reducing distribution costs and defective rate of battery copper foil in Europe. In addition, Electro-Materials BG will respond promptly to the technical problems of products that can be generated locally, and will build a leading position in the European market for battery copper foil based on its superior product competitiveness.



Doosan's Excellence in Battery Copper Foil Business

Development of high-end technology with high rigidity and high elongation
(Possessed by only 6 companies around the world)

The only battery copper foil plant in Europe
(Hungary)

Production scale : 50,000 tons/year
(Enough for 2.2 million electric cars)

Case Study



Battery Copper Foil Plant in Tatabánya, Hungary : Sustainable business for future society and environment

Doosan Corporation creates environmental and social value through its business and contributes to the implementation of a sustainable future society. Electro-Materials BG's Hungary plant is considering environmental factors, starting with the site selection for construction. The construction work was started by considering the feasibility of the site, in harmony with the surrounding environment, and biodiversity through a pre-environmental review to prevent damage to the local ecosystem by the construction of the plant. In addition to the environmental impact, it will create diverse social values such as revitalizing the local economy through continuous industrial activities and creating jobs in the local community through hiring local workers.

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Realization of Hydrogen Economy through Byproduct Hydrogen Fuel Cell

Climate Change and Hydrogen Energy

Global environmental issues such as climate change have emerged as important global agenda, and the whole nation has come to recognize the importance of protecting the environment. In particular, the move to use renewable energy to escape from the abuse of fossil fuels is no longer an option but a dire necessity. Hydrogen is one of the most prominent energy sources among new and renewable energy sources. Hydrogen is a clean energy source that produces no pollutants except for a small amount of nitrogen generated by combustion in the air, and is a promising source of renewable energy to replace fossil fuel.

Development of Fuel Cell Using Byproduct Hydrogen

Byproduct hydrogen means hydrogen generated as a byproduct in processes related to petrochemical and steel industries. When it is used as fuel for power generation of fuel cells, nitrogen oxides, sulfur oxides and greenhouse gases, which cause fine dust, do not get generated, while solving problem of surplus hydrogen. In addition, byproduct hydrogen does not require the same processes as natural gas reforming¹⁾ used in domestic and overseas fuel markets, so it has high power generation efficiency and can save investment

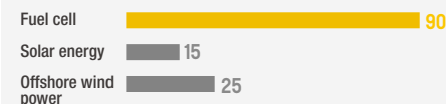


costs. Because of these advantages, many countries are interested in byproduct hydrogen-fueled power plants, but they are only in the early development stage on a scale of 1MW. In 2017, Fuel Cell BG developed byproduct hydrogen fuel cell in cooperation with domestic parts suppliers. A total of 46 partners have participated in the development over three years, while raising localization rate of main parts to 98 percent.

1) Reforming: A method of extracting hydrogen from natural gas by changing the structure of hydrocarbons by the action of heat or catalyst

Excellence of Fuel Cell

Operating rate (%)



An eco-friendly energy source with high operational reliability, wind power is suitable for distributed generation.

Installation area (m²/1MW)

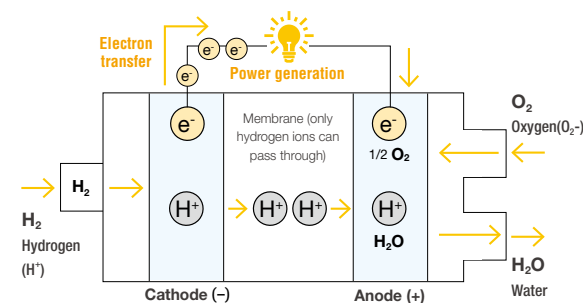


No restrictions for installation thanks to the highest space efficiency among renewable energy modes

World's First and Largest Byproduct Hydrogen-fueled Power Plant

In August 2018, Fuel Cell BG signed a contract to supply 114 byproduct hydrogen fuel cell units with a total capacity of 50 MW to Daesan Green Energy's fuel cell power plant in Daesan Industrial Complex in Seosan City, Chungcheongnam-do. It is the world's first byproduct hydrogen fuel cell power plant to produce 40 MWh of electricity annually for 170,000 households in the Seosan area after completion in 2020. This contract will give the Fuel Cell BG an opportunity to take the lead in the byproduct hydrogen fuel cell market that is still in its early stage.

Principle of Fuel Cells



Bird's-eye View of Daesan Hydrogen Fuel Cell Power Plant



Total Solution for Industrial Vehicles

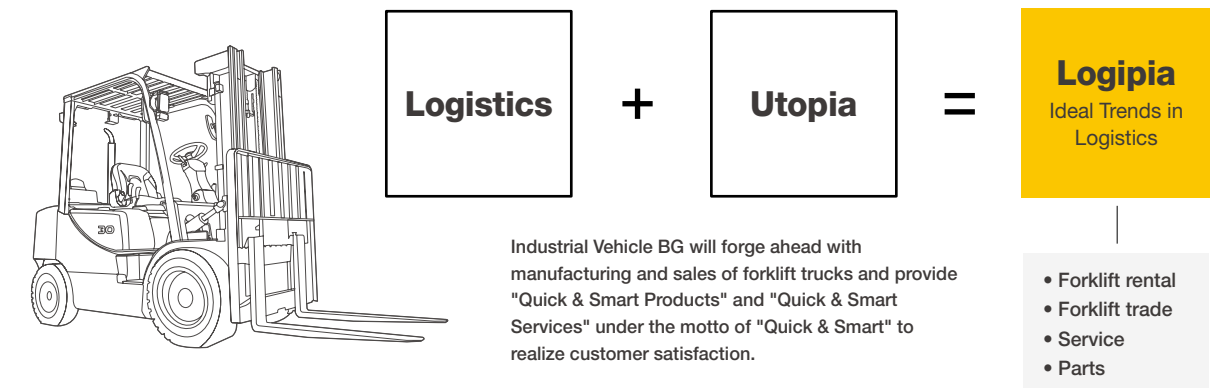
Domestic Logistics Equipment Market, Winds of Change

Unlike engine forklifts, whose environment and safety are controlled in accordance with the Construction Machinery Management Act, electric forklifts mainly operated in warehouses are not subject to legal and administrative management related to the environment and safety from production to disposal. Some companies have imported large numbers of old used electric forklifts from Japan and low quality forklifts from China. This seems to offer a temporary price benefit for customers, but in the long term, it is recognized as a problem since it increases risks associated with worker safety and working environment, which in turn can burden business owners and workers. In addition, poor post-management process for parts and repair services, combined with lack of price transparency for parts and repair services, has led to growing distrust among customers. In 2018, Industrial Vehicle BG launched Doosan Logipia to offer Total Life Time Management of logistics equipment such as trading, rental, service, disposal, and recycling for new and used equipment based on a Digital Platform to increase customer value while enhancing transparency and reliability of the logistics equipment market.

Downstream Business through Doosan Logipia

Doosan Logipia is a word that combines 'Logistics' and 'Utopia' that shows Doosan's will to realize ideal logistics. Doosan Logipia is a new business launched to expand into downstream business areas including rental of forklift, purchase of used forklift and maintenance services as well as total solutions for forklifts throughout their life cycle. Doosan Logipia plans to innovate the forklift market from the era of ownership to the era of sharing through transparent prices, customized products, and Quick & Smart Solutions based on Logipia digital platform.

Benefits of Doosan Logipia



Industrial Vehicle BG will forge ahead with manufacturing and sales of forklift trucks and provide "Quick & Smart Products" and "Quick & Smart Services" under the motto of "Quick & Smart" to realize customer satisfaction.

1. Automated Guided Vehicles
2. Doosan Logipia Booth at KOREA MAT (Materials Handling & Logistics Exhibition)





Realization of a People-centered Organizational Culture

Why it is Important

The expression 'Work-life balance' comes from the word 'work', which means work at the workplace and the word 'life', which means personal life after work. It is now a hotly debated topic among workers as well as corporate houses. Despite these trends and requirements, Korean workers continue to work 2,024 hours annually, which is the third highest among OECD member countries according to OECD statistics for 2018. This shows that efforts should be made to create a healthy working life and an efficient work culture in Korea.

How We Respond

Doosan Corporation has implemented a healthy workplace based on an organizational culture where leaders lead by example to help solve social issues and problems and realize sustainable growth. In addition, we are pursuing long-term growth based on Doosan's 2G strategy (Growth of People, Growth of Business) through nurturing talented people. We at Doosan Corporation are committed to realizing a virtuous circle in which corporate growth provides opportunities for individuals to grow.



Link to Materiality

- Realization of a desirable organizational culture at our workplaces
- Enhancement of employee competencies

Link to UN SDGs



Leadership Culture Formed by Exemplary Actions of Model Leaders



Leaders Workshop for Change and Innovation

Doosan Corporation holds 'Doosan Leader Workshop' with executives, team leaders, part leaders and others every year to share and discuss diverse opinions and provide a place for effective vision sharing and improvement in the organization. In 2018, four sessions of the leaders' workshop were held, starting with a business group discussion on 'vision communication' and 'business growth'. The leaders of business groups delivered their vision for continuous growth of the

company and discussed how to raise their members' capability levels, and then shared their thoughts and advice on the role of a desirable leader based on the discussions. We plan to establish an organizational culture in which leaders take the first step and continue their efforts toward change and innovation in order to build consensus on vision and increase the level of business growth.



Best Practices



Doosan Credo Conference, 'Paint the Tomorrow of Doosan'

Doosan's history over the past century is the result of its members' spirit of overcoming the fear of failure and embracing new challenges for a better today and tomorrow. Doosan consistently makes every effort to keep up with this original intention.

As part of this effort, the Doosan Group holds the 'Credo Conference' every year to prepare for Doosan's tomorrow by sharing its success stories, know-how and knowledge, and by recognizing and encouraging employees who have achieved outstanding results.

In 2018, Doosan Corporation held the conference with 250 leaders and executives including the CEO, BG directors, executive officers, and CAs to share various practical examples.

In particular, the 'Winning Concert' was a new program started in 2017. It took place in the morning, and was presented by representatives of BG/BUs for 4 topics: Leadership / Core Values / Lessons Learned / CA activity. In addition, we held knowledge sharing sessions in the afternoon to share various knowledge through excellent examples of fundamental competitiveness, advancement and scientification, as well as core values.

The idiom "Wen Gu Zhi Xin" means that "we should learn about the past and cherish it in our bosom." Doosan Corporation follows the idiom to develop its strengths and improve upon its weaknesses to become a sustainable company that draws yet another century.

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Strengthening Corporate Competitiveness by Developing Employee Competencies

Leadership

Training for Employees on Promotion List in Subsidiaries in China

In 2018, Doosan Corporation conducted leadership training for newly promoted employees in its subsidiaries in China. This is the first training for employees working at overseas subsidiaries to improve job performance by position and to make employees feel a sense of belonging through a systematic training curriculum. In 2018, a total of 16 personnel (nine managers and

seven deputy managers) were promoted in subsidiaries in China. The manager training was conducted at Changshu Corporation in China and the deputy manager training was conducted at the Doosan Leadership Institute in Korea (DLI). The managers and deputy managers took various courses to understand their roles and performance requirements in the new positions. They were motivated by the training and expressed their desire to have continuous training every year.

Satisfaction Survey Result for Training



Satisfaction Survey Result for Work Relevance



I was able to learn effective communication skills which is necessary for the future work through the training and it was a good opportunity to clearly understand the direction of my work.

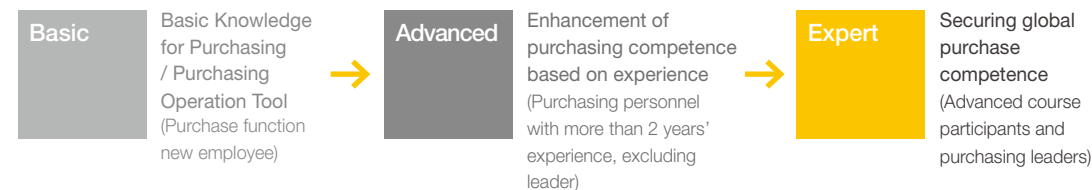
Electro-Materials BG
Purchasing Part in Management Team
at Changshu Corporation
Deputy Chief, Hong-mae Hwang

Professional

'Purchasing Academy' to Improve Expertise

Doosan Corporation has developed the 'Purchasing Academy' course to improve the ability of purchasing professionals to respond effectively to changing purchase environments. The academy offers Basic, Advanced, and Expert courses, among which the Advanced course was developed and operated in 2018. This course was developed by Doosan's in-house ex-

perts, and strengthened work relevance through practical content and know-how including theories, practice, and case studies for each module. In addition, it is designated as an essential training for all employees, except for leaders, in charge of purchase to strengthen their motivation. Doosan Corporation plans to provide training so that all purchasing personnel can complete the course.



Short-term MBA

Electro-Materials BG conducted a short-term MBA course for non-financial leaders such as team leaders, part leaders, and CA(Change Agent) to enhance their financial accounting skills, allow them to develop a better understanding of the nature of their work, and improve problem solving competencies so that they can create value for the company. The short-term MBA course for Electro-Materials BG has been conducted since 2017 and consists of four modules: Business,

Financial Knowledge, Management Skills, and Legal Compliance. Internal experts have joined as instructors for the course to provide knowledge through various cases for modules as well as theories. Leaders attending the course were able to have a comprehensive understanding of the company's overall management and business, including finance and strategy. In addition, Electro-Materials BG continues to make efforts to ensure that the short-term MBA course is a positive opportunity for inducing change in management and innovation.

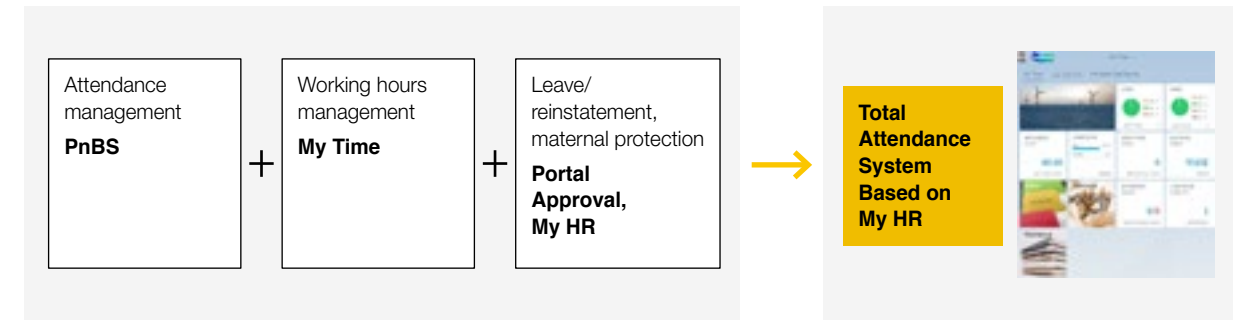
Healthy Workplace with 'Work & Life Balance'

Introducing the Total Attendance System

Doosan Corporation has operated a 'Total Attendance System' since 2019, which integrates the existing time and attendance systems for management of working hours, leave/reinstatement, and maternal protection application to enhance the convenience of working hours and attendance management. The mobile-enabled Total Attendance System

is more accessible and convenient, and provides real-time monitoring of attendance issues and system/calendar functions for efficient attendance management. We will improve and manage the attendance system to help our employees manage their working hours efficiently.

Existing System



Operation of a PC-OFF System

Doosan Corporation operates a PC-OFF system to ensure efficient work and work-life balance for our employees. The PC-OFF system allows all office employees to install a PC Agent on their personal PCs to use the PCs from 30 minutes before working hours to the end of working hours, and automatically keep the PCs locked for other hours to make them work more efficiently during working hours. As stipulated by the Labor Standards Act, we manage working hours within 52 hours per week based on the Total Attendance System. Employees who want to work after the basic working hours should seek approval from their team leaders.



Flexible Working Hour Program

Doosan Corporation operates a flexible working hour program to allow employees to adjust their working hours according to their personal situations. The flexible working hour program allows employees to adjust commuting time while complying with the existing regular working hours. It is

operated in three time zones (7:00 to 16:00, 8:00 to 17:00, and 10:00 to 19:00, including lunch hour). The program aims to reduce child care burden for employees with children and support employees who need long-term care, so that they can expand the available hours according to their needs and situations.

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Efforts for a Safe and Clean Society

Why it is Important

Safety and environment are among the most important values that companies must protect. Minor mistakes in safety and indifference to the environment bring back a great deal of risk for companies. Intensive prevention activities, based on basic attitudes and interests, can reduce these safety and environmental risks and strengthen corporate sustainability.

How We Respond

Doosan Corporation is taking the lead in maintaining a sustainable society and ecosystem by minimizing environmental impact, while pursuing safety as its top priority. We have reduced greenhouse gases through energy management, and are contributing to climate change response through our system. In addition, we continually implement programs to improve the level of awareness of EHS (Environment, Health & Safety) among our employees. Ultimately, we strive to create a safe and clean society through efficient EHS management.



Link to Materiality

- Response to Climate Change
- Implementing a safe working environment

Link to UN SDGs

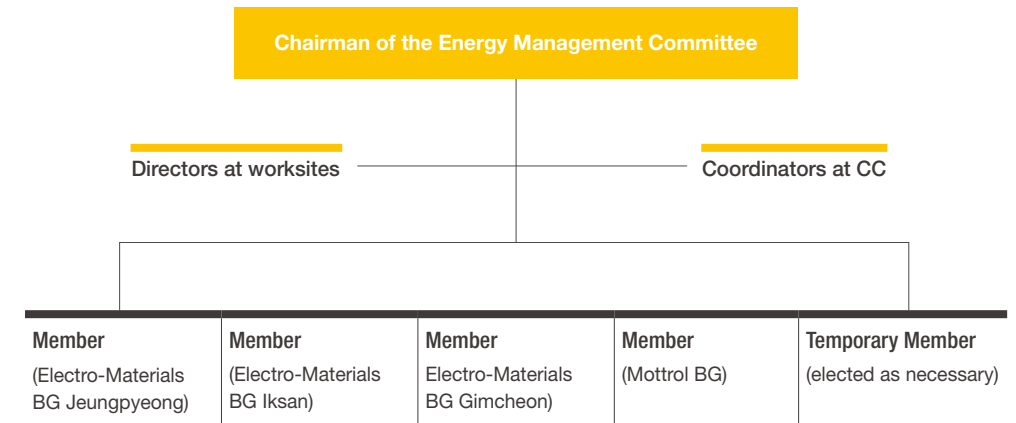


Contribution to Reducing Greenhouse Gas Emissions through Energy Management

Operation of Energy Management Committee

The government has enacted the "Low Carbon Green Growth Basic Act" to fulfill its responsibility toward addressing climate change, and aims to reduce greenhouse gas emissions by 37% by 2030. To accomplish this goal, the government aims to request industries to reduce greenhouse gas emissions by reducing their energy use. Doosan has established an Energy Management Committee for business sites, to meet national

requirements and contribute toward reducing greenhouse gas emissions. Energy Management Committee holds four or more annual meetings at the Electro-Materials BG's Jeungpyeong, Iksan, and Gimcheon plants and Mottrol BG. The Committee also checks the activities according to a pre-established energy saving plan and goals, and consultations on the operation plan.



Idle Power Management and Savings

Doosan Corporation has selected worksites with high power consumption as priority control target sites (Electro-Materials BG's Jeungpyeong, Iksan and Gimcheon plant and Mottrol BG) to reduce unnecessary energy consumption from facilities at the sites during off-hours. For Electro-Materials BG, air conditioners and air compressors are main facilities for energy consumption, and idle power is managed by installing inverters, adjusting temperature control and replacing LEDs.

For Mottrol BG, main reasons for the increase in energy consumption are the expansion of facilities including heating and cooling systems, toilets, and dust collectors for organic painting. Old heating and cooling system is replaced and cooling tower pump/fan automatic on/off system and heating and cooling system remote control system are installed to reduce idle power at the facilities. In addition, the power peak control system is operated to basic charge for power.

Target	Energy Saving Activities	2018 Savings	
		Electricity Savings (KWh)	Savings (KRW Million)
Electro-Materials BG	Replacement of LED lights	378,508	48.9
	Installation of oven fan inverters (No. V4)	74,528	8.1
	Installation of Heating Medium Pump Inverter (No. V2, No. V4, No. V7)	447,950	48.1
	Adjusting the supply temperature of 8 air conditioners by 2°C (20°C -> 22°C)	6,088	0.65
Mottrol BG	Replacement of old cooling and heating systems	168,544	20.2
	Cooling tower pump/fan automatic on/off control	298,921	23.9
	Installation of remote control system for cooling and heating systems	236,078	28.3

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Best Practice



Mottrol BG, Recycled the Ministry of Environment's Award at the Excellent Resource Circulation Company

In 2018, Jeong Gil-yong of Mottrol BG EHS Team received the Minister of Environment's Award at the Global Green Management Excellence Awards in recognition of the reduction of pollutants and greenhouse gases. The award reflects the excellence of Mottrol BG in EHS management. The Global Green Management Excellence Award is a prestigious environmental award in Korea given to companies that contribute to environment-friendly industry and green management.

Enhancement of EHS Level at Workplace



EHS Sessions for the Field Managers

Building EHS IT system

Doosan Corporation operates an EHS IT system to manage its major EHS status and performance. In 2018, it promoted the Smart & Slimization of the system by improving underutilized inconvenient functions that are distinct because of their complicated input method, lack of statistics utilization function, and unsuitability for EHS characteristics by industry. This minimizes the number of input steps and checking the status and analysis results of the EHS through a statistical/analysis function, and enables specialized functions according to the characteristics of each BG/BU. In addition, Doosan Corporation has improved usability of the existing EHS IT system by strengthening management functions on key EHS management items, by selecting common key management indicators, thus establishing business standards and developing various new functions.

EHS Session for Field Managers

Field managers have a direct impact on the on-site environment and safety management capabilities due to the nature of their work or instruction to their workers. Doosan Corporation has conducted "EHS Session for Field Managers" to further strengthen the EHS management capabilities of field managers and to share the importance of EHS activities and related issues. In 2018, a variety of programs were conducted to improve the EHS awareness level with a management capacity of 54 field managers in all BG/BUs, for two days. In particular, session participants did not only take the education passively, but also had actively shared information through group programs. The results of field managers' satisfaction survey for such programs showed an average positive satisfaction rate of 90% or more. The sessions will be expanded to reflect the feedback of the participants.

Creating Safe and Healthy Working Environment for Service Personnel

Preventing Accidents by Improving Safety Culture of Service Personnel

Service personnel moves all over the sites to provide better service and affected by a variety of external factors, including seasonal temperature differences, traffic safety risk due to vehicle operation, and physical burden of moving equipment. Fuel Cell BG recognized the need to improve the working environment of service employees at sites and enhanced awareness of accident prevention and EHS by discovering and improving potential safety risks. It provide rented vans to solve inconvenience of service personnel who operates vehicle with heavy parts such as stack, reformer and gas analyzer, and to reduce their physical burden during carrying and replacing heavy goods. In addition, we provide winter clothes and equipment in winter for health protection against outdoor activities, and summer items for responding to heat wave warnings in winter. Department managers and team Leaders are conducting improvement activities according to their pri-

orities by collecting the inconvenience of service personnel on site, and setting guidelines for continuous improvement.

Improving Work Environment for Emotional Labor Workers

At Doota Duty Free of Retail BG, all of the employees always greet customers with friendly smiles. Service workers who are primarily engaged in customer contact require close care and support because they affect customer satisfaction of the company. In particular, the Emotional Labor Workers Protection Act (Newly enacted article under the Industrial Safety and Health Act), which was enforced in October 2018, requires companies to provide support and responsibility for improving working conditions for employees who are engaged in customer contact. Retail BG has announced in-house policy for protecting the health and safety of the emotional labor workers and for response to these legal regulations. It also strives to create a desirable distribution culture that is mutually respected by our customers and employees.

Protection for Emotional Labor Workers

- 1** **Precautionary measures**

 - Support job stress prevention training, emotion recover program, and counseling to relieve their stress
 - Provide poster at customer contact points to protect workers from abuse and assault
 - Provide the emotional labor worker protection manual to notify self-management and how to react to black consumers
- 2** **Follow-up action**

 - Separate emotional labor workers from customers in case of problems such as verbal abuse and assault to secure physical and psychological stability of the workers
 - Provide at least 2 hours of rest time for affected employees, hospital treatment and psychological counseling if necessary.
 - Review support and look for solutions through the emotional labor worker protection committee when legal or administrative action is required



Poster for Customers on Mutual Respect

Service Worker Protection Programs of Doota Duty Free





Why it is Important

Companies are members of the community and corporate citizens that should seek to live and grow together with the community. To achieve sustainable growth, they must grow and develop together with the supply chain and local communities. Mutual growth and sharing can be done by anyone, but not by everyone. The practice of sharing with partners and local communities will be an important foundation for realizing a sustainable society.

How we respond

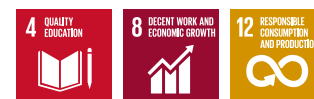
Doosan Corporation has established guidelines for sustainable supply chain management and strengthened its supply chain CSR management system in four areas: labor/human rights, safety and health, environment, and ethical/fair trade. As part of our efforts to enhance our supply chain CSR, we are operating an evaluation and support program for suppliers and are preparing to expand its scope to overseas, secondary and tertiary suppliers.



Link to Materiality

- Expanding communication with suppliers
- Social contribution activities aligned with nature of business

Link to UN SDGs



Building a System for Shared Growth with Suppliers

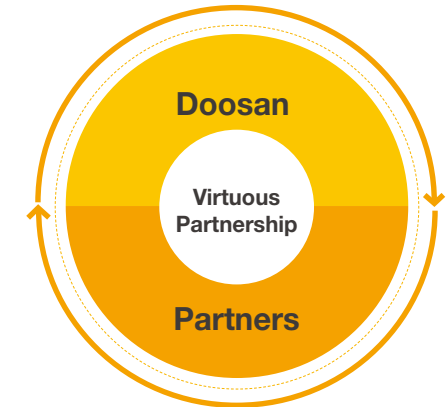
System and Roadmap for Shared Growth

Shared growth is essential for improving corporate competitiveness, developing national economy, and building a sustainable society. Under the vision of "Building a virtuous partnership with suppliers", Doosan Corporation strives to improve suppliers' competitiveness through shared growth. It

enhances overall competitiveness of the supply chain by preventing risks related to the Fair Trade Act through fair trade self-compliance activities, and by promoting diverse activities to strengthen suppliers' competitiveness. Furthermore, Doosan has set a mid- to long-term direction and carried out various activities based on its mid- to long-term roadmap.

Doosan Corporation's Philosophy of Shared Growth

- Definition of Shared Growth: Building a 'virtuous partnership' with suppliers to strengthen global competitiveness
- What is the virtuous partnership?
 - All technology/quality/management systems are operated as part of a single system including suppliers.
 - Doosan's technology capabilities, business systems, and other unique management quality, and technology systems are shared with its suppliers to enhance their competitiveness and seek mutual growth in the global market.



Four Areas for Shared Growth

<p>Support for Strengthening Competitiveness</p> <ul style="list-style-type: none"> • Support group to enhance competitive strength • Expert consulting • Smart factory project 	<p>Support for Overseas Expansion</p> <ul style="list-style-type: none"> • Participation in overseas exhibitions • Support for marketing to overseas buyers 	<p>Financial Support</p> <ul style="list-style-type: none"> • Mutual growth fund • Network loans 	<p>Expanding Communications</p> <ul style="list-style-type: none"> • Cooperative meetings and Partners Club • Management visits to suppliers • Supplier hotline
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Establishment of a Shared Growth Team

Doosan Corporation established Shared Growth Team since 2018 in order to strengthen its expertise in shared growth strategy and to promote mutual growth partnerships with suppliers. Shared Growth Team manages Doosan's systems and regulations, trainings and programs to create a fair trade base. The team is monitoring violations related to the Fair Trade Act and responding promptly when any issues arise. In addition, it provides a variety of support programs for suppliers

ers such as support groups for strengthening supplier's competitiveness, consulting, and shared growth funds. Shared Growth Team plays a pivotal role in strengthening the overall competitiveness of the supply chain by listening to difficulties experienced by suppliers and making/suggesting improvements. Shared Growth Team plans to continue its activities to drive sustainable growth in the supply chain for Doosan Corporation.

Fair Trade and Mutual Growth Agreement Ceremony



Business & Impacts

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Project for Gap Relief Support

The wage gap between small and medium-sized companies is a frequent issue discussed in the media, and is seen as a chronic problem in our society. Doosan Corporation has conducted a variety of shared growth programs and systems to contribute to solving this problem. In particular, since 2017, it contributed funds to the Small and Medium Business Agricultural Cooperative Foundation to provide KRW 100,000 per month

to secondary suppliers and in-house subcontract workers, while providing the same support to SMEs' employees who are in charge of cleaning and security. In addition to the mutual growth incentives, the beneficiaries can get welfare benefits such as holiday gifts, comprehensive health check-ups, and mutual aid. All benefits are offered at the same level as our employees.

Mutual Growth Incentives

Recipients: 2nd tier suppliers' workers, in-house subcontract workers, workers who are in charge of cleaning and security

→ Support: **KRW 100,000** per month for as incentive / increased amount in 4 major insurances

Health Checkups

Recipients: Persons over 35 years of age and their spouse among 1st and 2nd tier suppliers' workers, in-house subcontract workers, workers who are in charge of cleaning and security

→ Support: Health checkup service worth **KRW 300,000 to 500,000** per person

Holiday Gifts

Recipients: Workers at 1st and 2nd tier suppliers, in-house subcontract workers, workers who are in charge of cleaning and security

→ Support: Gift certificates worth **KRW 100,000** for Lunar New Year and Chuseok (Number of recipients in 2019: Approx. 4,000)

Mutual Aid

Recipients: Workers and their immediate family members among 1st and 2nd tier suppliers' workers, in-house subcontract workers, workers who are in charge of cleaning and security

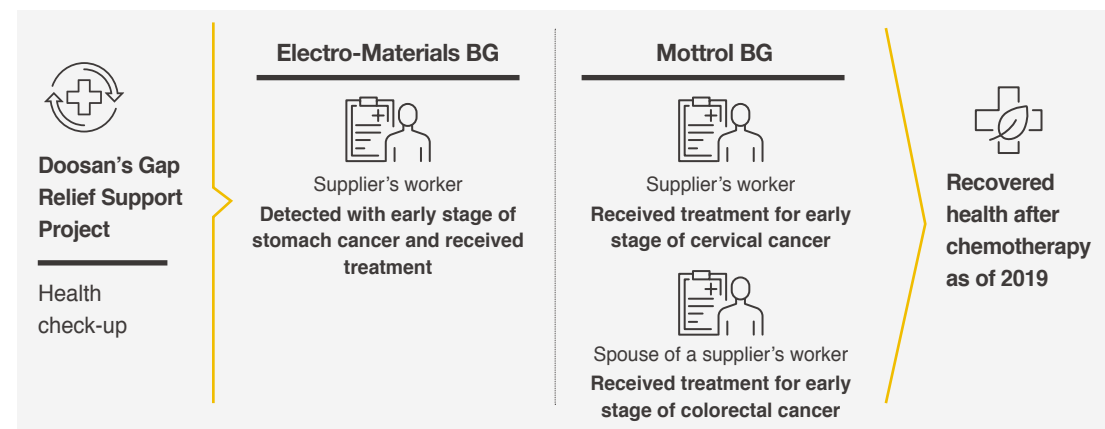
→ Total funeral service assistance worth **KRW 300,000**

Best Practice

Mutual Growth through the Gap Relief Support Project

The Gap Relief Support Project provides not only material support such as incentives and gift certificates, but also welfare benefits such as support for health checkups and funeral services. In particular, the health checkup supported by Doosan enabled employees and their families of some suppliers to screen for and treat cancer.

At a supplier of Mottrol BG, a worker in his 60s and his spouse found colon and uterine cancer respectively through Doosan's health checkup support in 2018. Thanks to the early detection of the tumor, they have successfully completed surgery and chemotherapy, and both will take follow-up health check-ups. Electro-Materials BG has a similar case. In 2017, a subcontractor's worker at Iksan plant found stomach polyps through Doosan's health checkup support. After surgery, he returned to work in a healthy condition.



'Didim Seed', Financial Support and Mentoring



As of the end of 2017, more than 12,000 children were living in 280 childcare facilities nationwide, according to the National Statistical Office. These children are under the age of 18, have no guardian, or are under guardians without parenting ability. They need help from the government or society to stand on their own feet as members of society. Doosan Corporation started the Didim Seed program to support healthy growth of children living in childcare facilities. In 2018, we donated KRW 168 million, collected from employees' donations and a matching amount from Doosan's support fund, to the Korean Social Welfare Council. These funds were credited to the Didim Seed Child Development

Accounts¹⁾ of 350 children at 15 childcare facilities nationwide.

In addition to financial support for the Child Development Account, Doosan Corporation also supports mentoring programs to strengthen self-leadership capabilities of children. Our employees serve as mentors to help children in childcare facilities so that they can grow up to be healthy members of society. We support them to understand and enjoy various fields such as forming of relationships, dreams and vision, study methods, future planning, and time management through fun-filled mentoring programs.

Didim Seed Child Development Accounts

Started in **2018** | **8** regions | **350** children at **15** child care facilities | **KRW 14 million** donated monthly (KRW 168 million per year)

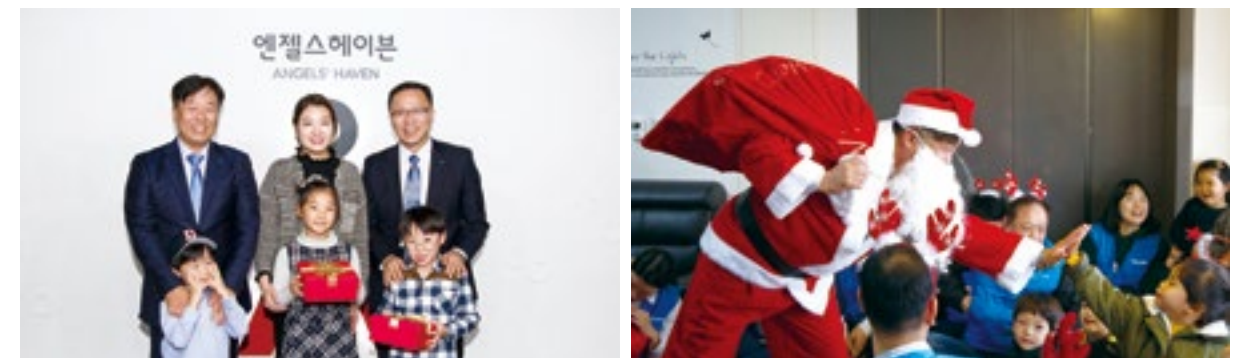
Didim Seed Mentoring

Recipient: Elementary / middle school students who are subject to Child Development Account

Self-Leadership Strengthening Program

1) Didim Seed Child Development Account is a social contribution project to help children in childcare facilities come up as healthy members of society. The funds are formed through the following process: if someone donates a certain amount of money each month to the Child Development Account of a child less than 18 years of age, the local government will donate the same amount up to KRW 40,000 each month through 1:1 government matching support fund.

2018 Ceremony to deliver Didim Seed Donation Funds



- Challenges and Scope of Innovation for the Future
- Realization of a People-centered Organizational Culture
- Efforts for a Safe and Clean Society
- Growth Shared with Suppliers and Communities
- CSR Achievements and Plans
- Creating Social Value of Doosan
- UN Global Compact

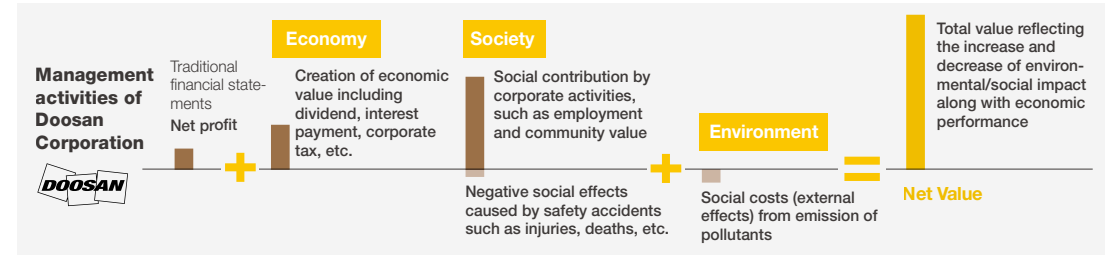
CSR Achievements and Plans

	Activities in 2018	Plans for 2019	Mid-to Long-term Plans	Performance Indicators		
	<ul style="list-style-type: none"> Expansion of grievance system Human rights surveys and due diligence Diagnosis of human rights management at overseas worksites Introduction of a 52-hour work week system 	<ul style="list-style-type: none"> Introduction of grievance system at all subsidiaries Regular human rights surveys and due diligence Introduction of human rights risk management process at overseas worksites Establishment of a 52 hour work week system using Total Attendance System 	<ul style="list-style-type: none"> 0 % of human rights infringement cases Establishment of human rights risk prevention system Expanding diversity within the supply chain and expanding women's rights 	<table border="1"> <tr> <td>Turnover rate Mid-to long-term target 2%</td> <td>Employee satisfaction survey Mid-to long-term target 80%</td> </tr> </table>	Turnover rate Mid-to long-term target 2%	Employee satisfaction survey Mid-to long-term target 80%
Turnover rate Mid-to long-term target 2%	Employee satisfaction survey Mid-to long-term target 80%					
	<ul style="list-style-type: none"> Enhancement of job/technical training Training for employees on promotion list at subsidiaries in China Enhancement of management skills development for female employees Enhancement of maternal protection program 	<ul style="list-style-type: none"> Regular expansion of job/technical training Expansion of training for employees at subsidiaries in China and other overseas worksites Increased coverage of management skills training for female employees and maternal protection program Expansion of employment for the disabled 	<ul style="list-style-type: none"> Verification and upgrade of job/technical training Management of ROI Indicators for training investments Target setting and management of HR key management indicators Expansion of the retirement support program 	<table border="1"> <tr> <td>Average hours of training per employee Mid-to long-term target 74 hours</td> <td>Rate of employees working at the company for more than a year after returning from paternity leave Mid-to long-term target 85%</td> </tr> </table>	Average hours of training per employee Mid-to long-term target 74 hours	Rate of employees working at the company for more than a year after returning from paternity leave Mid-to long-term target 85%
Average hours of training per employee Mid-to long-term target 74 hours	Rate of employees working at the company for more than a year after returning from paternity leave Mid-to long-term target 85%					
	<ul style="list-style-type: none"> Identification of idle power, setting of goal for savings Building energy management organization and selecting object of management 	<ul style="list-style-type: none"> Facility reviews for energy efficiency and idle power saving activities Performance management by activating energy management organizations and establishing KPIs for power management 	<ul style="list-style-type: none"> Application for the Energy Management System Certification (ISO50001) Establishment of strategies to address climate change 	<table border="1"> <tr> <td>Energy reduction performance (EM BG, Mottrol BG) Performance in 2018</td> <td>Savings 1,611 thousand kWh KRW 178 million</td> </tr> </table>	Energy reduction performance (EM BG, Mottrol BG) Performance in 2018	Savings 1,611 thousand kWh KRW 178 million
Energy reduction performance (EM BG, Mottrol BG) Performance in 2018	Savings 1,611 thousand kWh KRW 178 million					
	<ul style="list-style-type: none"> Upgrade of the SSAP assessment questions and establishment of improvement plans based on the results Planning of CSR roll-out for overseas supply chain and the pilot project Monitoring of fair trade status 	<ul style="list-style-type: none"> Enhancement of competitiveness and shared growth activities for suppliers Expansion of overseas roll-out of the supply chain Establishment of a regular inspection system and monitoring for risks to fair trade 	<ul style="list-style-type: none"> Expansion of supply chain CSR for secondary and tertiary suppliers System for monitoring of risk from conflict minerals 	<table border="1"> <tr> <td>Annual mutual growth index Mid-to long-term target Most excellent</td> <td>Fair trade monitoring 2018 performance 6 times Mid-to long-term 10 times</td> </tr> </table>	Annual mutual growth index Mid-to long-term target Most excellent	Fair trade monitoring 2018 performance 6 times Mid-to long-term 10 times
Annual mutual growth index Mid-to long-term target Most excellent	Fair trade monitoring 2018 performance 6 times Mid-to long-term 10 times					
	<ul style="list-style-type: none"> Industrial Vehicle BG: <ul style="list-style-type: none"> Development of electric vehicles with Li-ion battery Development of AI-based smart mode Fuel Cell BG: Development of H₂ (byproduct hydrogen) models 	<ul style="list-style-type: none"> Electro-Materials BG: Secure new market of HF Ultra Loss for hi-end servers Mottrol BG: Development of new plugs with 0% operating leakage Fuel Cell BG: Development of new 5/10KW fuel cells 	<ul style="list-style-type: none"> Electro-Materials BG: Response to demand for HF Middle Loss servers Industrial Vehicle BG: Compliant with European Stage V regulations Fuel Cell BG: Development of fuel cell 500KW NG model and hydrogen generator for hydrogen charging 	<table border="1"> <tr> <td>Sales ratio of eco-friendly products 2018 performance 65%</td> </tr> </table>	Sales ratio of eco-friendly products 2018 performance 65%	
Sales ratio of eco-friendly products 2018 performance 65%						
	<ul style="list-style-type: none"> Enhancement of ethics training with emphasis on areas in need of improvement Enhancement of ethical management level diagnosis Enhancement of communication and an ethical culture 	<ul style="list-style-type: none"> Strengthening of the ethics training system Expansion of assessment/management for areas with high corruption risk and ethical management at overseas worksites Enhancement of communication and ethical culture with stakeholders 	<ul style="list-style-type: none"> Independently assured compliance system Measurement and feedback on ethical management practices and results 	<table border="1"> <tr> <td>Online ethics training 2018 performance Domestic 2,600 participants Overseas 800 participants</td> </tr> </table>	Online ethics training 2018 performance Domestic 2,600 participants Overseas 800 participants	
Online ethics training 2018 performance Domestic 2,600 participants Overseas 800 participants						
	<ul style="list-style-type: none"> Development of a new social contribution program (Child Development Account) Enhancement of target/curriculum and transparency of the representative program (Time Traveler) 	<ul style="list-style-type: none"> Review of the reward system to strengthen public relations and motivate personnel toward social contribution Activation of the Social Contribution Subcommittee 	<ul style="list-style-type: none"> Building a platform to enable employees participate in voluntary social contribution and establishing support measures Social contribution culture for overseas subsidiaries 	<table border="1"> <tr> <td>Social contribution awareness 2018 performance 51% Mid-to long-term target 56%</td> <td>Participation rate of social contribution 2018 performance 38% Mid-to long-term target 42%</td> </tr> </table>	Social contribution awareness 2018 performance 51% Mid-to long-term target 56%	Participation rate of social contribution 2018 performance 38% Mid-to long-term target 42%
Social contribution awareness 2018 performance 51% Mid-to long-term target 56%	Participation rate of social contribution 2018 performance 38% Mid-to long-term target 42%					

Creating Social Value of Doosan

1. Social Value through Business

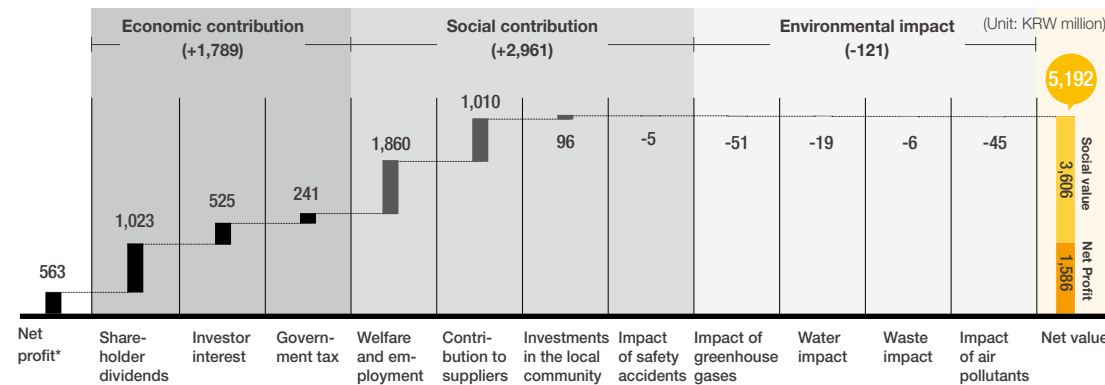
Doosan Corporation aims to measure not only its financial performance, but also its social value considering its impact on stakeholders and thereby upgrade the level of its social responsibility management. Social value measurement reflects social and environmental impacts (Impact¹⁾) that are not represented in traditional financial statements related to a company's activities, and measures true performance (Net Value²⁾) that the company generates. Measurements were conducted by an external professional organization. Indicators and formulae used in the measurement will be continuously supplemented and refined.



1) Impact – Impacts arising from corporate management activities (including both intended and accidental short-term social outcomes)
 2) Net Value – Total value reflecting the increase and decrease caused by environmental/social impact along with economic performance

Measurement Results

The results of analyzing the monetary value of various social contributions and environmental impacts from Doosan's management activities in 2018 show that: the net value of the economic, social, and environmental contributions and impacts was KRW 519.2 billion, about three times the net profit. The social value that is not represented in financial statements was KRW 360.6 billion, accounting for about 70 percent of the net value of Doosan.



* Net profit excluding dividend to shareholders
 The measurement results may not be accurate because it is explicit information based on various assumptions and references for establishing the direction of Doosan's CSR. In addition, this information cannot be considered as part of financial disclosure since the reference used in the process of monetizing social values can be supplemented and adjusted according to new research results and statistical data.

Measurement Principles

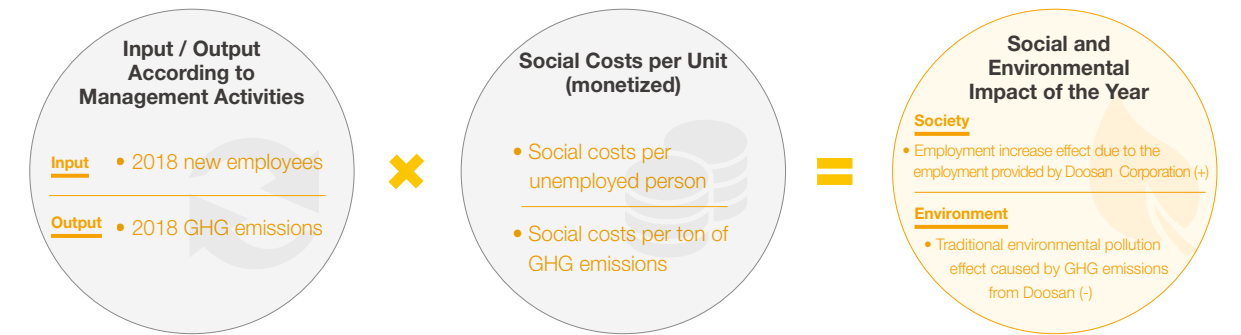
Doosan Corporation applied the following measurement principles for measuring social value in a reasonable and clear manner.

- 1. Measurement of direct impact**
 - Measure only the direct impact of corporate management activities on the environment and stakeholders.
 - Apply a rational measurement method that takes into account both the social and environmental values of the enterprise
- 2. Rational measurement of social benefits and cost**
 - Measure the size of social benefits and costs of the outcome resulting from business activities.
 - Measure the social impact by applying the Direct Value Estimation Method¹⁾, Relative Price Estimation Method²⁾ and Input Cost Application Method.³⁾
- 3. Conservative value measurement**
 - Apply conservative measurement method to prevent overestimation of values and ensure validity and reliability.

1) Direct Value Estimation Method: Estimation of value using reference values to monetize quantified figures based on causative validity of the social value (example: purchase amount of suppliers)
 2) Relative Price Estimation Method: Estimation of value using market average price and similar industrial group figures in the absence of quantitative or monetary reference values (example: costs of treating greenhouse gases)
 3) Input Cost Application Method: Estimation of value when input cost can be applied directly (example: dividends)

Measurement Method

We measured the social value generated for the year by using input / output data from management activities and statistics / research data on domestic / international social costs to convert the social value into monetary value.



Measurement Indicators

In 2018, Doosan Corporation's social value was calculated as net value based on net profit measured in terms of financial value and the impact on 19 socio-environmental indicators that are likely to occur due to business activities. The reference for monetary valuation was sourced from a number of foreign materials due to limitations of domestic research data.

Category	Indicators	Impact	Main activities	
Financial Performance	Net profit	N/A	Net profit generated by the company during the year, excluding expenses (Based on the Business Report) * Excluding dividends that enhance shareholder value	
Economic Contribution	Shareholders	Dividends	+	Increased shareholder value through by payment of dividends (Based on the Business Report)
	Investors	Payment of interest	+	Increase investor value payment of interest (Based on the Business Report)
	The Government	Corporate tax	+	Contribution to secure government funding through proper payment of taxes (Based on the Business Report)
Social Contribution	Welfare and Employment	Wages and benefits	+	Increase of individual income through employee salary and welfare (Based on the Business Report)
		Employment	+	Contributing to the reduction of unemployed through providing employment ¹⁾
	Contribution to Suppliers	Purchase amount	+	Contribution to the creation of a shared growth ecosystem through increasing purchase from suppliers
		Violation of fair trade	-	Inhibition of the shared growth ecosystem due to violation of the Fair Trade Act (penalty)
Investment in the Local Community	Education for the local community		+	Social value generated by strengthening community education, infrastructure and environment through social contribution activities and donations ²⁻⁴⁾
	Improvement of local infrastructure		+	
	Improvement of local environment		+	
Safety Accident Impact	Number of deaths	-	-	Social cost due to industrial accidents ⁵⁾
	Industrial accident	-	-	
Environmental Impact	Greenhouse Gases Impact	Total amount of emissions	-	Social costs related to GHG emissions ⁶⁾
	Water Impact	Water use and Wastewater discharge	-	Social cost related to water use and discharge of wastewater from business activities ⁷⁻⁸⁾
	Impact of Waste	Incineration and Landfill	-	Social costs associated with the method of disposal of landfill waste from business activities ⁹⁾
	Impact of Air Pollutants	Emissions of air pollutant (SOx, NOx and fine dust)	-	Social costs of emission by types of air pollutants generated by business activities ¹⁰⁾
Net profit reflecting social and environmental impact			Net Value of Doosan Corporation considering both financial / social / environmental impacts	

References

- 1) Financial and Economic Research (No. 364) [Recent Employment Conditions and Measures to Address Youth Unemployment], 2009
- 2) G.Psacharopoulos and H.A. Patrinos, Returns to Investment in Education: a Further Update, 2004
- 3) BCG, the Cement Sector: a Strategic Contributor to Europe's Future, 2000
- 4) G. Hutton, Global Costs and Benefits of Drinking-water Supply and Sanitation Interventions to Reach the MDG Target and Universal Coverage, 2012
- 5) Ministry of Employment and Labor, Industrial Accident Status, 2017
- 6) Energy Economy Researcher, Social Costs Per Ton of Greenhouse Gas, 2015
- 7) (Eco-cost) <http://www.ecocostsvalue.com/EVR/model/theory/subject/5-data.html>
- 8) Ministry of Environment, Average Cost of Sewage Treatment, 2017
- 9) Dr. Jeffrey Morris , The Environmental & Economic Waste Caused by Incineration, 2008
- 10) Ministry of Environment, Study on Re-evaluation of Social Cost of Air Pollutants, 2015

2. Social Value through Products

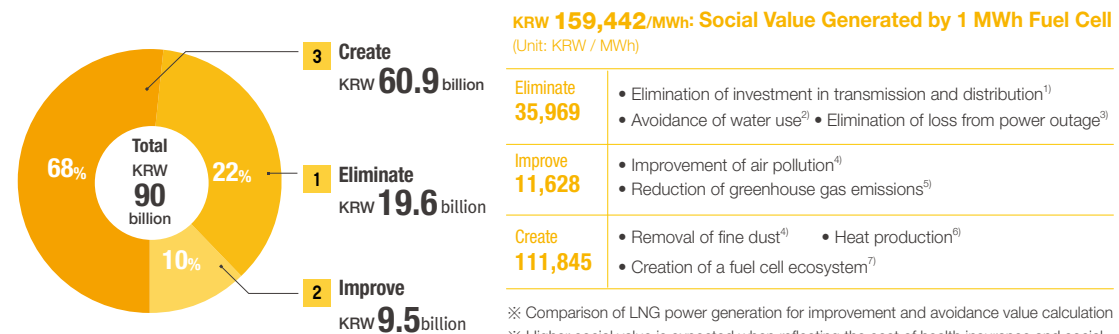
Social value of a company can be measured in two different ways; one is social value through business measuring the company's impact on the society through the input and use of resources and environmental emissions, and the other is social value through product and service. Therefore, Doosan Corporation not only measures the social value through business but also the social value through product to identify how it contributes to society. In 2018, we measured the social value of fuel cell as part of measuring social value through product. We plan to refine the method of measurement to expand the measurement of the social value of Doosan's products. The social value of fuel cell was measured based on three methods: 'Eliminate' negative factors of the existing products, 'Improve' negative aspects, and 'Create' new value.

Method of Social Value Measurement of Fuel Cell

1 Eliminate	Eliminate negative factors related to use of existing products <ul style="list-style-type: none"> Avoidance of transmission and distribution investment Avoidance of water use Avoidance of loss caused by power outage 	Determination of the social value created by eliminating negative impact of existing large-scale power plants Example Fuel cell has higher benefits from distributed power sources because it does not require transmission and distribution facility investment and generate transmission and distribution losses.
2 Improve	Areas with improved social value compared to existing products <ul style="list-style-type: none"> Improvement of air pollution Reduction of greenhouse gas emission Reduction of medical and social welfare costs due to improved air quality 	Determination of the social value created by eliminating negative impact of LNG combined-cycle thermal power generation Example Fuel cells generate half of the greenhouse gas emissions than that of LNG combined-cycle thermal power generation
3 Create	New area of value that existing products cannot create <ul style="list-style-type: none"> Removal of fine dust Heat production Creation of a fuel cell ecosystem 	New social value from fuel cells Example Prevention of social costs related to fine dust through filters in the fuel cell absorbing fine dust

Results of Social Value Measurement of Fuel Cell

The social value created by Doosan's fuel cell was estimated at about KRW 160,000 per 1MWh, and KRW 90 billion based on the total output of products supplied to customers in 2018. Measurement was made based on the social value measurement methodology of the Korea Productivity Center (KPC) and indicators and formula of domestic and overseas research. The measured results may vary according to the figures in the references. Doosan Corporation plans to supplement and refine these measurements to enhance the social value of its products.



References

- 1) Korea Electro-technology Research Institute Report, Benefit Unit of Distributed Power Source
- 2) Eco-cost) <http://www.ecocostsvalue.com/EVR/model/theory/subject/5-data.html>
- 3) KEPCO, Cost of Loss per Minute in Case of Power Outage, 2015 Power Statistics System, Annual Average Outage Time, 2013
- 4) Ministry of Environment, Re-evaluation of Social Costs of Air Pollutants, 2015
- 5) Korea Energy Economics Institute, Social Costs Per Ton of Greenhouse Gas, 2015
- 6) Korea Energy Economics Institute, Study on the Diffusion of New and Renewable Energy, 2017
- 7) Korea Exchange, Operating Margin of Listed Companies in Korea, 2018
- 8) Public Health England, Estimation of Costs to the NHS and Social Care due to the Health Impacts of Air Pollution, 2018

UN Global Compact

Doosan Corporation joined the UN Global Compact in 2014 and have been diligently abiding by its 10 principles in the four areas of human rights, labour, environment, and anti-corruption. We are committed to realizing corporate social values and thus continue to grow sustainably through constant challenges to the future's value innovation and sincere efforts as a global corporate citizen.



10 Principles

1 2	Human Rights	Principle 01. Businesses should support and respect the protection of internationally proclaimed human rights; and Principle 02. make sure that they are not complicit in activities pertaining to human rights abuses	79p. 79p.
3 4 5 6	Labour	Principle 03. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining; Principle 04. the elimination of all forms of forced and compulsory labour; Principle 05. the effective abolition of child labour; and Principle 06. the elimination of discrimination in respect of employment and occupation.	79p. 79p. 79p. 51p. 79p.
7 8 9	Environment	Principle 07. Businesses should support a precautionary approach to environmental challenges; Principle 08. undertake initiatives to promote greater environmental responsibility; and Principle 09. encourage the development and diffusion of environment-friendly technologies.	40-42p. 48-50p. 81p. 48-50p. 81p. 40-42p. 73p.
10	Anti-corruption	Principle 10. Businesses should work against corruption in all its forms, including extortion and bribery.	72p.

CSR Management

64_CSR Strategy and Key Activities

66_Transparency of Governance-Stakeholder Engagement

68_Interview with experts

70_Risk Management

72_Anti-corruption-Ethical Management-Fair Trade

73_Research and Development

75_Customer Satisfaction · Quality Management

77_Talent Management

81_Environment and Safety Management

83_Supply Chain Management

85_Social Contribution



Doosan's CSR management is a promise to its stakeholders

We aim to create present values based on the technology and experience accumulated from past management activities, and continue to change and challenge for the future.

CSR Strategy and Key Activities

CSR Value Structure

Doosan Group declared its firm resolution to practice CSR management and create a "Proud Global Doosan" on the basis of "Doosan Credo". Moreover, to anticipate and promptly respond to the various CSR requirements and standards within and outside Korea, a group-wide CSR strategy has been established consisting of clearly-defined objectives and missions, in four key areas and ten priority tasks. Doosan Corporation has been practicing CSR management based on Doosan Group's CSR value framework.

In particular, as the necessity to increase business values through CSR is growing within society, we added 'CSR Value Creation' and expanded the CSR area, which used to focus on CSR risk management activity such as meeting legal regulations and industrial standards, to understanding and creating social values.

CSR Governance

Doosan's CSR decision-making assembly consists of CSR Committee, CSR Subcommittees, and BG/BU level CSR Operation Meeting that is operated in accordance with the initiative body.



· CSR Committee

As Doosan's supreme decision-making body, the CSR Committee develops CSR strategic directions, reviews CSR-related management activities, and inspects the progress of improvement tasks and implementation plans. The CSR Committee is composed of representatives from all of the company's BG/BUs, Corporate Center, and Administration Center, as well as executives from its key departments. CEO of Doosan Corporation serves as the chairperson, with the relevant officers assuming responsibility for seven subcommittees, namely, the human rights, EHS, R&D, shared growth, ethics, personal information, and social contribution. The heads of BG/BU participate in the CSR Committee as members to enable each business division to aggressively promote CSR activities. The CSR Committee holds two meetings per year, which serve as a forum for designing improvement plans through in-depth discussion on key CSR issues.

· CSR Subcommittee

Seven CSR subcommittees are formed in categories of human rights, EHS, R&D, shared growth, ethics, personal information and social contribution, they discuss relevant CSR issues on a quarterly basis. The related matters are shared to BG/BU Operation Meeting and reported to CSR Committee.

BG/BU CSR Operation Meeting

The entire BG/BUs of Doosan Corporation separately run operation meetings for discussing CSR issues and making decisions periodically. An operation meeting is supervised by the head of each BG/BU and carried out by the executives and relevant team leaders every quarter. During the meeting, contents discussed at CSR Committee and Subcommittees are shared, and key activities to be handled at BG/BU level are established for improvement activities.

Key CSR Activities

· Operation of the CSR team

Doosan Corporation operates a CSR team dedicated to carrying out CSR management more effectively. The CSR team diagnoses the CSR management activities in order to survey economic, environmental and social risks and opportunities, and identifies and carries out improvement tasks for each subcommittee and BG/BU based on this. In addition, the team establishes a direction of CSR operation at company level and identifies CSR trends frequently to share with the management and subcommittees.

· External Communication of CSR Performance

Doosan Corporation publishes its CSR report each year in order to transparently communicate its achievements and plans with its stakeholders inside and outside. Doosan prepares for DJSI (Dow Jones Sustainability Indices) assessment that comprehensively evaluates economic, social and environmental performance of global companies around the world, and has been included in 'DJSI Asia Pacific', which refers to businesses of the Asian region in the top 20%, for five consecutive years. Doosan has been rated A or above since 2011 in the ESG (Environment, Social, Governance) evaluation conducted by Korea Corporate Governance Service. In 2018, we obtained overall A+ with governance (A), environmental (A+) and social (A+).

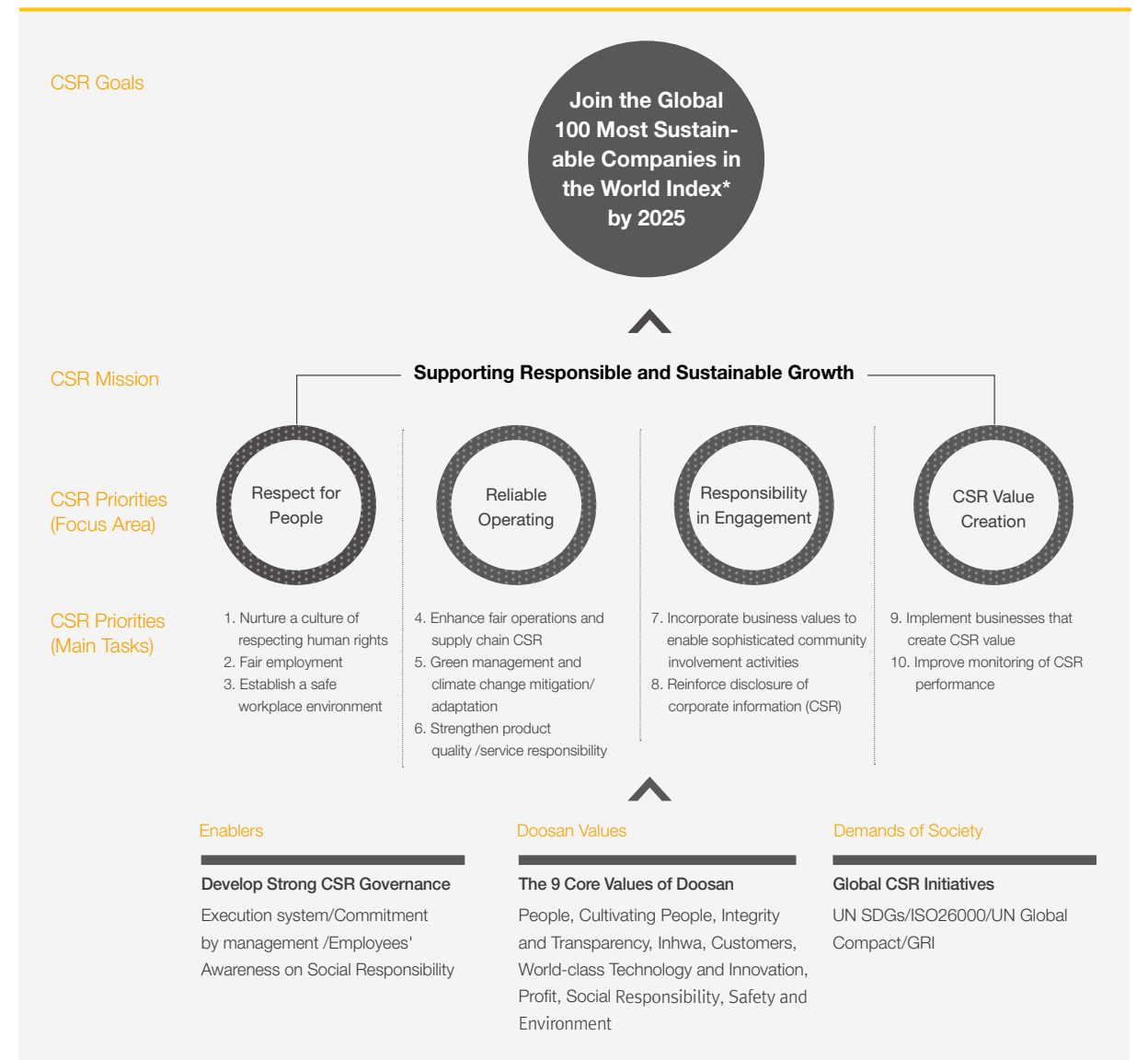
	2016	2017	2018
DJSI Assessment Dow Jones Sustainability Indexes	Asia Pacific / Korea Class Incorporation		
ESG Evaluation Korea Corporate Governance Service	A	A	A+

· Expansion of CSR to Overseas Subsidiaries

Doosan operates 30 production bases and subsidiaries/branches in 15 countries around the world, and promotes CSR-based management at both domestic and global sites. With the establishment of a CSR management system for global sites in 2016 as the start, we expanded the system to 4 subsidiaries in China (Electro-Materials Changshu/CFAP Zhangjiagang, Industrial Vehicle DIVC, and Mottrol DMJC) in 2017, and to subsidiaries located in the United States and Luxemburg (Fuel Cell DFCA, Electro-Materials CFL, Industrial Vehicle DIVAC, and DDIA) in 2018

· Key Achievements

By promoting key tasks of each subcommittee, we achieved dissemination of an ethical culture, reinforcement of communication, reinforcement of the human rights risk management procedure, promotion of work-life balance, reinforcement of competitiveness through evaluation and support for subcontractors, expansion of the effectiveness of CSR programs, strengthening of transparency, etc.



* Standards published by the World Economic Forum, Davos, Switzerland

Transparency of Governance · Stakeholder Engagement

Transparency of Governance

The Board of Directors(BOD) is responsible for deliberating and voting on major business issues and making decisions on matters stipulated by laws and corporate by-laws, matters delegated by the general shareholders' meeting, and other important matters related to the company's basic management policies and operations. Doosan selects outside directors among professionals who can supervise company management objectively from the outside perspective.

As of the end of 2018, the Board consists of seven directors, of which three are internal directors and four are outside directors. There are three committees established under the Board, which are composed wholly of outside directors: the Audit Committee, Internal Transaction Committee and the Outside Director Candidate Nominating Committee.

BOD Operations

Doosan Corporation makes decisions on major items of agenda and integrates shareholders' feedback into the decision-making process through the BOD for more careful deliberation. Pursuant to the applicable laws, Doosan allows all directors to participate in the decision-making process by means such as real-time voice communication, whereby directors are deemed present at the relevant BOD meetings. The BOD can host ad-hoc meetings when deemed necessary, and can also delegate a portion of its authority to the BOD committees to ensure swift and efficient decision-making, in which cases thorough reviews are performed and the details of deliberation and outcomes are reported to the BOD. Meetings of the BOD are convened when a majority of the directors are present, and decisions are made based on concurrence by the majority of directors. If a quorum with weighted voting is required by the laws and regulations, such a quorum is held. Directors cannot vote by proxy, and directors with personal interests in certain agenda items cannot vote when such agenda is raised for voting. In 2018, the BOD met twelve times with an average attendance rate of 94%.

Independence of BOD

The BOD maintains three or more outside directors, thus satisfying the target it set, namely, that outside directors should always make up the majority of all directors. This way, balanced and objective decision-making is facilitated, while the checking

functions of the BOD is reinvigorated. Directors who have interests in specific matters are restricted from voting on such matters. There are three committees under the BOD (including the Audit Committee), each of which is composed solely of outside directors so as to ensure independence and transparency. For the Audit Committee to perform audits effectively, the committee may request a report on the company's operations or an investigation into the status of its corporate assets. If deemed necessary for auditing, the committee may also request the relevant employees or external auditors to attend meetings while seeking advice from experts at the company's expense.

Procedure and Standards for the Appointment of Outside Directors

To fully enable the BOD's role in promoting checks and balances, Doosan preserves the independence of the outside directors pursuant to the stringent requirements set forth by commercial law. Outside director candidates are nominated by the Outside Director Candidate Nominating Advisory Group, which is composed of three external experts, and the total number of candidates is maintained at less than 2 times of the number of outside directors to be selected at the general shareholders' meeting. Further, the nominated candidates are recommended to the Outside Director Candidate Nominating Committee. The Outside Director Candidate Nominating Committee, consisting of three outside directors, reviews the candidates' suitability based on considerations such as establishing transparent corporate governance and enhancing expertise of the BOD, and selects the most qualified persons from the outside director candidates nominated by the Outside Director Candidate Nominating Advisory Group. The selected candidates are appointed as outside directors after approval of the general shareholders' meeting.

Approval on Key Matters

The BOD approves key management issues, including the disposal or transfer of important assets and the borrowing of assets worth large amounts pursuant to the relevant statutes or internal regulations. In 2018, the BOD approved 50 cases that were referred to it, including the 82nd Annual Financial Statement and the Business Report. The details of such issues are disclosed in the Business Report and other related documents to ensure transparency.

	Name in Full	Major Career	Duties	Date of First Appointment
Inside Directors	Jeong-won Park	(Present) Chairperson of Doosan Corporation	CEO, President of Board of Directors	2016
	Hyun-soo Dong	(Present) Vice chairperson of Doosan Corporation	CEO	2018
	Min-chul Kim	(Present) Vice president of Doosan Corporation	CEO	2018
Outside Directors	Sung-gwan Chun	(Present) Advisor to Kim & Chang Law Firm (Former) Director of Seoul Central District Prosecutor's Office	Audit Committee	2019
	Bok-hyeon Baik	(Present) Professor at Seoul National University Business School, (Present) Vice chairperson of Korea Accounting Information Association	Audit Committee	2019
	Doo-hee Lee	(Present) Professor at Korea University Business School, (Present) Chairperson of Korea Management Association	Audit Committee, Outside Director Candidate Nominating Committee	2018
	Hyoung-joo Kim	(Present) Professor at Seoul National University, Engineering College, (Former) Vice Dean of Seoul National University, Computer Engineering Department	Audit Committee, Internal Transaction Committee, Outside Director Candidate Nominating Committee	2017

Diversity of Outside Directors

Doosan Corporation strives to secure the diversity of its board members in terms of expertise as well as individual capabilities based on various procedures for organizing its BOD. In particular, Doosan organizes the BOD to make decisions considering diverse viewpoints on its management, including gender, specialization, industrial experience, and origin.

Evaluation and Compensation

Directors' compensation is determined within the director compensation limit approved by the general shareholders' meeting. Outside directors receive standard fixed pay, whereas inside directors receive

a compensation package consisting of salary, incentive pay, and severance pay, which is determined in a fair and transparent manner in accordance with the executive management policy.

Stakeholder Communication

The BOD interacts with Doosan's stakeholders through internal and external communication channels such as disclosures and IR events. To promptly provide management information to shareholders and stakeholders, decisions made at the general shareholders' meeting and key decisions on business operations are disclosed immediately.

BOD Committees			
	Audit Committee	Internal Transaction Committee	Outside Director Candidate Nominating Committee
Members	Doo-hee Lee, Seong-gwan Cheon, Hyoung-joo Kim, Bok-hyeon Baik	Sung-gwan Chun, Hyoung-joo Kim, Bok-hyeon Baik	Doo-hee Lee, Hyoung-joo Kim, Bok-hyeon Baik
Responsibility	Audit the company's accounting and business operations and review operational status of the internal accounting management system	Deliberate on and approve internal transactions pursuant to the Fair Trade Law	Recommend outside director candidates
Activity Description	Review the outcomes of accounting audits performed by external auditors, provide consultations on non-audited services, review the operational status of the internal accounting management system, etc.	Approve inter-affiliate transactions, etc.	Recommend outside director candidates, etc.

Stakeholder Engagement

Doosan Corporation defines its stakeholders as those who wield direct or indirect influence on its business activities. Based on this definition, key stakeholders include shareholders, investors, customers, employees, suppliers, local communities, and government agencies. Doosan consistently employs diverse

communication channels to listen to stakeholders' opinions and reflect them in its management. The outcomes of stakeholders' participation are reflected in Doosan's management activities. Further, the achievements of our major activities are disclosed transparently in the annual CSR Report.

Channels for Stakeholder Engagement		
Stakeholders	Major Issues	Communication Channels
Customers	<ul style="list-style-type: none"> Handle customer complaints and strengthen customer satisfaction initiatives Improve product quality and strengthen accountability 	<ul style="list-style-type: none"> VOC Customer satisfaction surveys Technical review meetings
Shareholders & Investors	<ul style="list-style-type: none"> Ensure shareholders and investors' participation in the decision-making process through general shareholders' meetings Healthy corporate governance 	<ul style="list-style-type: none"> General shareholders' meetings Disclosures IR events Website
Employees	<ul style="list-style-type: none"> Job satisfaction and improvement of welfare Active organizational communication Build mutually beneficial labor relations 	<ul style="list-style-type: none"> Employee surveys In-house intranet Corporate newsletters Labor-management council
Local Communities	<ul style="list-style-type: none"> Regularly gather feedback from local communities Support the growth of local communities in the vicinity of worksites 	<ul style="list-style-type: none"> Volunteer activities Discussions and meetings with local communities Sisterhood ties and partnerships
Government	<ul style="list-style-type: none"> Legal and regulatory compliance Public-private cooperative partnerships 	<ul style="list-style-type: none"> Participation in government-led projects Partnership agreements with governmental and public organizations
Suppliers	<ul style="list-style-type: none"> Assist suppliers in strengthening competitiveness and capacity Facilitate the sharing of information 	<ul style="list-style-type: none"> Cooperative Council Hotline Technical review meetings

Interview with Experts

Doosan Corporation interviewed experts to identify and reflect key issues related to its CSR activities along with surveys on stakeholders' expectations. It listened to the opinions of experts on the current status of Doosan Corporation and the direction it will have to take in terms of corporate governance,

customer relations, shared growth with suppliers, environment, and CSR. The experts were interviewed individually, and the questions were reorganized so as to assist the stakeholders' understanding of the issues.



Il-gyu Lee
 Director of Eco-Friendly Management Office
 Korea Environmental Industry and Technology Institute

Response to climate change is now regarded as a factor that affects growth and subsistence of companies. This means that climate change should be recognized as a risk rather than an optional management effort. Doosan Corporation engages in a variety of climate change response activities, and has a clear intent to resolve environmental issues by using high-efficiency and eco-friendly energy through its fuel cell business. I expect to see Doosan Corporation create even greater values by building a governance feedback system that can be shared with partner companies and community residents at each business site.



Jae-eun Kim
 Research Fellow
 The Institute for Industrial Policy Studies

The domestic industries are showing increased interest and making investments in social values, along with increased use of indicators to evaluate performance. Accordingly, companies need to take social values as a part of corporate management and reflect the consumption pattern of the M-Z generations that received environmental education on their corporate strategies. I look forward to seeing Doosan Corporation lead the market as a social value creator by setting adequate social missions and scales.



Jae-yeong Kang
 Director of Shared Growth Committee Operation
 Korea Foundation for Cooperation of Large & Small Business, Rural Affairs

As we enter into the era of the 4th Industrial Revolution, large companies of Korea are showing positive changes in terms of awareness of shared growth. However, they are still bound to conventional partnerships in the fields. Doosan Corporation must propose a program of virtuous circle that turns sustainability of partners into competitiveness and competitiveness into growth and scale-up of partners. There must be a realistic evaluation system that accounts for the opportunities and challenges presented by the 4th Industrial Revolution during CSR evaluation of partners. In addition, I hope to see Doosan Corporation achieve a sustainable supply chain with 1st, 2nd, and even 3rd tier partners.



Kyong-wun Lee, Head of CSR Operations
 Plan M Co., Ltd.

Recent corporate social contribution activities tend to focus on specific social problem solving and practical change of beneficiaries. To this end, many companies are measuring and improving performance of their social contribution activities. Doosan's major social contribution programs, such as 'Time Traveler program' and 'Woori Doori', reflect the recent corporate social contribution activities. They are exemplary and leading social contribution programs in which professional researchers measure practical changes of beneficiaries and performance of programs is continuously improved.

Safety, health and environment have become the top priority values of sustainable business management globally. Therefore, South Korea needs to establish business continuity plans to manage risks and identify new risk factors associated with the 4th Industrial Revolution. Doosan Corporation has the will to implement ceaseless changes in EHS by establishing the Business Continuity Management System (BCMS). It is also impressive to see the implementation of advanced safety systems to achieve business sites completely free of hazardous chemical substances. I look forward to seeing Doosan Corporation become a global safety leader that meets expectations of communities, consumers, and future global buyers.



Chi-woo Bae, The Head of Safety Support Division
 Korea Industrial Safety Association



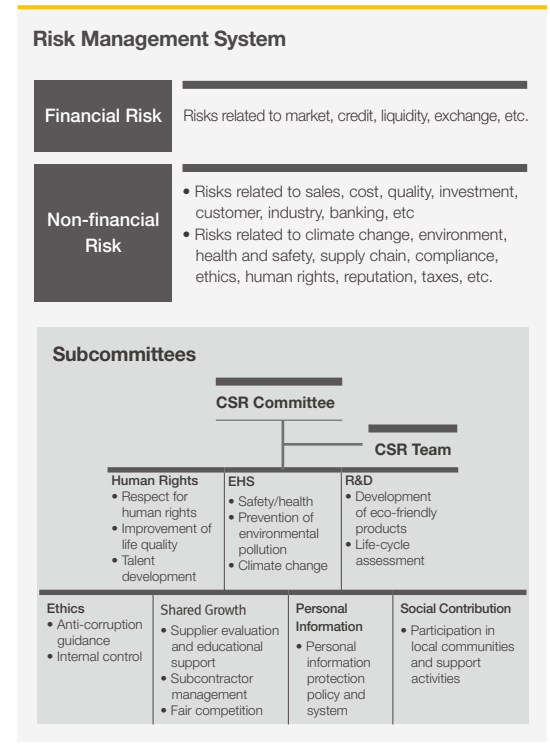
Kyung-il Kim, Professor of Psychology
 Ajou University

The core organizational capacity for the future is largely divided into the concepts of 'agile organization' and 'empowerment.' Agile organization refers to an organization that engages in active small-scale communications by breaking existing boundaries. Empowerment refers to increased autonomy of workers in making decisions at work. I believe that Doosan Corporation is making proper attempts in the direction of empowerment through Leader's Action Plan (LAP), Junior MBA, and diversification of grievance channels. I support the efforts of Doosan Corporation to find new avenues for improvement and horizontal union within the organization.

Risk Management

Risk Management System

Doosan Corporation carries out risk management of all business activities at all its worksites across the world. Risks are managed by classifying them into financial and non-financial categories for more systematic enterprise-wide risk management.



Management of Financial Risk

Doosan Corporation focuses on financial risk management with the aim of improving its financial structure and enhancing efficiency in the execution of funds in order to facilitate stable and continuous management in conditions where risks are likely to arise in connection with market, credit, liquidity, and exchange rates. In particular, the company focuses on improving its financial structure and enhancing its fund management efficiency. Financial risk management is primarily led by the Treasury Team, which sets financial risk thresholds and management policies by closely working with other relevant teams, while identifying, evaluating, and hedging financial risks. In addition, Doosan aims to minimize the impact of potential financial risks through regular monitoring.

Management of Non-financial Risks

Non-financial risks are managed by dividing them into business and sustainability risks. Each of Doosan's BG/BU manages business risks in-house, while sustainability risks are managed by the CSR team of Corporate Center overseeing the entire BG/BUs in collaboration with the relevant departments. Also, Doosan Corporation holds the CSR Committee

twice a year. At the CSR Committee, CEO of Doosan Corporation, head of BG/BUs and directors of subcommittees inspect enterprise-wide activities and achievements related to sustainability risks, and identify and manage factors requiring improvement.

Internal Control System

Doosan Corporation operates internal control assessment systems to secure the transparency and reliability of information. The Doosan Internal Control Assessment System (DICAS) includes not only internal accounting management systems but also items related to operational efficiency and compliance as risk factors subject to monitoring and control. It assesses every aspect of the company's business operations, including - but not limited to - finance, sales, purchase, and production. All BG/BU of Doosan Corporation perform a quarterly internal assessment by team, whereupon the Compliance Team inspects their performance. The outcome of the assessment is reported to the Audit Committee and the BOD via the CFO and the CEO based on the internal accounting management system and the Act on External Audit.



Since 2018, Doosan has been managing risks by applying the internal control assessment system to its overseas subsidiaries and branches around the world, including those in the United States and Europe. In 2019, we intend to reinforce preventive activities against possible risks by defining enterprise-wide risks and key management points at leadership level. In response to strengthened audits by external auditors based on the recent amendment to the Act on the External Audit of Shareholding Companies, we are restructuring the internal accounting control system with a professional external accounting firm. We plan to improve the transparency of accounting and the level of management on risks through these responses to changes and the restructured internal accounting control system.

Emerging Risks

Emerging risks mean risks with high uncertainty that can occur in a long term. These emerging risks must be identified and managed preemptively as they can have a significant effect on the business. Doosan promotes long-term stability of management by building an emerging risk management system. We identify emerging risks by

analyzing the political, economic, social, technological, legal, regulatory, and environmental factors of the macroscopic environment related to company business. Furthermore, we constantly implement and monitor plans to mitigate each risk after determining the priority based on the time of its possible occurrence and its potential impact on business.

Key Emerging Risks	Potential Impact on Business	Risk Mitigation Activities	
Changes in Technologies	<ul style="list-style-type: none"> Market changes attributable to new technological trends 	<ul style="list-style-type: none"> Business falling behind in the market as it fails to capture new growth opportunities in a timely manner 	<ul style="list-style-type: none"> Analysis of market opportunities for technological changes Introduction of the Product Development Roadmap and Technology Development Roadmap
Fluctuations in Markets and Business	<ul style="list-style-type: none"> Slow growth of existing main markets Intensified price competition due to excessive supply Emergence of new competition elements 	<ul style="list-style-type: none"> Decreased sales of existing main products Decreased profitability due to decline in selling prices and competition for securing supply volume Decrease in market share 	<ul style="list-style-type: none"> Reshuffle of product portfolio: Focus on high-performance, high value-added products Expansion of business lines: Provide total solutions across the entire value chain, veering away from existing business lines Focus on increasing sales in overseas/emerging markets
Procurement of Raw Materials	<ul style="list-style-type: none"> Supply imbalance of imported raw materials (if export of raw materials is limited by supplying countries based on their priority on domestic industries) 	<ul style="list-style-type: none"> Disruption of production due to shortage of raw materials Customer dissatisfaction and damage to corporate image due to failure to deliver ordered products in a timely manner 	<ul style="list-style-type: none"> Diversification of supply channel of raw materials
Climate Change and Environmental Risks	<ul style="list-style-type: none"> Strengthened environmental regulations Depletion of fossil fuels/unstable supply 	<ul style="list-style-type: none"> Market opportunities lost by failing to comply with environmental regulations 	<ul style="list-style-type: none"> Update of the Product Development Roadmap and Technology Development Roadmap considering environmental impact Promotion of product innovation using alternative energy as energy sources

Anti-corruption · Ethical Management · Fair Trade

Anti-corruption and Ethical Management

Doosan's Code of Conduct

To ensure sustainable growth and fulfill its corporate social responsibility, Doosan has enacted its Code of Conduct, which serve as the guiding principles for employees in performance of their duties. Doosan's Code of Conduct comprises Inhwa, customer-centered business philosophy, and transparent management. Doosan encourages its suppliers as well as all its employees to comply with the Code of Conduct. Doosan has also enacted detailed regulations and adhered to the Code of Conduct so as to embed the code in the daily work and life of its employees.



Click the following link to view further details concerning Doosan's Code of Conduct
<https://www.doosan.com/en/csr/csr-code/?menu=code-of-conduct>

Anti-corruption and Ethics Education

To enhance an ethical business mindset among its employees, Doosan Corporation conducts ethical business education each year and collects sworn statements from all of its employees requiring them to observe the Code of Conduct. In addition to ethical business education programs including online and offline trainings and workshops, in 2018, Doosan provided online education for office workers and offline education for technical workers at overseas subsidiaries in seven different languages: English, Chinese, French, Vietnamese, German, Czech, and Korean. In 2019, we plan to expand education on Code of Conduct all year long through general meetings and discussions for suppliers, and additionally conduct face-to-face education not only for employees of newly established subsidiaries and new employees, but also for those who have not completed online and offline trainings. In

addition, we will consolidate the foundations for ethical management and compliance through special education by key work function (purchase, financing, etc.).

Anti-corruption for Suppliers and Employees

Doosan conducted an anonymous questionnaire survey on 359 of its suppliers to prevent corruption or malpractice by analyzing the status of the ethical business practices of their employees. In addition, we assessed the level of ethical business performance and anti-corruption behaviors of all our employees and shared improvements with relevant departments to reflect establishment of the anti-corruption evaluation and management system. Further, we carried out activities for improving leaders' awareness (spreading cases of social issues, etc.), delivery of ethic letters (special days such as holidays), opening of supplier communication channel (hotline), to ensure that our ethical business policies are reflected throughout the value chain.

Whistleblowing System

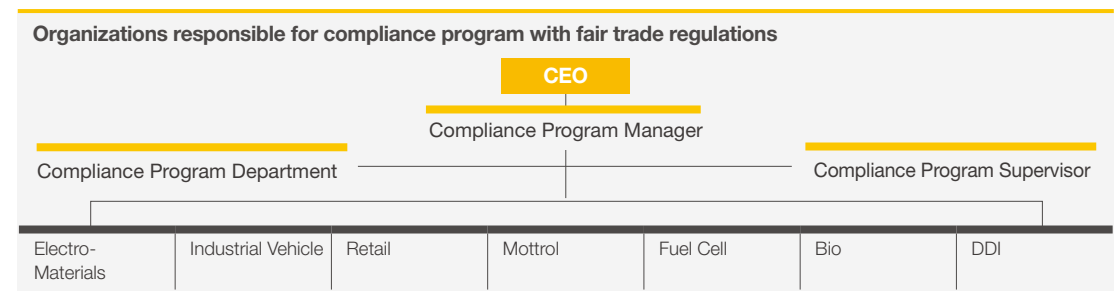
Doosan has set up an internal confidential reporting system to establish transparent and fair implementation of ethical management. By keeping the details of such reports confidential, Doosan protects informants and ensures that they do not suffer any disadvantages. Major issues are investigated and reported to the CEO and the Audit Committee. Doosan Corporation operates a cyber whistleblowing center at its website, where anyone can file a report either anonymously or under their real name. In 2018, it received 13 tip-offs concerning violations of Doosan's anti-corruption policies or Code of Conduct. Based on these reports, Doosan improved the internal business processes, conducted preventive education, and took disciplinary action against those concerned.

Fair Trade

Program for Compliance with Fair Trade Regulations

Since 2004, Doosan Corporation has operated a compliance program with fair trade regulations in order to promote transparent and legitimate business activities and foster a culture of compliance with fair rules while fulfilling its corporate social responsibility. In 2018, we reflected, enacted and revised laws, and published and distributed a subcontract transaction guide book and a branch transaction guidebook to allow working-level employees to apply compliance to the performance of their

duties. We also concentrated on preventing violations of the law by monitoring fair trade practices while providing our employees with education on the Act on Fair Transactions in Subcontracting, Act on Fair Agency Transactions, and Act on Fair Transactions in Large-scale Franchise, and Retail Businesses. Doosan plans to continue providing such education for its employees while strengthening the monitoring of fair trade practices.



Research and Development

Enhancement of Technological Competitiveness

Market-based Technological Competitiveness

Doosan Corporation practices technology-oriented management that leads innovation in technologies, products, and solutions based on market and customer requirements and analysis of rapidly changing technology trends. Doosan steadily explores and preemptively secures innovative technologies in order to develop, in a timely manner, market-leading products according to its mid- and long-term business strategies. All of Doosan Corporation's BG/BUs regularly establishes PRM¹⁾ and TRM²⁾ with specific action plans, and have reoriented their mid- and long-term growth objectives towards rapid growth and a highly profitable business portfolio, based on an analysis of changes in markets and the technological environment.

- 1) Product Roadmap
- 2) Technology Roadmap

Enhanced Ability to Practice Technology-oriented Management

To enhance its ability to practice technology-oriented management, Doosan operates various assemblies organized and managed by the CEO. Long-term technological strategies based on the market and technology trends are established through sessions of PRM/TRM, which is the core system of technology-oriented management. Further, the periodic R&D Project Review Session inspects newly started projects and the progress of ongoing R&D projects. In addition, sustainable growth is promoted at Technology Management Summit by sharing division-wise performance and future technology trends. In 2018 in particular, we arranged a forum to discuss the direction of projects through sharing of performances and trends that focus on digital transportation and IP¹⁾.

- 1) Intellectual Property

Doosan Corporation's technology-oriented management system	
PRM/TRM	• Analysis of market/technology trends → Development of mid- to long-term technological strategies
R&D Projects Review	• Inspection of achievements and risks of core tasks • Enhancement of capability to execute R&D projects
Reviewing Development of New Products/Technologies	• Application and enhancement of new development processes → Preemptive development of products/technologies
Technology Management Summit	• A forum for discussing technology-oriented management and business innovation, guided by Doosan Corporation's vision in pursuit of sustainable growth → Presentation of innovation examples of leading companies and brainstorming to find directions for technology-oriented management → Sharing of the execution process and outcome of technology innovation

Establishment of Enterprise-wide Integrated IP Strategy

Doosan Corporation has established an enterprise-wide IP strategy in connection with its mid- and long-term R&D road map (PRM/TRM), and secured an IP-based system to enhance R&D. It releases new market-leading products by analyzing patents of competitors and clients during the R&D planning stage and pioneering differentiated technologies and strategic IP. In 2018, Doosan Corporation awarded the Technology Management Award for sharing exemplary IP activities and achievements at the 'Technology Management Summit' supervised by the CEO.

Development of Environment-friendly Products

Initiatives for Development of Eco-friendly Products

Electro-Materials BG places efforts to develop eco-friendly materials in the field of electronic products. It has created an eco-friendly product portfolio on the R&D road map to develop products based on eco-friendly materials (lead-free, halogen-free, dust-free materials, EV batteries, low-power display materials, etc.). In addition, products are designed to use less hazardous ingredients in the development stage, avoiding the use of toxic solvents and managing environmental factors according to the EHS impact assessment (hazardous raw materials, raw material MSDS, etc.). In the intermediate development stage, the hazardous substance review tests (RoHS II¹⁾, SVHC²⁾, etc.) are applied to verify that products do not violate the international restrictions of hazardous substances. In 2018, BG developed eco-friendly and halogen-free products with features such as halogen as halogen-free middle loss and halogen-free ultra-low loss applicable to high-capacity, high-speed and high-function network equipment for the IoT and 5G. In 2019, BG will start developing BPA-free (Bisphenol A-free) products that comply with environmental regulations and are applicable to fingerprint recognition modules, contributing to the development of biometric products harmless to human body, since a major application of this products is in fingerprint recognition modules

- 1) RoHS II: Restriction of Hazardous Substances Directive adopted by the EU to restrict hazardous substances in electronic and electrical equipment (4 out of 6 RoHS Phthalates: DEHP, BBP, DBP, DIBP)
- 2) SVHC: Substances of Very High Concern

Industrial Vehicle BG develops eco-friendly products by enhancing energy efficiency and fuel economy, minimizing emission of harmful gases, and increasing the replacement cycle of consumable parts. The BG launched the nation's first lithium-ion battery forklifts and is now in expansion of their supply. In 2018, it signed an MOU to supply 2,500 lithium-ion battery forklifts to a large Korean distribution company. Furthermore, it has introduced a hazardous substance management system in collaboration with Korea Institute of Industrial Technology to manage hazardous chemical substances in products. In 2017 and 2018, BG completed the 3rd registration of European REACH³⁾ by operating a committee with relevant departments and partners.

- 3) Total allowable entry of substances of very high concern into Europe used to be 100 tons per year, but this volume was reduced to 1 ton per year as of June 1, 2018.

In 2017, Mottrol BG has established plans and objectives for the development of products that meet the requirements of international environmental regulations including REACH and RoHS. It is continually developing eco-friendly materials in 2019. In particular, the use of parts that contain hexavalent chromium was entirely prohibited starting 2017. In response to the EU standards that will prohibit the use of parts with lead content exceeding 0.1wt% from 2024, BG has selected the development of 'eco-friendly lead-free copper alloy materials' as the new technology development task.

Fuel Cell BG develops and manufactures eco-friendly products that produce electricity, water, and heat through electrochemical reaction of hydrogen extracted by various means with oxygen. In comparison to conventional power generation sources such as coal, the new products emit small amounts of air pollutants like CO₂, NOx and SOx. The products include a LNG⁴⁾ Model that uses hydrogen extracted from natural gas, H₂ Model that uses pure hydrogen gas, and LPG Model that uses hydrogen extracted from LPG⁵⁾. The fuel cell business for power generation will expand its eco-friendly product portfolio in line with the hydrogen economy road map of the government by developing a triple-generation system that can produce electricity, heat, and hydrogen in 2019. In addition, The BG recruited more R&D staff and installed evaluation equipment to strengthen the R&D competencies on fuel cell systems for houses and buildings. New fuel cells (10KW/5KW) with increased performance and cost competitiveness were also developed based on the existing fuel cell (10KW). In order to secure reliability of products,

BG plans to focus on developing technologies that can extend the service life of core parts such as stacks and reformer inverters. In 2018, overall power generation efficiency of the 10KW/5KW fuel cells exceeded 90% and the performance and service life of filters were more than doubled. Additionally, product size was reduced to minimize the installation area.

- 4) Liquefied Natural Gas
- 5) Liquefied Petroleum Gas

Bio BU develops and manufactures all products using natural ingredients (soybeans, eggs, etc.) and eco-friendly technologies, constantly expanding the eco-friendly product portfolio in the fields of pharmaceutical, food and cosmetic materials. In addition, it makes consistent investments in high value-added and eco-friendly biomaterials by securing new technologies including AI-based enzymes and eco-friendly fermentation to grow into a global health and beauty company. Products are manufactured in GMP-certified facilities, and the entire process from raw materials to final products is subjected to strict control. It guarantees the provision of a safe and healthy working environment by obtaining PSM⁶⁾ and ISO 14001 certifications. Also, Bio BU continues its efforts to enhance eco-friendliness of products by verifying genetic modification of main ingredients and minimizing the use of solvents. With such efforts, our company has obtained 4 ECOCERT and 4 REACH certifications as of 2018 and will continue to expand the scope.

- 6) Process Safety Management

Customer Satisfaction·Quality Management

Customer Communications

Customer Communication Channels

Doosan strives to strengthen management of customer satisfaction by expanding communication channels with customers and reflecting customers' opinions. As part of a drive to reduce the number of customer complaints, Electro-Materials BG promoted various Q-Day activities on a weekly basis at the initiative of the quality department. On Q-Day, BG carries out activities to discuss improvement plans while sharing issues related to customers and internal quality. The number of VOC cases decreased by 34% in 2018 compared to the previous year and exceeded the desired value of 30%.

Mottrol BG was able to shorten the response time to settle customer claims by improving its system for monitoring the entire process from the receipt of a claim to the final resolution. In addition, it is steadily improving the customers' perception of its product quality by strengthening its network with customer companies at home and abroad and by actively reflecting customers' voice.

Fuel Cell BG ensures that after-sales service requests are promptly processed upon reception through the VOC process. It has also established a system whereby the improvement points identified through the VOC - by operating weekly quality and service meetings - are reflected in both product improvements and the development of new products. In addition, RCA analysis techniques and cross-functional activities are operated for advancement of the operation system.

Retail BG promotes activities for redressal of customer inconvenience and complaints by using customers' feedback secured from various online/offline channels of the customer contact points. It was found that 46% of the VOCs received in 2018 was related to customer service at shops. With regard to this, Retail BG continuously conducted standardized CS education for sales employees to provide constant service. In addition, Retail BG provides high-quality customer service such as delivering cases through retail POS system. All customer requests received at Retail BG should be handled within 24 hours. To improve the quality of customer experience, Retail BG conducts internal and external monitoring and carries out activities to improve customer responsiveness through CS campaigns.

Bio BU operates a system for monitoring and inspecting all processes from reception of an issue to completion of processing. It is structured such that individual VOCs are classified by their importance and response to the customer is carried out based on the target time of each TAT¹⁾ stage. It shares the step-by-step progress of the received VOC to company employees on a regular basis to raise awareness of the issue at company level and improve the immediate cause. Also in a bid to better manage and support the supply chain, in 2018, the BG visited overseas agencies and conducted trainings, and carried out tours to production sites and trainings on the domestic market and products for overseas sales agents, so they could offer best service to final customers.

1) Turnaround Time: The time required from VOC reception to handling

Protection of Customers' Personal Information

Doosan sets protection of customers' personal information as a key management objective. In particular, Doosan implements its own internal personal information management plans to prevent customers from suffering damages due to leaks of their personal information. In

Importance	Contents	Processing speed	Approval	Comparison
A (High)	A company-level problem that may have an immediate effect on the client's production line if resolution is delayed	Urgent (immediate)	Manager	Handle on the same day
B (Relatively high)	A matter that may have an effect on the client's production line 2-3 days after	Respond quickly	Management representative	2-3 days
C (Average)	If it has no effect on the client's production line but may have a potential effect (ver. 01)	Average	Department manager (team manager)	1 week
D (Low)	Respond after observing the progress is fine	Pending	Department manager (Team manager)	-

TAT management item	Closure criteria	Targets
TAT1 Reception – first reply	Wired/wireless reply	24 hours
TAT2 Reception – arrangement	Arranging the direction of processing VOC details in consultation with the customer	7 days
TAT3 Reception – completion of customer service	Completion of processing the customer request	14 days
TAT4 Reception – completion of improvement	Completion of implementing improvement measures	30 days

development process, it has been possible for us to improve both customer satisfaction and product value. Industrial Vehicle BG holds the monthly "Quality Conference" at which the departments in charge of sales, quality assurance, and R&D get together to discuss how to provide the best products to satisfy customer requirements. In addition, it reflects customers' opinions in its products by operating the quarterly "Product Advisory Group," which is composed of the Sales and Dealer Council at the headquarters, as well as the "Service Manager Meeting" and the "Meeting of Senior Sales Personnel." In addition, it puts continuous efforts in providing the best quality products through improved mass production. To this end, industrial Vehicle BG operates user tests, and has established a prosumer system and diversified channels for listening to VOCs. In 2019, it will develop and implement a QRN (Quick Response Network) platform to accurately and quickly provide services desired by customers using local maintenance companies with outstanding service capability in addition to the existing dealer system. Mottrol BG supplies optimized products through close communication with the customers from the initial review of specifications to the mass-production stage. To that end, BG develops products that reflect customers' opinions through technology exchange meetings, promotion, and development processes.

Similarly, Bio BU develops customized products to meet the target customers' needs (quality and price requirements) through close communication with customers from the initial review of specifications to mass production. In addition, it provides key foreign customers with education on technology exchange and products. It completed the final registration of total four items to the REACH system in 2018, successfully securing material stability and improving customer satisfaction. DDI BU introduced a design thinking methodology to quickly identify and respond to customers' demands. In addition, it carried out education and practices for 100 employees through the training program, and cultivated their ability to perform tasks for clients using design thinking. It supports subsidiaries of Doosan Group through the design thinking methodology for training specialists and identifying the exact needs of customers, and thereby strives to secure customer satisfaction by reflecting design thinking to development and improvement of new products.

Doosan Group

Introduction

Design the Future Spark the Growth

Business & Impacts

CSR Management

- CSR Strategy and Key Activities
- Transparency of Governance-Stakeholder Engagement
- Interview with Experts
- Risk Management
- Anti-corruption-Ethical Management-Fair Trade
- Research and Development

> Customer Satisfaction-Quality Management

> Talent Management

- Environment and Safety Management
- Supply Chain Management
- Social Contribution

Appendix

Classification	Major Activities
Electro-Materials	<ul style="list-style-type: none"> • Deployment of a data-based management system • Application of real-time monitoring of key indicators an early alarm system • Enhancement of quality through analysis of big data
Industrial Vehicles	<ul style="list-style-type: none"> • Task force team activities for enhancing the quality competitiveness of suppliers • ENX activities (SENX¹⁾, 3rd-generation DFSS²⁾ • Enhancement of product competitiveness (DCA³⁾, benchmarking)
Mottrol	<ul style="list-style-type: none"> • Acquired digital inspection certificate issued by suppliers • Quality management level under upgrade; the SPC system linked with suppliers⁴⁾ is being deployed currently
Fuel Cell	<p>For industrial use</p> <ul style="list-style-type: none"> • Production data collected based on statistical quality management • Quality audits performed on key part vendors • Promotion of field VOC analysis and improvement tasks <p>For housing/commercial</p> <ul style="list-style-type: none"> • Improvement of the ppm level of components of defective quality • Reinforcement of initial quality through expansion of the process inspection gate • Gate management and securement of traceability for improvement of field quality
Bio	<ul style="list-style-type: none"> • Setting IPC⁵⁾ standards for major products • Field quality improvement through group activities • Reinforcement of investigation system for investigation of deviation and OOS⁶⁾
DDI	<ul style="list-style-type: none"> • Management of service requests based on standard process • Reinforcement of project audits

1) Speed Engineering-X
 2) Design for Six Sigma
 3) Doosan Customer Audit: Selecting 1-2 vehicles daily from the customer's perspective to evaluate the quality of the finished vehicle based on 170 items such as appearance, etc.
 4) It is being carried out on 39 suppliers in total 3 steps based on the organic sector; 6 suppliers completed step 1 in 2018, 15 suppliers completed step 2 in 2019 and 18 suppliers are expected to expand to step 3 in 2020
 5) In-process Control: All tests, inspections and measurements carried out during the process to product high quality products
 6) Out of Specification: If the test result exceeds the predefined test standard

Quality Management

Enhancement of Quality Management Systems

Doosan Corporation strives to satisfy the quality requirements of its global customers by acquiring the relevant quality certificates. Electro-Materials BG operates its quality management system based on IATF-16949¹⁾ certification. In 2018, technical skill trainings for engineers and benchmarking were conducted through technical exchange meetings with suppliers (9 suppliers, 22 meetings). The BG plans to operate internal group studies for chemical substances, the core of electronic materials in 2019.

As for Industrial Vehicle BG, it introduced a customer-oriented quality assessment system based on the ISO9001 and has been steadily improving programs to enhance suppliers' competitiveness in securing parts of reliable quality.

Mottrol BG operates a quality management system based on ISO9001, and has upgraded its quality management by deploying SPC²⁾ in conjunction with its suppliers. It also responds preemptively to changes in quality management systems. For instance, the BG acquired a certification for the AS9100 Rev. D³⁾ specifications, which were strengthened based on situation analysis and risk-based thinking at the organizational level.

Fuel Cell BG conducts quality management based on ISO9001, KGS Design Group Inspection, KS, and other quality management system certifications. It also reviews the field quality issue VOCs as a core task, and promotes improvement activities.

Bio BU renewed the BGMP⁴⁾ certification through regular audit by the Ministry of Food and Drug Safety and is presently in the process of obtaining the Effic⁵⁾ certification based on ISO9001 and ISO14001:2015.

DDI BU established and operates its quality management system based on ISO9001 and ISO20000 (International Standards for IT service). In addition, it plans to introduce and apply a RPA (Robot Process Automation) system in steps to carry out activities for requesting and handling of system use authority or detecting performance reduction and defects of servers all year round.

- 1) Certification of the latest TS16949, Quality Management System for automotive Industry under ISO9001
- 2) Statistical Process Control
- 3) Certification of the latest AS9100, Quality Management System for Aerospace Industry under ISO9001
- 4) Bulk Good Manufacturing Practice: Standards to be followed in all working processes for manufacturing and quality management of good medical excipients
- 5) The European Federation for Cosmetic Ingredients

Thorough Management of Quality

Industrial Vehicle BG established the Q-Cost management system and manages it effectively by setting 64 internal and external failed cost items. Q-Cost is a loss cost occurring from a quality issue. This system will be operated stably until 2021 through continuous management. In addition, Industrial Vehicle BG introduced a unique problem solving technique through operation of SENX (Speed Engineering-X) education and tasks to improve the capability for solving endemic problems. It also built a mobile app for customers to report quality issues. In 2018, an environment to register mobile-based claims in real-time was established by developing QR App v1.1, and the function for operating a GPS-based QRN (Quick Response Network) was introduced for pilot operation in the Pyeongtaek region. In 2019, the range of support will be expanded globally through increasing user convenience, improving functions, and seeking stabilization by accepting various VOCs.

In 2018, Bio BU successfully performed due diligence on the manufacturing facilities of global clients including Johnson&Johnson, Estée Lauder and Amway, and obtained accreditation for product quality. In addition, the process of obtaining Effic-GMP¹⁾ is under way to enable BU to respond preemptively to the global quality standards; it is expected to be completed in 2019. By establishing RTDB²⁾ and HMI³⁾, parameters will be collected during the process and the correlation of quality data will be analyzed to identify the cause of defects and further stabilize the process quality. The scope of work will be discussed and tests and data collection carried out in 2019, with a plan to apply it in the cosmetics raw material line first and then expand to other processes.

DDI BU adopted an Agile methodology for projects by accepting and applying customer feedbacks for continuous improvement. BU trained 28 scrum masters through education and practices for employees of Doosan Group. The trained scrum masters manage projects based on the Agile methodology, and contribute to enhancing project quality and customer satisfaction.

- 1) European Federation for Cosmetic Ingredients : A certification system combining the quality management system and GMP standards for manufacturers of cosmetic ingredients.
- 2) Real Time Data Base: A program for real time collection and saving of data
- 3) Human Machine Interface: A touch screen to control machine at automobile sites

Talent Management

Employee Communication

Doosan Leader Workshop for Change and Innovation

Starting 2016, Doosan Corporation has been operating a biennial workshop for leaders to discuss ideas about the desirable roles of leaders. 'Doosan Leader Workshop for Change and Innovation' was held over 4 occasions with about 240 leaders during last year, effectively delivering the organizational vision for sustainable growth, and exchanging opinions on methods for meeting members at the eye level.

Conference to acknowledge achievements and share exemplary cases

Doosan Corporation organizes an annual conference to acknowledge achievements and share exemplary cases and lessons learned during the year. This conference was started in 2016 and has turned into an annual event. Awards for Fundamental Competitiveness (R&D/Business Growth), Advancement and Science (OE Advancement/Innovation at Manufacturing Sites), Credo Value, and Doosan Talent Fostering (Executive/Team Leader/Team Member/CA¹⁾) were presented. A winning concert was organized to share members' stories. The conference is an opportunity to motivate members and work toward

better performance of the organization.

1) CA : Change Agent

Education for Overseas Corporations

Doosan Corporation conducts education for overseas subsidiaries in order to establish the way of working based on Doosan Credo. This education strengthens members' sense of belonging by linking strengths of individuals to the organization and ensuring participants' involvement in discussions on the future image of the organization. Doosan Corporation will continue its efforts to create its future in cooperation with members by overcoming regional boundaries.

Labor-management Culture Based on Mutual Trust

Doosan Corporation strives to maintain harmony and communication between labor and management by holding an annual labor-management workshop and operating a foot volleyball event managed by the labor union. In addition, it is creating a win-win labor-management culture based on mutual understanding and trust through monthly business presentations to help employees understand business operations.

Fostering Talent

Leadership Education

Leadership Enhancement Program for New BG Team Leaders

Doosan Corporation is a unique organization whose holding company manages a variety of businesses. The recent growth of Doosan Group was led by new business organizations such as fuel cell and duty-free businesses, in addition to the core businesses such as Electro-Materials BG, Industrial Vehicle BG, and Mottrol BG. Accordingly, Doosan Corporation operated a leadership enhancement program to help team leaders stabilize operations of Fuel Cell BG and Retail BG. This program, comprised of 5 sessions of education and workshops, was organized over 7 months from April to October 2018, aiming to help team leaders become aware of critical moment and practice solutions.

MBA Internal Short-term MBA of Electro-Materials BG

Electro-Materials BG operates an internal short-term MBA course for all non-financial team leaders and part leaders to enable them to gain a deep understanding of the company's strategies and enhance financial capability. In 2018, 45 leaders participated in 3 sessions of this course, which allowed them to learn about the strategies and financial significance of Electro-Materials BG's business operations. Leaders who participated in the MBA course evaluated that the course provided a practical and effective learning experience in better understanding theories, products, and businesses under guidance from experts of financing and strategy.

Fifth Term of Junior MBA of Doosan Corporation

The 5th term of Junior MBA Course of Doosan Corporation was organized to enhance long-term perspective and competency of employees and assistant managers who will become leaders in the future. This course is comprised of blended lectures of online and offline on strategy, financing, accounting, marketing, and personnel organization. Participants can gain a broader view of businesses and cultivate professional knowledge through team-based and individual tasks related to business strategies of Doosan Corporation. In addition, a special lecture has been added to introduce employees to the 4th Industrial Revolution, online marketing strategies of leading companies, and technology trends of the time. The last part of the course is a business management simulation that offers a chance to experience corporate management. Members who completed the Junior MBA Course gained a broader view of businesses, and were able to improve quality of their work by utilizing management knowledge. They had an increased sense of belonging as members of Doosan Corporation, and formed a network by interacting with other juniors of different BG/BUs. In the 5th term of 2018, 24 juniors of 8 BG/BU/invested companies under Doosan Corporation participated in the course. Doosan Corporation will continue the Junior MBA Course in 2019 to equip its young employees with an in-depth learning and practical education experience in business administration.

Professional Work Skill Level-Up Course
 Doosan Corporation conducted the 'Professional Work Skill Level-Up Course' to help employees of Retail BG, a unit that recently joined the organization, recognize their roles and improve their way of working. This one-day course was carried out for 15 employees in October 2018. Through this course, trainees were able to understand the systematic work processes and methods based on Plan-Do-See, acquire effective communication and professional skills to be used at the worksite, and practice such skills at work. The participants gained work know-how and shared various concerns of Retail BG's employees. They evaluated the course positively as a practical learning course.

Female Junior Leadership Education
 Women's Council of Doosan Corporation, which has been active since 2015, conducted leadership education to support sustainable growth of 31 female employees and assistant managers in 2018. This program was planned out to enhance competencies and strengthen the sense of belonging of female employees in the manufacturing business, given that the ratio of female employees is low and there are fewer opportunities for female juniors to foster leadership due to the reduced scale of open recruitment of university graduates since 2012. The primary modules of this program include strength management, self-development, communication and empathy. Through the Clifton Strength Finder, the participants were able to understand individual and team strengths and spend time to think about how to maximize strategies and outcomes. They also discussed methods of setting and attaining personal goals utilizing their strengths. The program also provided time to understand the purpose of communication, improve communication skills and emotion control, and promote diversity. The female juniors who participated in the course had often received feedback on weaknesses before participating in the program. They were able to gain stronger will and confidence by understanding and focusing on their strengths through this program. Women's Council of Doosan Corporation will prepare various opportunities for both female and male employees in 2019.

Leadership Education for Technical Personnel
 Doosan Corporation operates a leadership course for technical personnel and leaders to help influential leaders become aware of their proper roles and understand coaching methods. Leadership education for technical personnel was divided into 3 courses including the new site manager course and site manager courses I and II. In 2018, 77 site managers of Electro-Materials BG, Industrial Vehicle BG, Mottrol BG, Fuel Cell BG, and Bio BU

completed this education program. Since leadership is developed through continued practice, periodic follow-up checkups are done based on the action plan and expectations of leaders established prior to the program. The technical site managers who attended this course reported that they found meaning in their work life by gaining self-awareness and creating a cooperative team with their team members. Based on the result, Doosan Corporation will continue to improve and operate the training courses.

Courses for Promoted Personnel of Chinese Corporations
 Doosan Corporation operated a course for newly promoted general managers and assistant managers at Electro-Materials BG Changshu Corporation and Mottrol Jiangyin Corporation in June and July 2018. The course for new general managers was held in Electro-Materials BG Changshu Corporation with 9 personnel attending, and the course for new assistant managers was held in Seoul for 7 trainees. The participants learned about their new roles based on the 3 modules of Lead Self, Lead People, and Lead Work. They also gained various work skills by understanding the integrated values and visions of Doosan Corporation. This course has significance as the very first course operated for promoted personnel of Chinese corporations. The participants from different BG/BU came together to understand Doosan as a whole and gained pride as members of Doosan.

Job Education
Purchase Academy Advanced Course of Doosan Corporation
 Doosan developed a common job education course for purchase personnel in 2018. The Purchase Academy Advanced Course of Doosan Corporation was started out to increase our personnel's capability of responding to the rapidly changing purchase environment. This is the first course for which the entire process including 8 months of development and lectures was handled by purchase personnel of Doosan Corporation. In addition, a case study on a different BG was applied to further increase the applicability of education with practical contents and know-how of internal lecturers.

Based on opinions of purchase personnel, the 1st term of the Purchase Academy Advanced Course was comprised of 4 subjects including negotiation strategy, cost analysis, supplier management, and risk management. This 4-day course was operated for 16 hands-on purchase employees with at least 2 years of experience. The participants of the 1st term presented positive opinions such as "Ample case studies of Doosan Corporation were helpful" and

"Role playing based on actual cases was very effective in understanding the basic concepts." In 2019, two terms of this course will be operated, one in the first half and the other in the second half of the year, by adding various contents and cases.

Education and Conferences on Digital Trends
 DDI BU held a conference for all employees to provide insights into digital trends and help digital transformation of businesses for increased value and competitiveness. In addition, design thinking education was conducted for executives and employees to promote a creative and innovative way of working.

Human Rights Management

Human Rights Policy

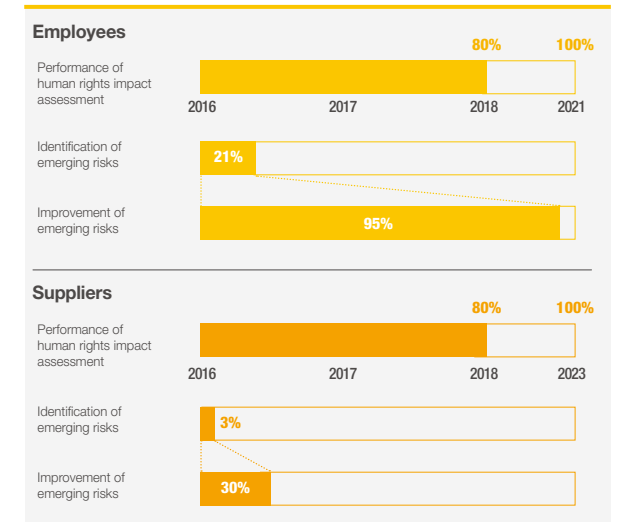
Doosan Corporation respects human rights of not only employees but all stakeholders engaged with its management activities, and advises third parties including suppliers to practice human rights management at the same level. Human rights policy of Doosan stipulates basic human rights guaranteed regardless of origin, gender, ethnicity, or other conditions. As a member of UN Global Compact, we abide by the 10 principles of Global Compact in areas of human rights, labor, environment and anti-corruption, and operate human rights management practices and due diligence based on the principles of human rights that are internationally recognized such as Universal Declaration of Human Rights and UN Guiding Principles on Business and Human Rights: Ruggie Framework.

Human Rights Management Practice and Due Diligence System

Doosan operates a human rights management system to prevent human rights violations that may occur in the business processes including the supply chain as follows. Through human rights impact assessment, we actively identify potential human rights violation issues in areas of grievance mechanism, discrimination, forced labor, wage, working hours, child labor, freedom of association, consumer human rights, information security, privacy, and continue to apply improvement activities.

Human Rights Impact Assessment

Doosan conducts assessment on all BG/BUs to investigate negative impacts and major vulnerable areas related to human rights issues. Human rights impact assessment is conducted in priority order by analyzing human rights risks, the gravity of human rights risk issues and business activities by countries in which Doosan's businesses are present. Approximately 80% of branches based on the total number of employees have been assessed in the last 3 years and we aim to complete 100% by 2021.



Human Rights Management Practice and Due Diligent System

01. Commitment

Human Rights Policy

04. Performance Assessment & Disclosure

Review and report of human rights management assessment

- Outcomes and results of impact assessment
- Investigating the vulnerable areas identified
- Records of employee risk prevention actions
- Records of supplier risk prevention actions

Disclosure of Human Rights Management

- Results of grievance reporting
- Results of corrective actions
- Number of legal actions and financial impacts
- Results of external sustainability evaluation

02. Risk & Impact Assessment

Preparation of Company-wide Human Rights Assessment System

1. Establishment of assessment areas
 - Human rights management/employment/prohibition of forced labor/prohibition of child labor/assurance of industrial safety/supply chain management/protection of human rights of local residents/ensuring of environmental rights/protection of consumer human rights, etc.

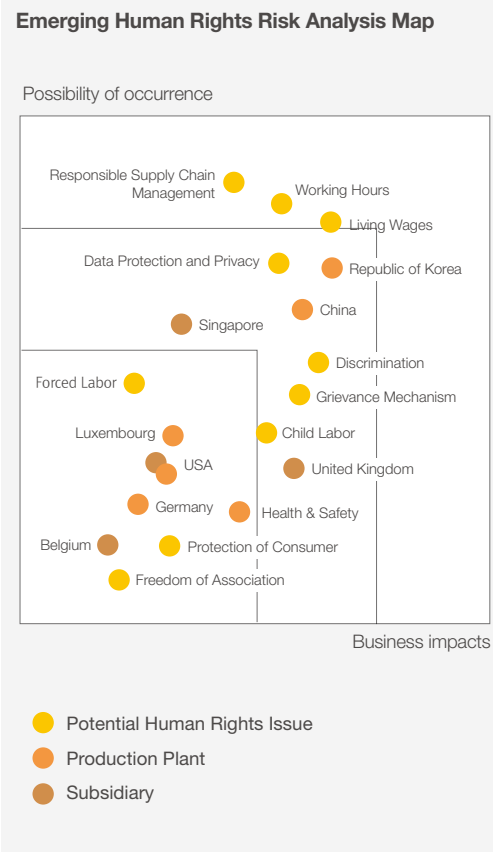
2. Establishment of assessment scope
 - BG/BUs, subsidiaries, overseas branches, etc.
 - Employees, suppliers, JV, etc.
3. Establishment of assessment period & plan
 - Short-term/long-term performance of all BG/BUs
 - Performance plan for the concerned year
4. Summarization of assessment results
 - Mapping of business risks, regional risks
 - Investigation of main vulnerable areas

03. Preventive & Mitigating Actions

Plan for risk prevention measures based on assessment result

1. Institutional solution of susceptible area
 - Systematic and regulatory supplementation
2. Education and communication
 - Educational planning and performance

Doosan analyzes human rights risks and their gravity by country and issue for all branches around the world as below. Emerging risks related to Asian countries (Republic of Korea, China, etc.) in terms of regions, operation and supply chain of our company, in terms of the value chain, and working environments (working hours, wage, discrimination, grievance procedure, etc.), and in terms of issues are classified as high. We put in our best efforts to identify and resolve these emerging risks.



Preventive and Mitigating Actions

For key emerging risks found through human rights impact assessment, we take improvement activities according to a timeframe that is set based on the risk matrix. In addition, we carry out preventive and mitigating actions through various programs including institutional solution, education, campaigns, etc. on the vulnerability areas, which are identified from the overall assessment result analysis.

In 2018, we implemented improvement of the system for better work & life balance such as management of working hours, expansion of the flexible working system, increased employment of the disabled, management of working hours and enhanced monitoring of human rights management of suppliers.

In addition, we newly introduced education for improving perception on the disabled to strengthen awareness on human rights management. We select human rights topics every month and encourage our employees to actively pursue positive behaviors in order to establish a culture for mutual respect.



Human rights management campaign

Grievance Process

Doosan introduced a grievance mechanism as an early warning system to obtain information related to human rights. We operate the Ombudsperson program and various grievance channels to provide the necessary help by offering counseling on complaints raised by employees. Each program provides an opportunity for members to work with appeals based on three principles of grievance redressal: anonymity protection, prevention of disadvantage and feedback. In 2018, DDI BU assigned dedicated ombudsman for the Changwon region and brought suppliers under its umbrella to reinforce grievance settlement. Doosan will continue to improve the grievance redressal process by strengthening the grievance system, expanding the number of ombudsmen, and educating counselors.

Environment and Safety Management

Environmental Management

Response to and Monitoring of New Environmental Regulations

Global public awareness of and an interest in environmental issues such as environmental pollution, water shortages, natural disasters and climate change have increased significantly over the years. Along with this interest, efforts such as policies and regulations to solve problems are continuing at the national level. In particular, the importance of environmental management of companies is heavily emphasized upon. In this regard, Doosan has deployed an environmental management system designed to minimize the impact of company business on the environment. It preemptively responds to government regulations and trends by steadily monitoring business activities and surveying their impact on local communities. Furthermore, the company has conducted in-depth expert research to secure essential EHS capabilities and enhanced its execution ability through its participation in EHS participatory activities.

Stewardship of Hazardous Chemical Substances

Doosan Corporation strives to create a safe and clean workplace through a tighter management of hazardous chemicals. Electro-Materials BG has obtained a business license for harmful chemical substances in order to comply with the laws and regulations of chemical substances, and conducts statistical and emissions surveys on a regular basis, in accordance with the legal requirements. Employees of all worksites periodically attend education courses on the safe handling of chemical substances, and the importance of systematically wearing personal protective gear. In addition, the company has continuously invested in facilities to comply with all chemical substances management laws in its business sites. In 2018, leak and gas detectors were installed at all major hazardous chemical handling facilities and processes. In 2019, factory wall improvements are scheduled to meet the legal requirements through continuous improvement. Safe management of chemical substances entering the company complies with all the legal procedures, by checking the material information of imported chemicals. In 2018, the company strengthened its management level by management surveys to identify issues and establish improvement measures.

Control of Air Pollutants

Doosan keeps the atmospheric pollutant emissions generated at its worksites below 50% of the standard allowed under the relevant statutes. In particular, Electro-Materials BG regularly conducts self-measurement of major pollutants twice a month and plans to further measure the pollutant emission concentration and improve facilities as the air pollutant emission standards get strengthened, starting 2020. Mottrol BG measures the replacement period of activated carbon in the environment pollution prevention facility to reduce THC¹⁾ and fine dust, and replaces it when the emission limit reaches 50%.

1) THC (Total Hydrocarbons)

Management of Water Use and Effluents

Electro-Materials BG manages water resource risks to reduce the risks related to depletion of water resources and maintenance of a stable water supply. It also maintains the density of water pollutants in final effluents below 50% of the current standard. Bio BU Iksan Plant has invested KRW 300 million to reduce pollutant concentrations in wastewater, and changed the wastewater treatment method from the biological treatment to the combination of biological treat-

ment and MBR method¹⁾, reducing the concentration of COD and SS, measures of waste water pollutants, by 70% (65ppm → 19ppm) and 90% (70ppm → 5.6ppm), respectively, compared to those of previous levels.

1) MBR method: Membrane Bio-Reactor

Environmental Investment Management

Doosan Corporation operates a system for the management of environmental expenditure to internalize its environmental management system. Its environmental investments are mainly focused on installing or replacing pollution prevention or environmental protection facilities and on constructing wastewater treatment stations and waste storage warehouses. In 2018, Electro-Materials BG invested KRW 360 million in wastewater treatment plant maintenance, with the replacement of filter/ filter media (at Jeungpyeong plant), also the replacement of wastewater treatment plant panels, along with improvement of ventilation of mixing equipment (at Gimcheon plant), washing booth and adsorption tower. Mottrol BG invested KRW 890 million in the improvement of environmental pollution prevention facilities of its painting facilities to comply with the THC emission allowance standards for responding to the strengthened environmental regulations.

Waste Management

To reduce the volume of discharged waste, Doosan separates its wastes according to its nature and state, and then legally treats them under its "Allbaro System"¹⁾. For the legal treatment of wastes generated by various processes, Doosan periodically educates and evaluates the vendors responsible for treating these wastes. It also maintains consistent efforts to reduce the volume of wastes discharged by its processes. Electro-Materials BG reduced waste by about 13% (10,868 tons in 2017, 9,428 tons in 2018), and waste treatment costs by about KRW 357 million, compared to those of 2017

1) Allbaro System: As the IT-based waste management system of the Korean government, it controls the entire set of processes for waste management, right from discharge to transportation, to the final treatment.

Response to Climate Change

Doosan regularly discloses information related to the greenhouse gas emissions of its facilities and controls them according to the IPCC¹⁾ Guidelines and the government's own guidelines. Doosan's statements of its greenhouse gas emissions and energy consumption and its plans for monitoring them are verified by a third party each year. In particular, the company set reduction targets for its workplaces and has steadily promoted energy saving and greenhouse gas reduction activities to achieve the targets given by the government, as the regulatory targets are shifted from the GHG emission trading system to the target management system in 2018. Mottrol BG reduced costs and greenhouse gas emissions by the replacement of old air conditioners (76tCO₂), the installation of cooling/heating remote control system (108.2 tCO₂), the installation of cooling tower automatic on/off system (KRW 17.4 million, 99.7 tCO₂), and the addition of cooling fan automatic on/off function (KRW 6.5 million, 37.4 tCO₂).

1) IPCC (International Panel on Climate Change)

Health and Safety Management

EHS Leadership Activities

Doosan Corporation has strengthened voluntary EHS management among the heads of its organizations, based on the top management's deep interest in and support for EHS. All the leaders personally perform diverse EHS leadership activities, including field EHS inspections, safety dialog, and EHS meetings. Through these measures, there has been an effective increase in the safety awareness of all its employees, thus contributing to the prevention of safety accidents at its worksites.



EHS leadership activity (Video message of management related to EHS)

Creating Safe Worksites Together

Doosan Corporation has deployed a mutual cooperation system with our suppliers in order to establish safe and healthy worksites. In 2018, Electro-Materials BG's Iksan and Gimcheon plants, Industrial Vehicle BG, and Mottrol BG participated in the "Win-Win Safety and Health Cooperation Program" systematically operated for a total of 23 suppliers, which included safety and health-related education and support for hazard assessment.



Health and safety training for employees

Enhancing Employee Health

Doosan Corporation conducts periodic health examinations to enhance the health of its employees, as well as those of its suppliers. It strives to protect their health by providing steady health counseling and effective tracking and management of those suspected to be suffering from illnesses. It has developed and operates diverse health enhancement programs for its employees, including a quit-smoking fund, an anti-obesity program, and a healthy diet management program. In addition, it actively operates preventive programs for health promotion. It closely works with areas related to mental health, including stress assessment and counseling.

Basic Compliance with EHS Rules

All of Doosan Corporation's worksites carry out activities designed to ensure basic compliance with the EHS rules and prevent the recurrence of safety accidents caused by non-compliance with those rules. They select items that must be observed without fail in order to prevent accidents, based on risk assessment of the worksite and process at hand. By linking them to periodic education, publicity, inspection, and citation, all employees are naturally encouraged to comply with the safety rules, with an advanced level of safety awareness.

EHS Session for Field Managers

Doosan Corporation has conducted an EHS Session for its field managers who are the EHS leaders in the field. They understood the role of field managers to communicate more smoothly with EHS-related issues to employees, watched a movie about leadership, and discussed on how to encourage voluntary action to settle the EHS culture. Opportunities for benchmarking were provided to share best practices from other business sites.



EHS session for field managers

Response to ISO45001 Certification

In March 2018, the occupational health and safety management systems (ISO45001:2018) was officially established. Unlike the procedure-based OHSAS18001, ISO45001 is based on a process, allowing for systematic operation management. Doosan Corporation is preparing to change its existing OHSAS18001 to ISO45001. Thus far, Industrial Vehicle BG has already completed the certification transition.

Protection of Customer Service Workers

Doosan Corporation established a customer service worker manual to raise awareness of protection for customer service workers and to create a desirable distribution culture in which customers and employees respect each other. The company has declared the Customer Service Worker Protection policy, operated both resting facilities and counseling room to reduce their stress, and provided preventive activities such as posting employee protection instructions, promoting activities, and establishing complaints offices for difficulties in treatment. In addition, preventive measures are provided to deal with customer abuse or assault for a customer service worker.

Supply Chain Management

Supply Chain Management

Supply Chain Status

Doosan operates various businesses involving machine, materials, distribution and so on. Each business division selects key supply chains according to the business environment and purchase strategy. The key supply chains are managed every year according to the trade volume considering the strategic importance and trade connections of the trade items.

Supplier classification		Number of suppliers	Purchase percentage
Tier 1	Total	1,822	100%
	Materials	338	22%
	Machinery	999	73%
	Others	485	6%
	Key suppliers	181	48%
Tier 2	Key suppliers	52	-

Geographical Classification	Purchase Percentage
Korea	65%
Japan	16%
China	7%
Asia, Pacific	9%
Others	3%

Management of a Sustainable Supply Chain

Doosan has enacted and applied the Guideline for Sustainable Supply Chains for suppliers since 2015 in order to secure a sustainable supply chain. This Guideline includes contents related to labor and human rights, safety and health, environment, ethics and fair trade, general management, posting of guidelines and compliance, etc. and the full text can be found in the Doosan e-procurement website.

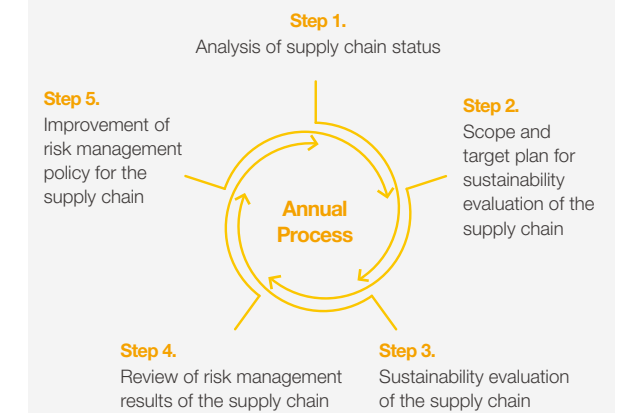
All companies that wish to have business with Doosan must perform self-diagnosis including an evaluation of sustainability. A company that meets the criteria set by our company may open trade with us, and the possibility of renewal is determined through regular sustainability self-checks in the areas of ethics/general management, labor/human rights, health/safety and environment.

The candidate group of key suppliers is shortlisted according to purchase strategies, and key suppliers are selected based on the result of regular evaluation that includes the sustainability item each year. For the risks found in the evaluation process, separate field diagnosis and improvement plan are carried out.

Field diagnosis was conducted on 38 companies in the last 3 years, and the improvement plans were implemented on 14 companies.

Doosan aims to achieve complete sustainability evaluation of the entire supply chain and eliminate sustainability risks of key suppliers by 2025.

Sustainability Management Process



Sustainability Evaluation Status

Classification	Evaluation of Sustainability risks	Site visits	Improvement activities
2016	447	7	-
2017	1,351	11	3
2018	227	20	11

Supply Chain Evaluation Items

Classification of supplier	Item	Percentage
Performance evaluation	Quality, delivery, unit price, finance, etc.	50%
Due diligence evaluation	General management (quality management, purchase, technology, etc.)	30%
	Sustainability (labor/human rights, EHS, etc.)	20%

Sustainable Purchase Strategy

For management of sustainable supply chains, Doosan identifies worksites with high possibility of causing environmental accidents/pollutions or violate environmental regulations; worksites with high possibility of employees and stakeholders causing/suffering legal/physical damage through issues/accidents related to human rights/safety/ethics; and worksites that cannot carry out normal operations due to sanctions or punishments, as high-risk worksites.

Based on the defined risks, Doosan establishes a purchase strategy that reflects ESG elements in addition to quality, delivery and price in order to enhance sustainability of supply chains. This purchase strategy selected fair trade and stability of the working environment as key items in addition to traditional elements to maintain sustainable supply chains. Doosan intends to increase transparency by spreading a climate conducive to fair trade within the supply chains. This will lead to trust of the entire supply chain in compliance, and enhance the integrity of the supply chains.

Since 2004, Doosan has operated the Compliance Program and conducted the Code of Conduct Compliance Survey (226 suppliers responded in 2018) for key stakeholders of supply chains. In addition, we operate a hotline (080-850-3398) for open communication with suppliers. Creating a safe working environment is one of our most important strategic goals. This can increase the safety of supply chains and ultimately enhance sustainability of the entire supply chain by eliminating quality costs, supply-demand setbacks, etc. caused by accidents.

Doosan has been operating the Coexisting Cooperation Program (23 companies in 2018) for safety management of suppliers' workplaces in order to increase quality, price and delivery competitiveness of supply chains. In addition, for suppliers found with vulnerabilities as the result of sustainability evaluation, we visit the sites to assess the vulnerability and help them to better the working environment through improvement activities.

Supply Chain Management Goal (KPI)

Doosan Corporation aims to achieve a sustainable supply chain by Supplier Sustainability Assessment Program (SSAP), purchase agreement based on ESG, and improvement in employee's awareness of the supply chain. We have established an evaluation system, SSAP, to conduct in-depth diagnostics for key suppliers. SSAP assessment has been conducted for 145 suppliers, which is 80% of our suppliers, over the past three years.

Doosan Corporation is committed to expand agreements based on ESG elements. Although the three-year assessment index has declined due to the increase of new suppliers including foreign companies, we plan to expand our

total ESG-based purchase by 80% by 2023 through active ESG propagation activities and policy reflection. Doosan Corporation continues to expand ESG training for purchase personnel in order to strengthen its sustainable supply chain. As a result, ESG training rate for purchase personnel was 89% in 2018, and will achieve 100% in 2021.

Classification	2016	2017	2018	Total
SSAP Execution	121 suppliers	123 suppliers	127 suppliers	147 suppliers
Purchase based on ESG	63%	62%	59%	59%
ESG training rate for purchase personnel	59%	74%	89%	

Management of Conflict Minerals

Doosan Corporation had devised and implemented various supply chain policies in connection with products and parts containing relevant minerals or the actual minerals in order to participate in the international community's efforts concerning conflict minerals.

Based on our conflict mineral management policies, we preferentially identify products that may include 3TG (Tantalum, Tungsten, Tin and Gold). We request our suppliers to verify the place of origin based on BOM¹⁾, and we were able to confirm that no conflict mineral is used in the verified product group (application components of industrial vehicles, casting materials, etc.).

Doosan will continue to carry out monitoring on the possible presence of 3TG in BOM from the R&D step and reinforce the process of verifying the place of origin.

1) Bill of Material

Enhancement of Suppliers' Competitiveness through Reforms

Doosan Corporation pursues diverse win-win activities to enhance the product competitiveness of its suppliers, including the provision of education by experts and the transfer of problem-solving methods. In particular, Industrial Vehicle BG has fostered a culture of win-win cooperation by improving the suppliers' factory environment and sharing its inventory control know-how and outcomes, and by forming internal task force teams in cooperation with the Korea Productivity Center. As a result of these efforts, the productivity and process quality of ten suppliers has improved significantly in the past three years.

Doosan provides new business opportunities to domestic suppliers by continuously supporting localized development. In Fuel Cell BG, we promote localization for the fuel cell system that has been heavily dependent on imports. Based on this, we provided approximately KRW 17.2 billion worth of new business opportunities to local suppliers since 2017.

Social Contribution



'Time Traveler' Program for Nurturing Youth

Launched in 2012, the Time Traveler program is Doosan Corporation's representative program supporting education on photography and humanities education, with a view to nurturing youths and inculcating upright values.

In 2018, we diversified curricula by expanding the fields of human studies including photography, video making, literature, and the environment. Along with 120 youths from low-income families, we newly supported 68 youths with disability. Participating students hosted an exhibition with the photographs they took along with essays. We were able to see positive emotional changes through effectiveness measurement conducted by an expert.



Employee Funding Programs: 'Youth Start' and 'Mother's Future'

We operate a scholarship program and single mother self-sufficiency support program, which are selected through the Employee Funding Committee. These funding programs are operated with the contributions collected from employees and the company's matching grants.

'Youth Start', the 2018 scholarship program, provided approximately KRW 100 million of scholarship to 39 students in underprivileged surroundings to enable them continue their studies. In addition, we support continued growth of students through mentoring activities jointly with employees.

'Mother's Future', which is a program for supporting self-sufficiency of single mothers, offers employment and job education expenses to 53 single mothers who are raising their children under social prejudice and economic difficulties. Through sectoral coaching and mentoring supports, 23 beneficiaries succeeded in obtaining qualification and finding a job.

Sharing Tea with Love

Sharing Tea with Love is a CSR program that has continued for 28 years since 1991, delivering warmth to soldiers serving on the front line. We delivered 8,000 boxes of instant coffee and donation money in 2018, and the total number of tea cups delivered to 360 military camps around the country so far reached 38.5 million.

'Woori Doori' Sports Program for Youths with Disability

'Woori Doori' started in 2016 is a sports program for helping youths with development disabilities to build physical strength and improve social skills through T-Ball, which is a new sport similar to baseball.

For youths with disabilities in Seoul, Incheon, Iksan, and Changwon areas where Doosan subsidiaries are located, a group of volunteers composed of Doosan employees and college students participated in the program and offered T-Ball coaching. In 2018, 123 youths with disabilities availed the coaching; further, they gathered together at the end of the year for a sports day to compete on T-Ball and experience a variety of new sports.

As the result of effectiveness measurement conducted by expert professors, we were able to see positive changes in sports ability and social skills of youths with disabilities, and employees who participated as volunteers also showed a high level of satisfaction and intention to participate again.



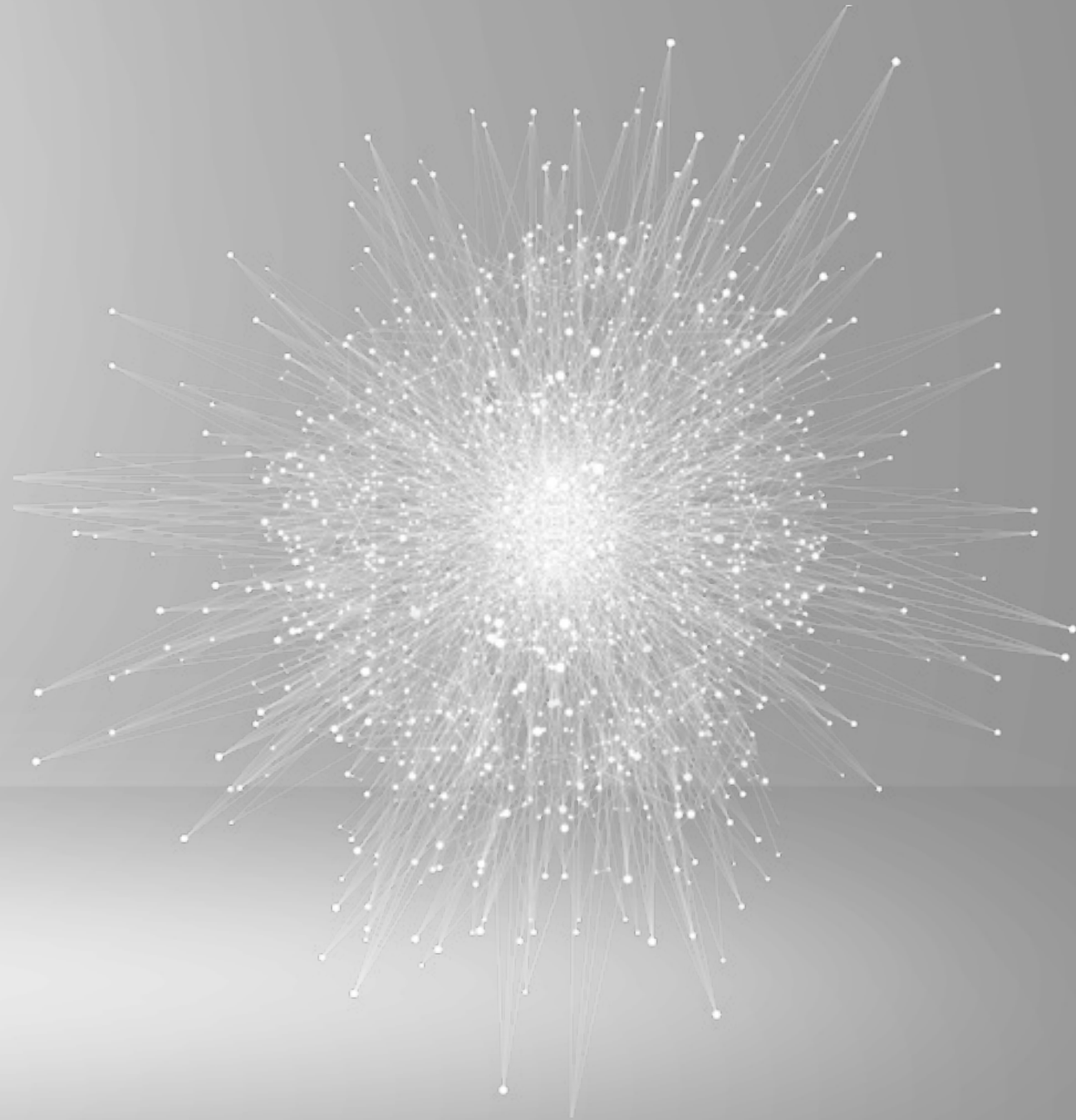
'Dadok-Georim', a Reading Support Program

DDI BU operates 'Dadok-Georim', a reading support program for children at child-care institutions to promote their intellectual and social development.

In 2018, reading teachers and employees volunteered at Eden I Ville located in Seongdong-gu, Seoul and provided fairy tale narration and making/drawing activities related to the books to seven children. They also built a mini library to provide an opportunity for children to get more familiar with books. Children who participated in Dadok-Georim showed cognitive development, enhanced creativity, development of language skills, and better anger control, and reduced need for emotional therapy.

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Economic Performance

Financial Performance

Category		Unit	2015	2016	2017	2018
Balance Sheet	Total assets		3,478,223	3,744,673	3,950,029	4,734,223
	Current assets		713,534	810,638	980,974	1,176,134
	Non-current assets		2,764,689	2,934,035	2,969,055	3,558,089
	Total liabilities		1,368,966	1,632,123	1,750,271	2,428,715
	Current liabilities		870,354	1,042,961	1,319,120	1,404,103
	Non-current liabilities		498,612	589,161	431,151	1,024,613
	Total equity		2,109,256	2,112,550	2,199,759	2,305,508
	Capital		134,838	134,838	134,846	134,846
	Capital surplus		668,082	678,233	680,215	734,169
	Other capital adjustments		-426,551	-428,592	-395,601	-343,557
	Other accumulated income (loss)		42,963	39,338	48,546	137,013
	Earned surplus		1,689,925	1,688,734	1,731,753	1,643,037
	Total liabilities and equity		3,478,223	3,744,673	3,950,029	4,734,223
Income Statement	Operating income	KRW Million	1,873,556	2,067,136	2,624,829	2,919,401
	Sales		1,759,222	1,887,802	2,530,569	2,822,149
	Dividend profits		114,334	179,334	94,260	97,252
	Operating expenses		1,660,155	1,841,764	2,348,072	2,666,038
	Cost of sales		1,377,076	1,476,840	1,932,771	2,163,103
	Selling, general, and administrative expenses		283,079	364,924	415,301	502,935
	Operating profits		213,401	225,371	276,757	253,363
	Non-operating profit		44,342	42,678	90,329	45,221
	Non-operating profits		97,708	113,753	114,347	115,898
	Net income before income taxes		160,035	154,297	252,739	182,686
	Corporate tax expenses		36,711	495	47,638	24,073
	Income from continuing operations		123,324	153,802	205,100	158,613
	Income/Loss from discontinued operations		0	0	0	0
Net income		123,324	153,802	205,100	158,613	

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Credit Rating					
Category		2015	2016	2017	2018
Credit Rating	Korea Investors Service, Inc.	A	A	A	A
	Korea Ratings Corporation	A	A	A	A
	NICE Information Service Co.	A	A	A	A

Distribution of Economic Outcomes					
Category	Unit	2015	2016	2017	2018
Investors	Interest expenses	382	382	423	566
Shareholders	Dividend	723	913	1,004	1,771
Customers	Sales (excluding dividend payouts)	17,592	18,878	25,306	28,221
Suppliers	Purchasing expenditure (excluding tax-exempt items)	10,718	13,003	14,416	14,623
Employees	Salary, severance pay, benefits, etc.	2,674	2,896	2,857	3,079
Government	Taxes and utility charges, corporate tax expenses	408	44	516	335
Local Community	Donations, expenses related to corporate community involvement	171	74	73	57
Total		32,668	36,189	44,595	48,653

*The cost for the local community category may vary from the previous report due to changes in internal data collection methods.

R&D						
Category	Unit	2015	2016	2017	2018	
R&D	R&D investments	KRW 0.1 Billion	453	630	880	875
	R&D investment to sales	%	2.6	3.2	3.7	4.4

Customer Satisfaction					
Category	Unit	2015	2016	2017	2018
Customer Satisfaction Index (Electro-Materials BG)	Points	3.5	3.5	3.5	3.9
Customer Satisfaction Index (Mottrol BG)		3.4	3.8	3.6	3.7

Anti-corruption/Ethical Management						
Category	Unit	2015	2016	2017	2018	
Ethical Management	Education Hours per Capita	Hours/ Persons	1.8	1.0	1.0	0.9
Education	Education participants	Persons	1,890	2,295	2,056	2,231

Sustainable Supply Chain						
Category	Unit	2015	2016	2017	2018	
Sustainability of Supply Chain	No. of key suppliers	Suppliers	365	342	235	180
	No. of suppliers subject to sustainability assessment		-	121	123	127
	Total purchases from suppliers		10,718	13,003	14,390	14,623
	Purchases from key suppliers	KRW 0.1 Billion	7,367	7,474	9,668	6,942
	Total purchases from SMEs		5,059	6,309	6,930	7,093

Environmental Performance

Environmental Efficiency

Environmental Investments (Domestic/Overseas)						
Category	Unit	2015	2016	2017	2018	
Environmental Investment and Expenses		KRW 0.1 Billion	80.2	101.2	88.2	110.7
	Domestic		52.8	72.6	61.9	70.4
	Overseas ¹⁾		27.4	28.6	26.3	40.4

1) Scope of overseas data collection has expanded: Changshu, CFL, DLE, DIVC, DMJC, DFCA

Air Pollutants ²⁾					
Category	Unit	2015	2016	2017	2018
NOx Emissions	Tons	56.7	58.2	55.4	65.8
SOx Emissions		0.3	1.2	1.0	2.0

2) The figures for 2018 include data from Oversea Corporation (Changshu). However, CFL, CFAPZ, DLE, DIVC, DMJC, and DFCA are not subject to measurement. NOx and SOx emissions are not applicable.

Water Use (Domestic/Overseas)						
Category	Unit	2015	2016	2017	2018	
Total Water Use		1,008	967	1,011	1,042	
Domestic	Total	Thousand Tons	559	500	515	502
	Water supply		383	427	457	360
	Groundwater		176	73	58	83
	All other sources		0	0	0	0
Overseas ³⁾	Total		449	467	496	540
	Water supply		379	414	416	444
	Groundwater		0	0	0	0
	All other sources		70	53	80	96

3) Scope of overseas data collection has expanded: Changshu, CFL, DLE, DIVC, DMJC, DFCA

Discharge of Wastewater						
Category	Unit	2015	2016	2017	2018	
Discharge of Wastewater	Total	Thousand Tons	401	415	413	433
	Domestic		181	168	179	184
	Overseas		220	247	234	249
Chemical Oxygen Demand (COD)	ppm	20	21	22	32	
Biochemical Oxygen Demand (BOD)		12	18	16	17	

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Consumption of Resources						
Category		Unit	2015	2016	2017	2018
Consumption of Key Raw Materials	Total	Tons	52,121	56,588	65,097	80,766
	Copper foil		6,651	6,501	5,634	5,062
	Glass fabric		17,852	20,125	18,042	16,920
	Epoxy resin		10,190	10,066	9,679	11,441
	Steel plate		3,993	3,503	4,178	5,120
	Casting materials		13,201	16,196	27,230	41,943
	Egg yolk powder		99	104	124	92
	Ethanol		26	19	56	41
	Acetone		37	32	106	78
	Steel use stainless plate		32	19	21	31
	Steel use stainless tube		9	5	6	9
	Steel sheet		31	18	21	29
	Use of Recycled Materials		Consumption	Tons	56	45
Rate of consumption		%	34.6	28.8	49.0	49.0
Waste Generation (Domestic ¹⁾ /Overseas ²)						
Category		Unit	2015	2016	2017	2018
Waste Generation			19.4	18.1	18.0	17.3
Waste Generation by Type	Domestic	Total	16.6	15.1	14.7	13.7
		General waste	8.7	8.1	6.3	6.7
		Designated waste	7.9	7.0	7.5	7.3
	Overseas	Total	2.8	3.0	3.3	3.6
		General waste	1.9	2.0	2.2	2.2
		Designated waste	0.9	1.0	1.1	1.4
Waste Generation by Discharge Method	Domestic	Recycle	10.4	9.7	10.3	11.0
		Landfill	1.0	0.7	0.5	0.3
		Incineration	5.2	4.7	3.0	2.5
	Overseas	Recycle	2.7	2.8	2.8	2.8
		Landfill	0.03	0.03	0.2	0.2
		Incineration	0.1	0.2	0.3	0.6

1) Korean waste emission figures may differ from those reported in the past due to changes in the method of calculating emissions of Doota building and Yeongang building

2) Scope of overseas data collection has expanded: Changshu, CFL, CFAPZ, DLE, DIVC, DMJC, DFCA

Climate Change

GHG Emissions (Domestic/Overseas)						
Category		Unit	2015	2016	2017	2018
Total GHG Emissions			165.6	172.4	189.8	179.1
GHG Emissions	Domestic	Total	77.5	81.6	86.0	83.5
		Scope 1	29.2	28.9	25.1	23.4
	Overseas ¹⁾	Scope 2	48.3	52.7	60.9	60.1
		Total	88.1	90.8	103.8	95.6
		Scope 1	10.5	10.1	8.9	8.3
		Scope 2	77.5	80.6	94.9	87.3
GHG Intensity (GHG Emissions/Sales)	Total		7.8	7.4	6.4	5.9
	Domestic	tCO ₂ e / KRW 0.1 Billion	4.4	4.3	3.4	3.3
	Overseas		24.7	20.2	23.3	16.3
GHG Emissions by BG	Electro-Materials		138.2	139.9	151.1	147.4
	Industrial Vehicle		4.3	4.2	6.2	6.1
	Mottrol		7.5	7.5	9.1	10.2
	Fuel Cell		7.6	9.8	11.1	3.7
	Retail		0	2.7	4.2	3.6
	Bio		1.9	1.9	2.1	2.5
	ETC ²⁾		6.0	6.3	6.0	5.4

1) Scope of overseas data collection has expanded: Changshu, CFL, DIVC, DFCA

* Among the overseas data for 2018, DFCA was excluded owing to credibility issue for the collected data.

2) Including Corporate Center, Administration Center, and DDI

Energy Consumption (Domestic/Overseas)

Category		Unit	2015	2016	2017	2018
Energy Consumption			2,209	2,312	2,442	2,366
Domestic	Total		1,563	1,646	1,725	1,643
	Electricity		995	1,061	1,189	1,185
	Fuel		568	564	481	400
	Others		-	21	55	58
Overseas ³⁾	Total		646	666	717	723
	Electricity		513	533	550	563
	Fuel		133	133	167	160
Energy Intensity	Total		1.0	0.99	0.82	0.76
	Electricity		0.9	0.86	0.68	0.65
	Fuel		1.8	1.50	1.62	1.24

3) Overseas Data Collection Scope: Changshu, CFL, CFAPZ, DLE, DIVC, DMJC, DFCA

* Among the overseas data for 2018, CFAPZ was added, but DFCA was excluded owing to credibility issue for the collected data.

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Social Performance

Talent Management

Composition of Human Resources						
Category	Unit	2015	2016	2017	2018	
Total Employees		3,942	4,165	3,600	3,902	
Employees by BG/BU	Electro-Materials	1,313	1,265	1,251	1,315	
	Industrial Vehicle	535	520	546	585	
	Mottrol	500	484	460	511	
	DDI	486	464	432	453	
	Corporate Office/CC /Administration Center	527	433	292	289	
	Retail	-	327	249	287	
	Fuel Cell	91	223	292	371	
	Bio	70	73	78	91	
Employment Type	Full-time	3,645	3,722	3,541	3,779	
	Contract	297	443	59	123	
Gender (Full-time)	Male	3,703	3,479	3,067	3,142	
	Female	239	686	533	637	
Employees Overseas	Asia	-	-	786	705	
	Europe	-	-	490	680	
	Americas	-	-	646	361	

* Personal resource data are calculated based on the tax payee at the end of 2018 and may differ from the figures reported in the business report.

Employment and Turnover

Category	Unit	2015	2016	2017	2018
New Recruits	Full-time	76	371	259	286
	Contract	163	226	74	118
Employment Diversity	Disabled	37	50	42	47
	Veterans	29	32	44	38
Employment Turnover (Full-time)	%	4.3	5.8	4.7	6.1

Labor Practices

Category	Unit	2015	2016	2017	2018
Ratio of Workers Enrolled with Labor Unions ¹⁾	Persons	78	78.8	79.1	78.8

1) Ratio of employees belonging to the labor unions = Number of employees belonging to the labor unions / Number of total employees

Assessment of Achievements

Category	Unit	2015	2016	2017	2018
Ratio of Employees Who Received Formal Evaluation of Performance ²⁾	%	99.3	99.8	99.8	100

2) For white collars

Health and Safety

Category	Unit	2015	2016	2017	2018
Rate of Occupational Accidents ³⁾	Employees	0.12	0.15	0.25	0.26
LTIFR ⁴⁾	Employees	0.70	0.98	1.38	1.29
	Suppliers	3.14	-	-	0.67
OIFR ⁵⁾	Employees	0.35	0.16	-	0.13

3) Approval criteria for industrial accidents

4) LTIFR (Lost Time Incidents Frequency Rate): Total number of incidents / total working hours * 1,000,000

5) OIFR (Occupational Illness Frequency Rate): Total number of diseases / Total working hours * 1,000,000

Development of Employees' Capabilities						
Category	Unit	2015	2016	2017	2018	
Total Training Expenses	KRW Million	7,328	5,685	4,728	4,802	
Total Training Hours	Hours	243,900	189,532	103,487	118,351	
Training Expenses per Capita	KRW 1,000/ Person	1,859	1,365	1,313	1,464	
Training Hours per Capita	Hours/Persons	118	82	46	49	
Education Status ¹⁾	General education	111	71	35	32	
	Ethical management education	1.8	1.0	1.0	0.9	
	Anti-sexual harassment education	1.2	1.3	1.3	2.6	
	Compliance Program education	4.7	2.1	1.4	0.9	
	Information security education	3.2	5.4	4.6	8.8	

1) The total training hours per person is not equivalent to the sum of training hours per person by specific training course

Parental Leave and Pension

Category	Unit	2015	2016	2017	2018	
Employees who availed parental leave	Employees who took parental leave	36	33	39	56	
	Employees reinstated after taking parental leave	24	24	29	35	
	Employees who worked for 12 months or longer since their reinstatement following parental leave	10	13	20	21	
Pension	Funds under management	KRW Million	102,364	122,749	128,396	150,250
	Defined Benefits (DB)	Persons	3,490	3,329	2,828	3,345
	Defined Contribution (DC)		39	29	39	34

Human Rights

Category	Unit	2015	2016	2017	2018
Human Rights Education	Hours	2,403	3,111	2,968	6,180
Employees Participating in Human Rights Education ²⁾	%	-	100	100	100
Suppliers Subject to Human Rights Assessment		-	6	8	7

2) Human rights education was conducted for all of the domestic employees for up to 30 times, excluding those working overseas and those on leave. Education materials were provided to those who could not attend the collective education courses to allow self-study.

Corporate Community Involvement

Category	Unit	2016	2017	2018
CCI expenses ³⁾	Total	7,400	7,288	5,747
	Charitable contribution	753	1,079	669
	CCI investments	5,959	4,621	4,555
	Commercial initiative (public service marketing, etc.)	450	1,389	326
	Time cost of employee's contribution activities	237	200	198
Employee Volunteering	Persons	2,564	2,242	2,328
Volunteer Hours	Hours	9,199	7,623	7,255

3) Community contribution costs may differ from those reported in the past due to changes in calculation and classification methods.

Business Associations

Category	Unit	2015	2016	2017	2018
Total Expenses	KRW Million	816.6	855.4	675.8	828.7

* Top five categories of expenses in 2018: H2KOREA (KRW 150 million), Incheon Chamber of Commerce and Industry (KRW 80 million), Korea Employers Federation (KRW 79 million), Korea International Trade Association (KRW 73 million), Gimcheon Chamber of Commerce and Industry (KRW 65 million)

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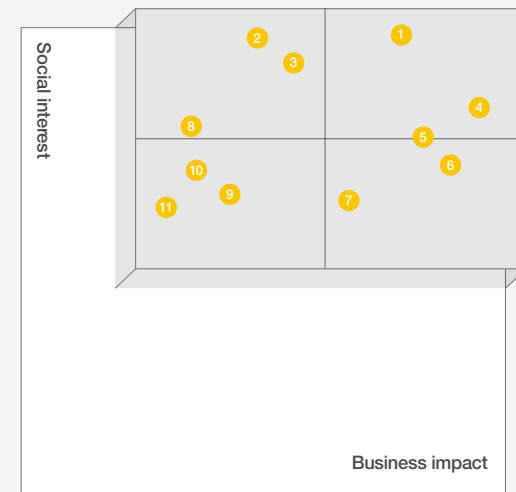
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Materiality Test

Doosan Corporation conducts materiality test every year with the participation of all relevant stakeholders in order to identify essential key issues for sustainable management in terms of economy, environment, and society. The materiality test for 2018 CSR Report was conducted in a four-step process: 1) Building issue pool 2) Prioritization of issues 3) Identification of issues 4) Communication of issues. CSR related international

standards (GRI Standards, DJSI, ISO26000, UNGC) were considered for the materiality test. Priorities of issues were evaluated based on media research, global benchmarking, and Doosan Corporation's internal data analysis. The key issues selected through materiality assessment are disclosed in the Doosan Corporation CSR Report.

Materiality Map

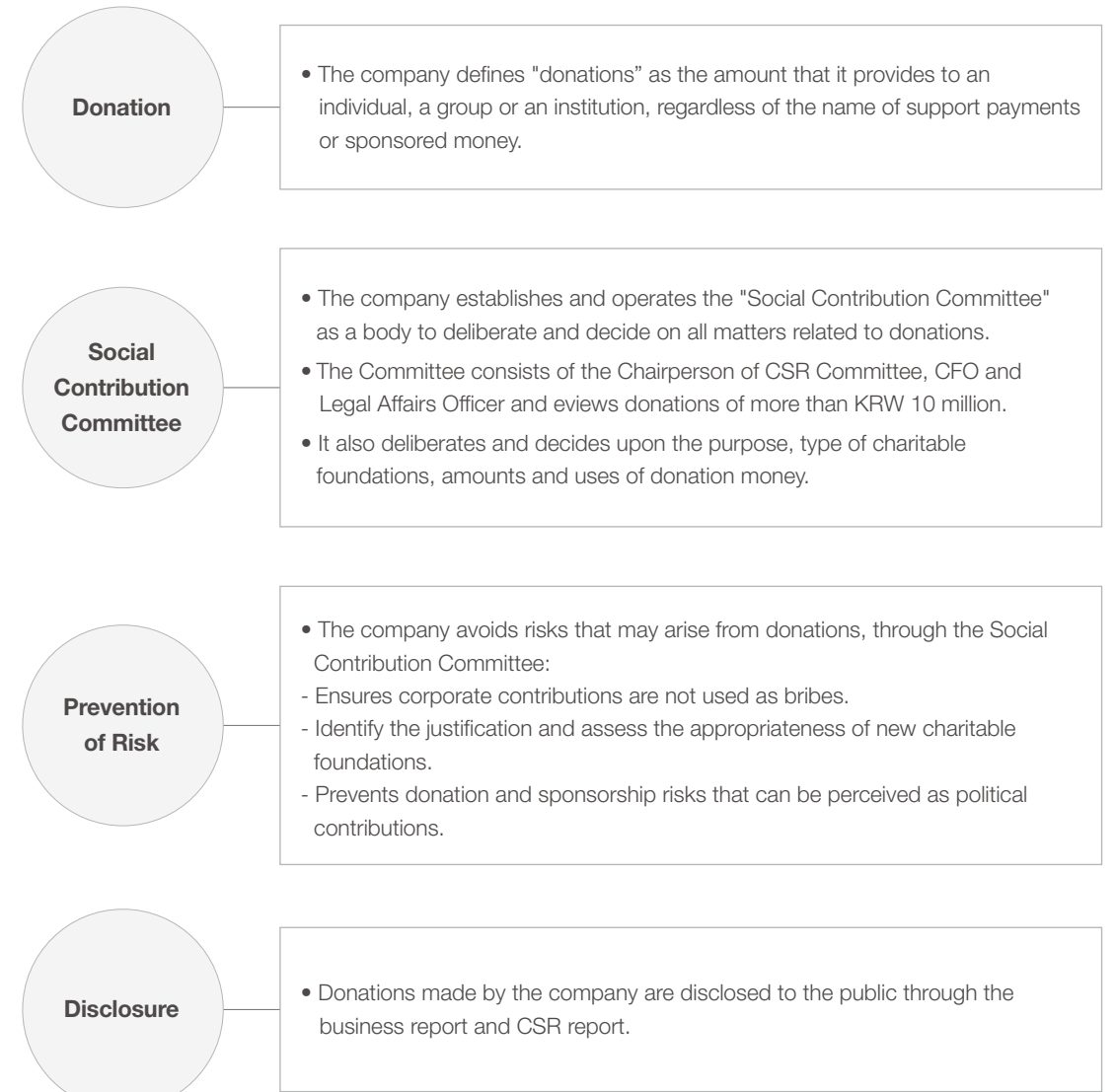


No.	Area	Issue
1	Employees	Realization of a desirable organizational culture for workplaces
2	CSR General (Economy)	Securing new growth engines (business diversification, new market etc.)
3	CSR General (Economy)	Creating economic performance and improving financial safety
4	Environmental Management	Response to Climate Change
5	Local communities	CCI activities aligned with core business
6	Employees	Enhancement of competencies of employees
7	Safety Management	Realization of a safe work environment
8	CSR General (R&D)	Increased investment in R&D
9	Customers	Highest level of quality management
10	Suppliers	Expanding communication with suppliers
11	Environmental Management	Development of environment-friendly products and services

Core Issues	Related Issues	Business Relevance	Key Stakeholders	Page
Challenge and Innovation for the Future ➔	<ul style="list-style-type: none"> • Securing new growth engines (business diversification, new market etc.) • Development of eco-friendly products and services • Increased investment in R&D 	Challenges and innovations for the future are closely linked to corporate sustainability. Securing new growth engines and building a sustainable business portfolio are essential approaches to strengthening the company's competitiveness in the future.	Customers, Shareholders and Investors	40p.
Realization of a people-centered organizational culture ➔	<ul style="list-style-type: none"> • Realization of a desirable organizational culture for workplaces • Enhancement of employee competencies 	The company's fundamental competitiveness comes from its employees possessing leadership and competence, in these constantly changing market conditions and in the age of limitless competition. Implementing a good organizational culture and attracting key talented people are major priorities for the company's future sustainability.	Employees	44p.
Efforts for a safe and clean society ➔	<ul style="list-style-type: none"> • Response to Climate Change • Realization of a safe work environment 	EHS activities of companies that are closely related to health and safety of stakeholders have become a major concern of corporate stakeholders. In addition, EHS enhancement activities for environmental issues such as environmental pollution, water shortage has become the core of corporate risk management.	Local communities, Employees	48p.
Practice of shared growth ➔	<ul style="list-style-type: none"> • Expanding communication channels with the suppliers • CCI activities aligned to the business 	Collaboration with stakeholders in the value chain is an essential element of corporate management in the global business competition space. Mutual growth activities to coexist with a wide range of stakeholders, such as communities and partners, are not an option today but instead have become an essential requirement.	Suppliers	52p.

Principles of Charitable Contribution and Sponsorship

Doosan Corporation operates the Social Contribution Committee to promote transparent and appropriate donations based on the following principles.



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Human Rights Policy



System for Implementation and Review of Human Rights Management

01. Commitment Human Rights Policy

02. Risk & Impact Assessment

Preparation of a Company-wide Human Rights Assessment System

1. Establishment of assessment area
2. Establishment of assessment scope
3. Establishment of assessment period & plan
4. Summarization of assessment result

03. Preventive & Mitigating Actions

Plan for Risk Prevention Measures Based on Assessment Results

1. Institutional solutions for the susceptible areas
2. Education and communication

04. Performance Assessment & Disclosure

Review and Reporting of Human Rights Management Assessment Disclosure of Human Rights Management

As a member of UN Global Compact, Doosan abides by 10 principles in the four areas of human rights, labor, environment, and anti-corruption. We publicly support and strive to respect internationally-recognized human rights principles including 'Universal Declaration of Human Rights' and 'UN Guiding Principles on Business and Human Rights: Ruggie Framework'.

To prevent human rights violations that may occur in the business process, Doosan has established a human rights management system as described below. In case of human rights violation, we make our best efforts to carry out rectification measures. We aim to grow with society through sustainable improvement activities.

1. Ensuring Employment Non-discrimination, and Freedom of Association and Collective Bargaining

We strive to avoid any unjust discrimination regarding employment based on gender, religion, disability, age, social status, region of origin, etc. Furthermore, we recognize workers' freedom of association and collective bargaining, and do not pursue any punitive action against workers for labor union activities.

2. Prohibition of Forced Labor and Child Labor

We do not accept any form of forced labor that may occur in business activities, and abide by the minimum age for employment set by the country of business. We follow the minimum employment age prescribed by laws of the country of business and in case of finding that we hired a minor, we take an immediate remedial measure to prevent all wrongful labor practices that damage human dignity.

3. Securement of Industrial Safety and Management of Responsible Supply Chains

We strive to maintain a safe working environment and follow environmental, health and safety laws and standards applied to the workplace. In addition, we adopt separate safety and health measures for pregnant women, the disabled and other vulnerable workers. We establish and continuously check policies and guidelines related to CSR risks of our supply network. We also monitor all business partners.

4. Protection of Human Rights and Environmental Rights of Local Residents

We respect local residents' rights to life and freedom of relocation, as well as individuals' rights related to safety and property ownership. In addition, we adhere to principles of preventive approach on environmental issues and systematically implement plans to prevent, mitigate, and control serious environmental damage and environmental disasters.

5. Protection of Customers' Human Rights

We pay necessary attention to marking design, manufacturing conditions and other indications on products in accordance with the legal standards to prevent product defects causing damage to customers' life, health, and safety. In case of detecting damage after a product is launched in the market, we notify customers of the risk and recall the product immediately. Moreover, we take necessary measures to protect personal information collected by our company based on our policy of respecting privacy of customers and employees.

Doosan operates the online Whistle Blowing Center (<https://ethicshelpline.doosan.com/cbrpt/frontView.do>) on our website to prevent possible human rights violations occurring in the business process. We protect the whistleblower through confidentiality principles and handle the issue in a quick and fair manner.

Doosan will take the lead in supporting and respecting the human rights principles as Proud Global Doosan.

GRI Standards Index

General Standards

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302-2	Energy consumed outside the organization	91	
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405-2	Basic pay and reward ratio of pay of female to male employees	-	'Employee Status' in Business Report
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406-1	Number of discrimination cases and their corrective actions	-	0 case
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418-1	Number of violations of regulations for protecting customers' personal information and complaints concerning verified leak of customer information	-	0 case
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Membership & Awards

Memberships

Classification	Associations and Organizations
Doosan Corporation	Korea Employers Federation, Korea Listed Companies Association, Institute for Global Economics, Korea Advertisers Association, Korea Chamber of Commerce and Industry, Korea Industrial Technology Association, Korea Mecenat Association, Korea IR Service, MagKyung S.E.L(Safety & Environment Leaders) Club, Fair Competition Federation
Electro-Materials BG	Gimcheon Chamber of Commerce and Industry, Iksan Chamber of Commerce and Industry, Cheongju Chamber of Commerce and Industry, JIEP(Japan Institute of Electronics Packaging), Korea Display Industry Association(KDIA), Korea Printed Circuit Association(KPCA), SEMI(Semiconductor Equipment and Material Institute), Korea Industrial Technology Association(KOITA), The Korean Microelectronics and Packaging Society, Chungcheong Regional Chemical Safety Association, Gyeongbuk Employers Federation, The Polymer Society of Korea, Korean Information Display Society(KIDS), Korea Environmental Preservation Association, Korea Environmental Preservation Association-Jeonbuk Regional District, Korea Environmental Preservation Association-Gyeongbuk Regional District, Iksan Business Environment Council, Iksan Safety and Health Managers' Council, Iksan Fire and Hazard Managers' Council, Jeungpyeong County Entrepreneur Association, Korea Industrial Safety Association-Chungbuk Regional District, Korea Industrial Safety Association, Korea Industrial Safety Association-Gyeongbuk Regional District, Meeting of Equipment Industry CEOs and Equipment subcommittee within Korea Display Industry Association, Jeonbuk Regional Chemical Plant Council, Jeonbuk Environmental Management Association, Western Gyeongbuk Environmental Engineers Association, Gumi-Gimcheon Safety Management Association, Gimcheon Regional Fire Administrator Association, Iksan Chamber of Commerce and Industry, Korean Association of Occupational Health Nurses, Daegu · Gyeongbuk Process Safety Management Council, Korea Electric Engineers Association, Korea Fire Safety Association, Korea Fire Safety Association-Gyeongbuk Regional District, Korea Electric Engineers Association, Korea Energy Engineers Association-Gyeongbuk Regional District, Korean Nurses Association-Chungbuk Regional District, Korean Nurses Association, Chungcheong Regional Process Safety Management Council, Korea Chemical Society
Industrial Vehicle BG	World Industrial Truck Statistics(WITS), Korea Industrial Technology Association(KOITA), KSA (Korean Standards Association), Korea Energy Agency, Incheon Chamber of Commerce and Industry, North America Fork Lift Truck Association, European Materials Handling Federation(FEM), Korea Construction Equipment Manufacturers Association, Fork Lift Truck Association, China Industrial Truck Association(CITA), Incheon Environmental Volunteer Association, Korea Industrial Safety Association, Korea Fire Safety Association, Korea Construction Engineers Association
Mottrol BG	Changwon Chamber of Commerce and Industry, Korea Construction Equipment Manufacturers Association, Korea Industrial Complex Corporation-Korea Defense Council, Korea Industrial Complex Corp, Korean Society for Fluid Power and Construction Equipment, Volvo Construction Machine Korea Partners Association, Gyeongnam Regional Industrial Security Executive Council, Gyeongnam Regional Employers Federation, Korea Defense Industry Association, Japan Fluid Power Society(JFPS), Korea Industrial Safety Association, Security Council for Defense Companies-Gyeongnam Regional District, Korean Nurses Association(Gyeongsangnam-do Nurses Association), Changwon Industrial Complex reserve power manager's Union Council, Korean Industrial Health Association, Korea Energy Engineers Association, Korea Electric Engineers Association, Korea Fire Safety Association, Korea Occupational Hygiene Association
Retail BG	Seoul Chamber of Commerce and Industry, Korea Duty Free Association
Fuel Cell BG	Korea Electric Association, H2KOREA, Korea International Trade Association, Korea New and Renewable Energy Association, SOFC Industrialization Forum, Korea Hydrogen Industry Association, Iksan Safety and Health Association, Environmental Engineers Association-Jeonbuk Regional District, Iksan Business Environment Council
Bio BU	Iksan Chamber of Commerce and Industry, Phospholipid research center, Seoul Chamber of Commerce and Industry, Iksan Regional Fire and Hazard Managers' Council, Korea Industrial Safety Association, Jeonbuk Environmental Engineers Federation, Jeonbuk Regional Chemical Plant Council, Iksan Safety and Health Managers' Council, KDRA(Korea Drug Research Association), Iksan Business Environment Council, Korea Fire Safety Association, Korea Electric Engineers Association, Korea Energy Engineers Association
DDI BU	Seoul Chamber of Commerce and Industry, Korea Duty Free Association

Awards

Classification	Name of Award	Hosted by	Date awarded
Industrial Vehicle BG	Citation by the Minister of Industry and Trade at the 4th Technology Regulatory Policy Forum	Ministry of Trade, Industry and Energy	2018.11
	Best of Best	Korea Association of Industrial Design	2018.12
	PIN UP BEST 100	Korea Association of Industrial Design	2018.12
Mottrol BG	Citation by the Minister of Environment for contribution to green management (Deputy general manager Jung Gil-yong)	Ministry of Environment	2018.07
	Award for Project Excellence	Volvo Construction Machine Korea	2018.06
Electro-Materials BG	Citation by the Prime Minister (Labor Day)	Ministry of Employment and Labor	2018.04
	Technical Prize' for 2018 in The Polymer Society of Korea Fall Academy Award	The Polymer Society of Korea	2018.04
	Citation by the Korea Red Cross Jeollabuk-do Center	Korea Red Cross Jeollabuk-do Center	2018.12
	Appreciation plaque by the Korea Association of Health Promotion	Korea Association of Health Promotion	2018.11
	Prize in the Korea Fire Institute Contest	Korea Fire Institute	2018.11
	Prize in the Korea Fire Institute Contest	Korea Fire Institute	2018.11
	Citation by the Gwangju Regional Ministry of Employment and Labor	Gwangju Regional Ministry of Employment and Labor	2018.07
	Citation by the Korea Industrial Safety Association	Korea Industrial Safety Association	2018.12
Public CPR Content (Excellence Prize)	Jeungpyeong Fire Station	2018.02	

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Independent Assurance Statement

Introduction

Doosan Corporation (“Doosan”) commissioned DNV GL Business Assurance Korea Ltd. (“DNV GL”), part of DNV GL Group, to undertake independent assurance of Doosan corporation CSR Report 2018 (the “Report”). The directors of Doosan have sole responsibility for the preparation of the Report. The responsibility of DNV GL in performing the assurance work is to the management of Doosan in accordance with the terms of reference. DNV GL’s assurance engagements are based on the assumption that the data and information provided by the client to us as part of our review have been provided in good faith.

Scope of assurance

Based on non-financial data and sustainability activities and performance data generated in 2018 from Doosan’s headquarters and domestic facilities, we have evaluated the adherence to AA1000 Accountability Principles (AP) 2018 and assessed the quality of sustainability performance information. We have reviewed that the Topic-specific disclosures of GRI Sustainability Reporting Standards 2016 which are identified in the materiality determination process;

No.	Material Topics	GRI Disclosure	No.	Material Topics	GRI Disclosure
1	Build organizational culture for good workplaces	Non GRI	7	Build a safe work place	403-1
2	Secure new growth engine (Business diversification, new market entry, etc.)	Non GRI	8	Increase in investment in R&D	Non GRI
3	Achieve good financial performance and improve financial stability	201-1	9	Highest level of quality control	Non GRI
4	Response to Climate Change	302-1, 302-4	10	More frequent communication and engagement with suppliers	414-2
5	Social contribution activities utilizing the characteristics of business	413-1	11	Development of environmentfriendly products and services	Non GRI
6	Strengthening Employee Capability	404-1, 404-3	12		

We performed our work using AA1000AS (2008) and DNV GL’s assurance methodology VeriSustain™¹⁾ (Version 5.0) which is based on our professional experience, international assurance best practices. DNV GL provides Type 1 and the moderate level of assurance. The assurance was carried out from May and till July 2019. The site visit was made to Doosan’s Headquarters in Seoul, Korea. We undertook the following activities as part of the assurance process:

- challenged the sustainability-related statements and claims made in the Report and assessed the robustness of the underlying data management system, information flow and controls;
- interviewed representatives from the various departments;
- conducted document reviews, data sampling and interrogation of supporting databases and associated reporting system as they relate to selected content and performance data;
- reviewed the materiality assessment report.

1) The VeriSustain protocol is available upon request at DNV GL Website (www.dnvgl.com)

Limitations

The engagement excludes the sustainability management, performance and reporting practices of Doosan’ subsidiaries, associated companies, suppliers, contractors and any third-parties mentioned in the Report. DNV GL did not interview external stakeholders as part of this Assurance Engagement. Economic performance based on the financial data is cross-checked with internal documents, the audited consolidated financial statements and the announcement disclosed at the website of Korea Financial Supervisory Service (http://dart.fss.or.kr) as well as Doosan’s website(www.doosan.com). These documents, financial statements and the announcements are not included in this Assurance Engagement. Limited depth of evidence gathering including inquiry and analytical procedures and limited sampling at lower levels in the organization were applied. The baseline data for Environmental and Social performance are not verified, while the aggregated data at the corporate level are used for the verification. DNV GL expressly disclaims any liability or co-responsibility for any decision a person or an entity may make based on this Assurance Statement.

Conclusion

On the basis of the work undertaken, nothing comes to our attention to suggest that the reported data and information disclosed in the Report do not give a fair representation of Doosan’ sustainability performance. Further opinions with regards to the adherence to the Principles are made below;

The Principle of Inclusivity

Doosan has identified 6 internal and external stakeholder groups such as Shareholders and Investors, Customers, Employees, Suppliers, Local Communities and Regulators. Doosan engages with the stakeholders at the company and business unit levels through various channels. The Report provides the definition of stakeholder, expectations and requests by key stakeholders, and communication channels. Doosan reflects the results of its stakeholder engagement activities in its management activities. The activities and performance of key stakeholders are disclosed through the Report.

The Principle of Materiality

Doosan has conducted the materiality assessment to prepare the Report. 38 various issues have been derived by analysing the topics covered in various global initiatives and standards, media research, global benchmarking PRJC-598972-2019-AST-KOR Page 3 of 4 and internal data analysis. The issue pools were used to rate the material topics in terms of business relevance and impact on the stakeholders. 11 material topics are prioritized accordingly. Doosan has divided material topics identified in the materiality assessment into 4 reporting topics and presented the management approach and major performances for each stakeholder issue in the Report. Doosan discloses the prioritized material sustainability topics in a comprehensive and balanced way.

The Principle of Responsiveness

The ‘CSR Achievements and Plans’ section of the Report in which Doosan’s 2018 activities, plans, and performance indicators are addressed helps stakeholders understand Doosan’ sustainability management.. In addition, the Report discloses the key performance and results in 2018. The Report is prepared in a comparable, comprehensive, and timely way using the reporting principles.

The Principle of Impact

The Report presents the direct and indirect impacts of material topics identified materiality assessment. Doosan identifies, monitors and assesses the impacts of material topics to stakeholders. Doosan has presented business relevance and key stakeholders corresponding to the respective material topics. In addition, Doosan measures social values by taking into account not only financial performance but also the impact on all stakeholders.As a result, Doosan discloses corporate social value as an effort to upgrade the level of social responsibility management.

Quality on sustainability performance information

We have tested data and information on a sampling basis. The intentional error or misstatement is not noted from the data and information disclosed in the Report. Data owners were able to demonstrate the origin and interpretation of the data in a reliable manner. The data was identifiable and traceable.

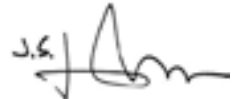
Competence and Independence

DNV GL applies its own management standards and compliance policies for quality control, in accordance with ISO/IEC 17021:2011 - Conformity Assessment Requirements for bodies providing audit and certification of management systems, and accordingly maintains a comprehensive system of quality control, including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements. We have complied with the DNV GL Code of Conduct²⁾ during the assurance engagement and maintain independence where required by relevant ethical requirements. This engagement work was carried out by an independent team of sustainability assurance professionals. DNV GL was not involved in the preparation of statements or data included in the Report except for this Assurance Statement. DNV GL maintains complete impartiality toward stakeholders interviewed during the assurance process. DNV GL have no other contract with Doosan and did not provide any services to Doosan in 2019 that could compromise the independence or impartiality of our work.

2) DNV GL Code of Conduct is available from DNV GL website (www.dnvgl.com)

July 2019
 Seoul, Korea



 **Jang Sup Lee**

Country Representative

DNV GL Business Assurance Korea Ltd.

Greenhouse Gas Verification Statement

Scope of verification

The scope of verification covers all greenhouse gas emission facilities under the operational control of Doosan Corporation.

Verification Standards

The verification was performed based on the Administrative Guidelines for the Greenhouse Gas Target Management System (Ministry of Environment Notice No. 2016-255), and Guidelines Reporting and Certification of Volume of Emissions under the National Greenhouse Gas Inventories System (Ministry of Environment Notice No. 2014-154).

Verification Procedure

The verification was planned and performed according to the procedure set forth under the Administrative Guidelines for the Greenhouse Gas and Energy Target Management System. In particular, the verification was performed at a reasonable level of assurance. It was also confirmed through internal review that the procedure was effectively performed throughout the entire verification processes.

Limits of Verification

The verification implies inherent limits that may occur in the process of applying the standards and methods.

Verification Opinion

The conclusions below are presented with regard to the data concerning volumes of greenhouse gases emitted and energy used as indicated in the statement.

- 1) Doosan Corporation prepared its 2018 Greenhouse Gas Emissions Statement based on the Administrative Guidelines for the Greenhouse Gas Target Management System.
- 2) The materiality test of Doosan Corporation's greenhouse gas emissions and energy consumption volumes for 2018 revealed that they satisfy the criteria for 5% or less based on their volume as the company emits less than 500,000 tCO₂_eq.
- 3) Therefore, we hereby present an unqualified opinion on the Doosan Corporation's greenhouse gas emissions and energy consumption volumes for 2018.

Serial Number of Korea Foundation for Quality I1100120040

30 March 2019
 Korea Foundation for Quality, Inc
Byeongtaek Yu Representative



Volume of greenhouse gas emissions of Doosan Corporation Unit: tCO₂e

Scope (Based on the Definitions under the Administrative Guidelines for the Greenhouse Gas Target Management System)	2018
Volume of directly emitted greenhouse gases (Scope 1)	23,279
Volume of directly emitted greenhouse gases (Scope 2)	59,894
Total volume of greenhouse gas emissions	83,162

The data above correspond to the CO₂ converted tonnage value based on the Corporation's domestic worksites.

**BUILDING
 YOUR
 TOMORROW
 TODAY**

TF Members of this Report

Description	Name of Business Group
Electro-Materials	Management Strategy Team, HR Team, Labor Relation Team, Strategy Purchas Team, EHS Team, Quality Planning Team, Business Management Team, Technology Planning Team, GFC Team
Industrial Vehicle	Business Strategy Team, HR Team, Technical HR Team, Purchas 1 Team, EHS Team, Production Technology Innovation Team, Quality Management Team, Domestic Sales Team, Research Strategy Team, Management Team
Mottrol	Management Strategy Team, HR Team, Technical HR Team, Purchase Team, EHS Team, Organic Quality Team, R & D 1 Team, Organic Division Sales Marketing Team
Retail	Management Team, HR Team, Management Support Team, EHS part, Sales Team
Fuel Cell	Management Team, Management Support Team, HR Team, Purchase Team, EHS Team, Quality Team, Management Strategy Team, Sales Team, RD & E Team
Bio	HR Team, Technical HR Team, Management Team, EHS Team, QA Team, Sales Team 1, Product Development Team, Management Strategy Team
DDI	Strategy Team, HR Team, Purchase Team, Quality Innovation Team
CC	HR Credo Part, Management Strategy 2 Team, Business Opportunity Team, HRM Team, HRD Team, EHS Team, Technology Strategy Team, Compliance Team, Communication Team, Shared Growth Team
Management Headquarter	Financial Accounting Team, IR Team, Management Support Team, Finance Team, HR Team
Holding Company	Legal Affairs Office, HRM Personnel Support Team, Communication Office