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.

Overview of Key Affiliates

Talent-centered management, which is the source of global competitiveness

Establishing stream-lined processes to reach global standards

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

- 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

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.

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.

2) 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 intrinsis Traits of Doosan People may be summarized as follows:

- Limitless Aspiration
- Cultivating Talent
- Inhwa
- Open Communication
- Tenacity & Drive
- Prioritization & Focus
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 discusses 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.
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
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 all its domestic and overseas businesses 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

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

Main business lines

- Materials
  - Electro-Materials EG: Copper clad laminate, panel materials, heat radiation panels
  - Bio-EU: Pharmaceutical ingredients, Nutraceutical ingredients, Pharmaceutical / Nutraceutical emulsifiers, Cosmeceutical ingredients

- Machinery
  - Industrial Vehicle EG: Engine-powered, electric fork-lifts, forklift parts and services
  - Metal EG: Hydraulic drives, Hydraulic parts for the defense industry

- Energy
  - Fuel Cell EG: Renewable energy, fuel cell, high/low capacity fuel cell system

- Distribution
  - Retail EG: Duty-free shop, Fashion mall

- Information and Communication
  - Digital innovation EU: Consulting, IT system building and operating, IT infrastructure operations

Global Network of Doosan Corporation

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<tr>
<th>Head-quarter</th>
<th>CEO Message</th>
<th>Letters to Stakeholders</th>
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<tr>
<td>Seoul, S. Korea</td>
<td>CEO Park Jeongwon, Dong Hyunsoo, Kim Minchu</td>
<td>December 18th, 1933</td>
</tr>
</tbody>
</table>

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 Minchu
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

- Total assets: KRW 6,494.4 billion
- Revenues: KRW 3,416.4 billion
- Operating income: KRW 215.1 billion
- Number of employees: 5,648 persons

Number of employees including overseas subsidiaries of Doosan BGs at the end of 2018.

Introduction of Doosan Corporation

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

<table>
<thead>
<tr>
<th>Domestic Plants</th>
<th>International Plants</th>
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| Electro-Materials EG
  - Doosan Corporation Seoul, S. Korea
  - Electro-Materials Gyeonggi Plant Goyang, S. Korea
  - Electro-Materials Goheung Plant Goheung, S. Korea
  - Electro-Materials Iksan Plant Iksan, S. Korea
  - Fuel Cell Iksan Plant Iksan, S. Korea
  - Industrial Vehicle Iksan Plant Iksan, S. Korea
  - Motroli Changwon Plant Changwon, S. Korea
  - Fuel Cell/Energy Iksan Plant Iksan, S. Korea |
| Electro-Materials EG
  - Electro-Materials Shanghai Branch Shanghai, China
  - Electro-Materials Suzhou Branch Suzhou, China
  - Electro-Materials Shenzhen Branch Shenzhen, China
  - Electro-Materials Hong Kong Branch Hong Kong, China
  - Electro-Materials Japan Branch Tokyo, Japan |
| Electro-Materials EG
  - Electro-Materials Shanghai Branch Shanghai, China
  - Electro-Materials Suzhou Branch Suzhou, China
  - Electro-Materials Shenzhen Branch Shenzhen, China |
| Electro-Materials EG
  - Electro-Materials Shanghai Branch Shanghai, China
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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.

**Vision**

**WORLD BEST INNOVATION PARTNER**

**Slogan**

“Design the Future, Spark the Growth”

**Strategy**

1. **Pursuing new business avenues in response to Paradigm Shift**
2. **Advancement into high-growth new businesses**
3. **Competitiveness enhancement of existing businesses**
4. **Enablers**

**Strategic Tasks**

- Battery components for electric vehicles
- Advanced materials for 5G
- Industrial vehicle total solution
- Industrial drone solution
- Fuel-cell power generation (RMPS)
- Mottrol fault diagnosis and prediction service
- Robotics
- Sensing technology
- Logistics automation
- Manufacturing
- Quality innovation
- Advanced technology management system securing the world’s best products / Technologies
- Acceleration of DT
- Data-driven operations (- IIA, - RPA, - Mobile app customer management)
- DT capabilities
- Open innovation
- New biz. exploration
- IT capabilities

**Enablers**

- Improve productivity through faster setup time by utilizing manufacturing big data
- Improve on defective processes by improving quality by in-house training
- Capture new business opportunities, driven ///
- Manage /support shopping activities such as entry, shopping and exit at shops.
- Unified shopping convenience and shopping information management

**Tasks**

1. **Pursuing new businesses in response to the current Paradigm Shift**
2. **Advancement into high-growth new businesses**
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. RPA**

- Improve business efficiency by using robotic software for automation-enabled office tasks according to a set of predefined rules
- Activated 50% or more improvement in office work productivity on Electro-Materials (3G)
- Robotic Process Automation

**3. Mobile app Customer Management**

Retail BG improves on the shopping experience and provides customized services by utilizing 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**

- Establishment of DT organization and hiring professional analysts
- Enhancing DT capabilities through in-house training
- Enhanced awareness of emergency and changes in new technologies
- Capture new business opportunities, competitive new technology geared towards sensing, product service innovation, and new vendor discovery
- 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

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.

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

**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

**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

**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

**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.

**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.

**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.

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 32 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.

**2018 Key Achievements**

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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

KRW 869.6 billion

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 workplaces 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.

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 areas 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.

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 (ARIA).

1. 50th anniversary event
2. Award winning model (BR18S-9) at 2018 PIN UP Design Award
3. Rushlift GSE won IARA
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 TSV series of the same class, total length has been shortened by 30%; also, the new model has adopted the latest low pulsation, low noise technology, and can be applied to various heavy equipment in combination with various control methods (flow 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 extendability.

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.
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 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

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.

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 10,000 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.

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.

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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, re-awakes customer satisfaction through delivery of differentiated services.

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.

Expansion of Airport and Overseas Sites Securing Momentum
Doota Duty Free is preparing 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.

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.
Fuel Cell Business Group

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
- 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

Korea

- In operation: 104MW (238 Units)
- Under installation: 108MW (454 Units)
- Contract concluded: 31MW (71 Units)

England

- Under installation: 1.3MW (5 Units)

USA

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

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 (GIST-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 cell worth 3MW 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.

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 55MW 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.

**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 SOFC products. BG also aims to participate in hydrogen power generation through development of hydrogen fuel cell.

1) SOFC(Solid Oxide Fuel Cell)

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).
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 GMP\(^1\) 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 PSM\(^2\) 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.

### Main Products and Services

- **1) Good Manufacturing Practice**
- **2) Process Safety Management**

### 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 Pharmerging\(^3\) 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.

### 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 bonding 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 PS\(^4\) 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.

### 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 cGMP\(^5\) and DMF\(^6\) certifications.

- **Expanding Big Overseas Markets for Cosmeceutical Ingredients**
  - In 2018, ceramide, the leading cosmeceutical ingredient for Bio BU, achieved more than 30% increases 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 Aesina 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 Dossari’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 angles.

### Ecocert Certified Products

- **31.2 billion KRW**
- **4 products**

### Nutraceutical Ingredients

<table>
<thead>
<tr>
<th>Features</th>
<th>Nutraceutical Ingredients</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Improves cognitive skills that tend to deteriorate due to aging</td>
<td>Phosphatidylserine (DS-PS series)</td>
</tr>
<tr>
<td>• 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</td>
<td></td>
</tr>
<tr>
<td>• Moisturizing effect on the skin</td>
<td>Ceramide (DS-Ceramide)</td>
</tr>
<tr>
<td>• Hydroporphic substances and homogeneously distributed fatty and residualophile oil is emulfled in for application as transparent emulsion</td>
<td>Phosphatidylcholine (DS-PL95E)</td>
</tr>
<tr>
<td>• Safest material made of natural substances derived from egg yolk</td>
<td></td>
</tr>
<tr>
<td>• Recognized as a worth class product by the Ministry of Knowledge and Economy</td>
<td></td>
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</tbody>
</table>

### REACH Registered Products

<table>
<thead>
<tr>
<th>Main Product</th>
<th>REACH Registered Products (DS-PL95E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramide</td>
<td></td>
</tr>
<tr>
<td>Phosphatidylcholine</td>
<td></td>
</tr>
</tbody>
</table>

### Top Ingredients

- **1) Good Manufacturing Practice**
- **2) Drug Master Files**

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 world market for health care products for emerging markets such as Thailand, Egypt, South Africa, and China.

2. PSM: Process Safety Management

3. ISO 14001: An international standard for an environmental management system

4. REACH: Registration, Evaluation, Authorisation, and Restriction of Chemicals

5. cGMP: Current Good Manufacturing Practice

6. DMF: Drug Master Files
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.

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.

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) to support the Digital Transformation of Doosan Group companies.

Main Products and Services

Digitalization Service
Utilizing digital technology to support customers’ business innovation and creating new revenue value opportunities

Platform/IT Infrastructure Development and Operation
Building an open innovation system for internal and external collaboration and maintenance of IT infrastructure for system operation

Application Development and Operation
Application development and digital service based on UI/UX

Application Development and digital service based on UI/UX

1) RPA (Robotic Process Automation)

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.
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.

<table>
<thead>
<tr>
<th>Business Division</th>
<th>DT Directions</th>
<th>Main Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electro-Materials BG</td>
<td>Expanding business opportunities based on enhanced customer connectivity</td>
<td>Provision of proactive solutions for customers</td>
</tr>
<tr>
<td></td>
<td>Enhanced intelligent manufacturing utilizing Data / AI</td>
<td>Smart Factory-based process prediction / automation</td>
</tr>
<tr>
<td>Industrial Vehicle BG</td>
<td>Expanding connectivity-based businesses, products and services across value chains</td>
<td>Downstream platform</td>
</tr>
<tr>
<td></td>
<td>Development of automated forklifts and operating platform</td>
<td></td>
</tr>
<tr>
<td>Mottrol BG</td>
<td>Innovation of business model based on DT technology</td>
<td>Fault diagnosis and prediction of product lifecycle</td>
</tr>
<tr>
<td></td>
<td>Promoting digital operation excellence</td>
<td>Robotic / automation based smart factory</td>
</tr>
<tr>
<td>Retail BG</td>
<td>Utilizing virtualization and AI to provide a unique shopping experience and enhance customer convenience</td>
<td>Customized shopping recommendations</td>
</tr>
<tr>
<td></td>
<td>Smart shopping</td>
<td></td>
</tr>
<tr>
<td>Fuel Cell BG</td>
<td>Digital-based eco-friendly energy total solution</td>
<td>Advanced RMS* based on AI</td>
</tr>
<tr>
<td></td>
<td>Product / service platform innovation</td>
<td>Cloud-based platform operation</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>R&amp;D Investments</th>
<th>Development of New Products/Technologies</th>
<th>Patent Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRW 87.5 billion</td>
<td>109 cases</td>
<td>150 cases</td>
</tr>
</tbody>
</table>

Link to Materiality
Securing a new growth engine
Development of eco-friendly products and services
Expansion of R&D Investments

Link to UN SDGs
7) Affordable and clean energy
9) Industry, innovation, and infrastructure
13) Climate action

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 foil, which form the core components of batteries.

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 Tatabanya 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.

Cases Study

Battery Copper Foil Plant in Tatabanya, 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 Hungarian 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.
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 agendas and the entire world has come to recognize the importance of protecting the environment. In particular, the move to 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 reforming 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.

Excellent Efficiency of Fuel Cell

<table>
<thead>
<tr>
<th>Operating rate (%)</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel cell</td>
<td>15</td>
</tr>
<tr>
<td>Solar energy</td>
<td>10</td>
</tr>
<tr>
<td>Offshore wind power</td>
<td>25</td>
</tr>
</tbody>
</table>

The highly efficient energy source with high operational reliability and power is suitable for industrial applications.

Installation area (m²/1MW)

| Fuel cell | 170 |
| Solar area | 48,000 |
| Offshore area | 90,000 |
| 1) Reforming: A method of extracting hydrogen from natural gas by changing the structure of hydrocarbons by the action of heat or catalyst

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

- Principle of Fuel Cells
  - Hydrogen (H₂) supplied to cathode
  - Oxygen (O₂) supplied to anode
  - Electrode: Electron and proton exchange
  - Reaction: 2H₂ + O₂ => 2H₂O

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.

Benefits of Doosan Logipia

- First-time delivery: 90%
- Standard price table
- Redesigned Time within 2 Hours

Doosan Logipia is a word that combines ‘Logistics’ and ‘Utopia’ that shows Doosan’s will to realize ideal logistics. 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.
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.

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 thus 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 drives yet another century.
Strengthening Corporate Competitiveness by Developing Employee Capabilities

Leadership

Training for Employees on Promotion List in Sub-sidieties in China

In 2018, Doosan Corporation conducted leadership training for newly promoted employees in its subsidiar- ies in China. This is the first training for employees working at overseas subsidiaries to improve job perform- ance 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 subsidiar- ies in China. The manager training was conducted at Changshu Corporation in China and the deputy man- ager training was conducted at the Doosan Leadership Institute in Korea (DLS). The managers and deputy man- agers 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

<table>
<thead>
<tr>
<th>Role</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>New deputy managers</td>
<td>4.7 / 5.0</td>
</tr>
<tr>
<td>New managers</td>
<td>4.9 / 5.0</td>
</tr>
</tbody>
</table>

Satisfaction Survey Result for Work Relevance

<table>
<thead>
<tr>
<th>Role</th>
<th>Average Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>New deputy managers</td>
<td>4.9 / 5.0</td>
</tr>
<tr>
<td>New managers</td>
<td>5.0 / 5.0</td>
</tr>
</tbody>
</table>

Professional

‘Purchasing Academy’ to Improve Expertise

Doosan Corporation has developed the ‘Purchasing Academy’ course to improve the ability of purchas- ing professionals to respond effectively to changing purchase environments. The academy offers Basic, Advanced, and Expert courses, among which the Ad- vanced course was developed and operated in 2018. This course was developed by Doosan’s in-house ex- pertise, and strengthened work relevance through practi- cal 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 attend- ing the course were able to have a comprehensive understanding of the company’s overall management and business, including finance and strategy. In addi- tion, 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 func- tions for efficient attendance management. We will improve and manage the attendance system to help our employees manage their working hours efficiently.

Exising 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 auto- matically 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 pro- gram 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.
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.


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 Jeungpyeongyong, 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, 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.

Environmental Investment

<table>
<thead>
<tr>
<th>Environmental Investment</th>
<th>2018 Energy Savings (Electro-Materials BG, Mottrol BG)</th>
<th>Rate of Industrial Accidents</th>
</tr>
</thead>
<tbody>
<tr>
<td>KRW 11.1 billion</td>
<td>KRW 0.18 billion</td>
<td>0.26%</td>
</tr>
</tbody>
</table>

Link to Materiality
- Response to Climate Change
- Implementing a safe working environment

Link to UN SDGs

<table>
<thead>
<tr>
<th>Target</th>
<th>2018 Savings (KRW)</th>
<th>Savings (KRW Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electro-Materials BG</td>
<td>Replacement of LED lights</td>
<td>378,508</td>
</tr>
<tr>
<td></td>
<td>Installation of oven fan inverters (No. V4)</td>
<td>74,528</td>
</tr>
<tr>
<td></td>
<td>Adjusting the supply temperature of 8 air conditioners by 2°C (20°C to 22°C)</td>
<td>6,088</td>
</tr>
<tr>
<td>Mottrol BG</td>
<td>Replacement of old cooling and heating systems</td>
<td>168,644</td>
</tr>
<tr>
<td></td>
<td>Cooling tower pump/fan automatic on/off control</td>
<td>298,921</td>
</tr>
<tr>
<td></td>
<td>Installation of remote control system for cooling and heating systems</td>
<td>236,078</td>
</tr>
</tbody>
</table>

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Cultural Change
Design the Future Spark the Growth
Introduction

Doosan Group

- Growth Shared with Suppliers and Communities
- UN Global Compact
- Creating Social Value of Doosan
- CSR Achievements and Plans
- Realization of a People-centered Organizational Culture

Challenges and scope of Innovation for the Future

Efforts for a safe and clean society

Best Practice

Enhancement of EHS Level at Workplace

In 2018, Jeong Gii-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.

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/BU, 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.

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 rental vans to solve inconvenience of service personnel who operates vehicles 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 priorities by collecting the inconvenience of service personnel on site, and setting guidelines for continuous improvement.

Improving Work Environment for Emotional Labor Workers

At Doosta 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

Service Worker Protection Programs of Doota Duty Free

Poster for Customers on Mutual Respect

Poster for Customers on Mutual Respect

Service Worker Protection Programs of Doota Duty Free

Service Worker Protection Programs of Doota Duty Free
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.

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.

**System and Roadmap for Shared Growth**

Doosan Corporation strives to improve suppliers’ competitiveness through shared growth. It endeavors to ensure the 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**

- **Support for Strengthening Competitiveness**
  - Support group to enhance competitive strength
  - Expert consulting
  - Smart factory project
- **Support for Overseas Expansion**
  - Participation in overseas exhibitions
  - Support for marketing to overseas buyers
- **Financial Support**
  - Mutual growth fund
  - Network loans
- **Expanding Communications**
  - Cooperative meetings and Partners Club
  - Management visits to suppliers
  - Supplier hotline

**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 such as support groups for strengthening supplier's competitiveness, consulting, and shared growth funds. Shared Growth Team plans to continue its activities to drive sustainable growth in the supply chain for Doosan Corporation.
**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.

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**Mutual Growth Incentives**

*Recipient: 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**

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**Health Checkups**

*Recipient: 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**

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**Holiday Gifts**

*Recipient: 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 per person**

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**Mutual Aid**

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

- **Total funeral service assistance worth KRW 300,000 per person**

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**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 same suppliers to screen for and treat cancer. At a supplier of Moltri BG, a worker in his 60s and his spouse found colon and uterine cancer respectively through Doosan’s health checkup support. 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.

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**DooSan’s Gap Relief Support Project**

- **Electro-Materials BG**
  - Supplier’s worker: Received treatment for early stage of cervical cancer, as of 2019
  - Supplier’s worker: Received treatment for early stage of cervical cancer

- **Mottrol BG**
  - Supplier’s worker: Received treatment for early stage of stomach cancer and received treatment
  - Spouse of a supplier’s worker: Received treatment for early stage of colorectal cancer

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**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 Accounts 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.

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**Didim Seed Child Development Accounts**

- **Started in 2018**: 8 regions, 14 million (KRW 168 million per year)

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**Didim Seed Mentoring**

Recipient: Elementary / middle school students who are subject to Child Development Account
Self-Leadership Strengthening Program

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2018 Ceremony to deliver Didim Seed Donation Funds
## CSR Achievements and Plans

<table>
<thead>
<tr>
<th><strong>Activities in 2018</strong></th>
<th><strong>Plans for 2019</strong></th>
<th><strong>Mid- to Long-term Plans</strong></th>
<th><strong>Performance Indicators</strong></th>
</tr>
</thead>
</table>
| **Promotion of Employee Values** | - Expansion of grievance system  
- Human rights surveys and due diligence  
- Diagnosis of human rights management at overseas workplaces  
- Introduction of a 52-hour work week system | - Introduction of grievance system at all subsidiaries  
- Regular human rights surveys and due diligence  
- Introduction of human rights risk management process at overseas workplaces  
- Establishment of a 52-hour work week system using Total Attendance System | - 0 % of human rights infringement cases  
- Establishment of human rights risk prevention system  
- Expanding diversity within the supply chain and expanding women’s rights | Turnover rate  
- Mid-to-long-term target 2 %  
- Employee satisfaction survey  
- Mid-to-long-term target 80 % |
| **Talent Fostering and Respect for Diversity** | - 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 | - Regular expansion of job/technical training  
- Expansion of training for employees at subsidiaries in China and other overseas workplaces  
- Increased coverage of management skills training for female employees and maternal protection program  
- Expansion of employment for the disabled | - 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 | Average hours of training per employee  
- Mid-to-long-term target 74 hours  
- Ratio of employees working at the company for more than a year after returning from paternity leave  
- Mid-to-long-term target 89 % |
| **Response to Climate Change** | - Identification of idle power, setting of goal for savings  
- Building energy management organization and selecting object of management | - Facility reviews for energy efficiency and idle power saving activities  
- Performance management by activating energy management organizations and establishing KPIs for power management | - Application for the Energy Management System Certification (ISO50001)  
- Establishment of strategies to address climate change | Energy reduction performance  
- (EM BG, Mottrol BG)  
- Performance in 2018  
- Annual mutual growth index  
- Mid-to-long-term target 4 times  
- Fair trade monitoring  
- 2018 performance  
- Most excellent |
| **Shared Growth and Fair Trade** | - 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 | - Expansion 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 | - Expansion of supply chain CSR for secondary and tertiary suppliers  
- System for monitoring of risk from conflict minerals  
- Establishment of strategies to address climate change  
- Application of strategies to address climate change | Sales ratio of eco-friendly products  
- 2018 performance  
- Mid-to-long-term target 65 %  
- Online ethics training  
- 2018 performance  
- Most excellent |
| **Eco-friendly R&D** | - Industrial Vehicle BG: Development of electric vehicles with Li-ion battery  
- Industrial Vehicle BG: Development of AI-based smart mode  
- Fuel Cell BG: Development of H₂ (byproduct hydrogen) models  
- Electro-Materials BG: Secure new market of HF Ultra Loss for Hi-end servers  
- Motrol BG: Development of new plug with 0% operating leakage  
- Industrial Vehicle BG: Compliant with European Stage V regulations  
- Fuel Cell BG: Development of fuel cell 500KW NS model and hydrogen generator for hydrogen charging  
- Independently assured compliance system  
- Measurement and feedback on ethical management practices and results | - 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 NS model and hydrogen generator for hydrogen charging  
- Independently assured compliance system  
- Measurement and feedback on ethical management practices and results  
- 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 | Turnover rate  
- Mid-to-long-term target 2 %  
- Employee satisfaction survey  
- Mid-to-long-term target 80 % |
| **Ethics Management** | - 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 | - Strengthening of the ethics training system  
- Expansion of assessment/management for areas with high corruption risk and ethical management at overseas workplaces  
- Enhancement of communication and ethical culture with stakeholders | - 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 | Average hours of training per employee  
- Mid-to-long-term target 74 hours  
- Ratio of employees working at the company for more than a year after returning from paternity leave  
- Mid-to-long-term target 89 % |
| **Social Contribution** | - Development of a new social contribution program (Child Development Account)  
- Enhancement of target/curriculum and transparency of the representative program (Time Travel)  
- Review of the reward system to strengthen public relations and motivate personnel toward social contribution  
- Activation of the Social Contribution Subcommittee | - Building a platform to enable employees participate in voluntary social contribution and establishing support measures  
- Social contribution culture for overseas subsidiaries | - Social contribution awareness  
- 2018 performance  
- Mid-to-long-term target 51 %  
- Participation rate of social contribution  
- 2018 performance  
- Mid-to-long-term target 38 % |
Creating Social Value of Doosan

1. Social Value through Business

Doosan Group 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 (Impacts) that are not represented in traditional financial statements related to a company’s activities, and measures true performance (Net Value) 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.

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.

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.

Measurement Method

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

References

1. Financial and Economic Research [No. 90] [Recent Employment Conditions and Measures to Address Youth Unemployment], 2020
2. G.Plaschenko and H.A. Patino, Returns to Investment in Education in Further Education, 2004
3. BISG, the Cement Sector: A Strategic Contributor to Europe’s Future, 2003
4. G. Vouillon, 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 Accidental Status, 2017
8. Ministry of Environment, Average Cost of Sewage Treatment, 2017
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

<table>
<thead>
<tr>
<th>No.</th>
<th>Method</th>
<th>Description</th>
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| 1   | Eliminate | Negative factors related to use of existing products:  
- 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 impacts 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 generates transmission and distribution losses. |
| 2   | Improve | Social value comparing to existing products:  
- 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. |
| 3   | Create | Social value of existing products cannot create:  
- Removal of fine dust  
- Heat production  
- Creation of 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. Doo- san Corporation plans to supplement and refine these measurements to enhance the social value of its products.

- **Eliminate**  
  - Investment in transmission and distribution avoidance  
  - Avoidance of water use  
  - Avoidance of loss caused by power outage  

KRW 1,559,442/1MWh  

- **Improve**  
  - Improvement of air pollution  
  - Reduction of greenhouse gas emissions  

KRW 11,928/1MWh  

- **Create**  
  - Removal of fine dust  
  - Heat production  
  - Creation of a fuel cell ecosystem  

KRW 111,845/1MWh

In comparison with LNG power generation for improvement and avoidance value calculation, higher social value is expected when reflecting the cost of health insurance and social welfare due to air pollution such as fine dust (PM2.5) and NOx (When the UK medical insurance standard is applied, the improved value of KRW 87,000 will be added, which can be further increased by 59%).

References

1) Korea Electric Technology Research Institute Report, Benefit Unit of Distributed Power Source  
2) Eco-cool [http://www.eccool.co.kr/EEV/MoldHistory/ subject5/data.html]  
3) KEPCO, Cost of Loss per Minute in Case of Power Outage, 2015  

UN Global Compact

Doosan Corporation joined the UN Global Compact in 2014 and has 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

**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

**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.

**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 environmentally-friendly technologies.

**Anti-corruption**

- Principle 10. Businesses should work against corruption in all its forms, including extortion and bribery.
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
Dossan Group declared its firm resolution to practice CSR management and create a “Proud Global Dossan” on the basis of “Dossan Credo.” Moreover, to anticipate and promptly respond to the various CSR requirements of 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. Dossan Corporation has been practicing CSR management based on Dossan 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
Dossan’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 Dossan’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 BGs/BUs, Corporate Center, and Administration Center, as well as executives from its key departments. CEO of Dossan 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/BUs 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 Subcommittees
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 Dossan 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
    Dossan 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
    Dossan Corporation publishes its CSR report each year in order to transparently communicate its achievements and plans with its stakeholders inside and outside. Dossan 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. Dossan 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+).
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 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 consensus by the majority of directors. If a quorum with weighted voting is required by the laws, regulations, or the corporate by-laws, the total number of directors shall be at least one more than the number of directors required to be selected at the general shareholders’ meeting.

Approval on Key Matters 
The BOD approaches 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 met twice with an average attendance rate of 94%.

Independence of BOD 
The BOD maintains three or more outside directors, thus satisfying the target set by relevant laws. These outside directors are capable of representing the interests of the minority shareholders, and the BOD maintains a high level of independence by adhering to the selection criteria.

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.

Transparency of Governance 

Stakeholder Engagement

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

Stakeholder Engagement
Doosan Corporation defines its stakeholders as those who wield direct or indirect influence on its business activities. Based on the 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 strategic activities. Further, the achievements of our major activities are disclosed transparently in the annual CSR Report.
Dooan 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 Dooan 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.

**Response to climate change**

Climate change is now regarded as a factor that affects growth and sustainability of companies. This means that climate change should be recognized as a risk rather than an optional management effort. Dooan 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 Dooan 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.

**CSR Strategy and Key Activities**

· Talent Management
· Environment and Safety Management
· Supply Chain Management
· Social Contribution

**CSR Strategy and Key Activities**

CSR Strategy and Key Activities

- CSR Strategy and Key Activities
- Corporate Social Responsibility and Environment
- Environmental Management
- Risk Management
- Anti-corruption and Ethical Management
- Research and Development
- Customer Satisfaction
- EHS Management
- Supply Chain Management
- Social Contribution

**CSR Management**

CSR Management

- CSR Strategy and Key Activities
- Corporate Social Responsibility and Environment
- Environmental Management
- Risk Management
- Anti-corruption and Ethical Management
- Research and Development
- Customer Satisfaction
- EHS Management
- Supply Chain Management
- Social Contribution

**Business & Impacts**

Dooan Group

- Doosan
- Doosan Heavy Industries
- Doosan Engineering
- Doosan Environmental
- Doosan Corporation

**Introduction**

Design the Future Spark the Growth

- CSR Strategy and Key Activities
- Corporate Social Responsibility and Environment
- Environmental Management
- Risk Management
- Anti-corruption and Ethical Management
- Research and Development
- Customer Satisfaction
- EHS Management
- Supply Chain Management
- Social Contribution

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CSR Management

- CSR Strategy and Key Activities
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- Doosan
- Doosan Heavy Industries
- Doosan Engineering
- Doosan Environmental
- Doosan Corporation

**Introduction**

Design the Future Spark the Growth

Doosan's major social contribution programs, such as "Time Traveler program" and "Woori Doori system", 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.

**Appendix**

- CSR Strategy and Key Activities
- Corporate Social Responsibility and Environment
- Environmental Management
- Risk Management
- Anti-corruption and Ethical Management
- Research and Development
- Customer Satisfaction
- EHS Management
- Supply Chain Management
- Social Contribution

**Interview with Experts**

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.

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 seek environmental education in their corporate strategies. I look forward to seeing Dooan Corporation lead the market as a social value creator by setting adequate social missions and scales.

Il-gyu Lee

Director of Eco-Friendly Management Office

Korea Environmental Industry and Technology Institute

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**Kyung-wun Lee**, Head of CSR Operations

Plan M Co., Ltd.

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. Dooan 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 Dooan 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

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 Dooan Corporation is making proper attempts in the direction of empowerment through Leader’s Action Plan (LAP), Senior MBA, and diversification of grievance channels. I support the efforts of Dooan Corporation to find new avenues for improvement and horizontal union within the organization.

**Jae-yeong Kang**, Director of Shared Growth Committee Operation

Korea Foundation for Cooperation of Large & Small Business, Rural Affairs

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**Kyung-Il Kim**, Professor of Psychology

Ajou University

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Risk Management

Risk Management System

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

Financial Risk
- Risks related to market, credit, liquidity, exchange, etc.
- Risks related to sales, cost, supply, investments, customer, industry, banking, etc.
- Risks related to climate change, environment, health and safety, supply chain, competition, ethics, human rights, reputation, laws, etc.

Non-Financial Risk
- Risks related to climate change, environment, health and safety, supply chain, competition, ethics, human rights, reputation, laws, etc.

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 improvement. All BG/BUs of Doosan Corporation perform a quarterly internal assessment by team, wherein 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.

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/BUs of Doosan Corporation perform a quarterly internal assessment by team, wherein 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.

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

- Market changes attributable to new technological trends
- Business falling behind in the market as it fails to capture new growth opportunities in a timely manner
- Analysis of market opportunities for technological changes
- Introduction of the Product Development Roadmap and Technology Development Roadmap

Fluctuations in Markets and Business

- Slow growth of existing main markets
- Intensified price competition due to excessive supply
- Emergence of new competition elements
- Decreased sales of existing main products
- Decreased profitability due to decline in selling prices and competition for securing supply volume
- Decreased in market share
- Restructure of product portfolio: Focus on high-performance, high-value-added products
- Expansion of business lines: Provide total solutions across the entire value chain, seeing away from existing business lines
- Focus on increasing sales in overseas/emerging markets

Procurement of Raw Materials

- Supply imbalance of imported raw materials if export of raw materials is limited by supplying countries based on their priority on domestic industries
- 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
- Diversification of supply channel of raw materials

Climate Change and Environmental Risks

- Strengthened environmental regulations
- Depletion of fossil fuels/unsustainable supply
- Market opportunities lost by failing to comply with environmental regulations
- Update of the Product Development Roadmap and Technology Development Roadmap considering environmental impact
- Promotion of product innovation using alternative energy as energy sources

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.
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 serves as the guiding principles for employees in performance of their duties. Doosan’s Code of Conduct comprises 170 articles, 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.

Anti-corruption and Ethical Education
To enhance an ethical business mindset among its employees, Doosan Corporation conducts ethical business education programs each year and constructs several statements from all of its employees regarding to observe the Code of Conduct. In addition to ethical business education programs including online and offline training 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 by spreading 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 manipulation by analyzing the status of the ethical business practices of their suppliers. 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 ethical policies (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 names. 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 on those concerned.

Program for Compliance with Fair Trade Regulations
Since 2014, 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 guideline 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, the Act on Fair Agency Transactions, and the 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.

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 PMM/TRM, which is the core system of technology-oriented management. Further, the periodic R&D Project Review Session implements 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 and future technology trends. In 2018 in particular, we arranged a forum to discuss the direction of projects through sharing of performances and plans that focus on digitalization and (1) intellectual property.

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 PMM/TRM, and在此之前 with specific action plans, and have re-targeted their mid- and long-term growth objectives toward 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

Research and Development
Enhancement of Technological Competitiveness

Doosan Corporation’s technology-oriented management system

- PMM/TRM: Analysis of market/technology trends → Development of mid- to long-term technological strategies
- R&D Project Review: Improvement of technical and business capabilities → Strengthening of capability to execute R&D projects
- Technology Management Summit: Reviewing development process → Process improvement of development of new technologies

Development of Environment-friendly Products

Development of new products that address social issues or achieve sustainable growth, such as environmentally friendly products, has been one of the major areas of research. Doosan’s new product development process is designed to ensure that all products comply with environmental regulations and are applicable to fingerprint recognition modules, contributing to the development of biometric pro ducts that are both friendly to the human body, as well as to the environment.

1) Intellectual Property

Initiatives for Development of Eco-friendly Products
Electronic 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. It is considering 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, hazardous substance review tools (HSTS IF, SVHC, 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 and halogen-free mobile modules and halogen-free ultra-low loss applicable to high-capacity, high-speed and high-function network equipment for the IT and SG. In 2019, Doosan will start developing 8P-8A (8P-8A) products that comply with environmental regulations and are applicable to fingerprint recognition modules, contributing to the development of biometric products that are compatible with a variety of devices.
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 harmful chemicals has been entirely prohibited starting in 2017. In response to the EU standards that will prohibit the use of parts with lead content exceeding 0.1% from 2024, BG has selected the development of so-called lead-free copper alloy materials as the new technology development task. FuelCell BG develops and manufactures eco-friendly products that produce electricity, water, and heat through an 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 LNS® Model that uses hydrogen extracted from natural gas, H₂ Model that uses pure hydrogen gas, and LPG Model that uses hydrogen extracted from LO₂. 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 competitiveness 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 assure reliability of products, BG plans to focus on developing technologies that can extend the service life of core parts such as stacks and reformer modules. In 2018, overall power generation efficiency of the 10KW/15KW fuel cells exceeded 90% and the performance and service life of filters were more than doubled. Additionally product size was reduced to mini- mize the installation area.

Bio BU develops and manufactures all products using natural ingredients (soybeans, eggs, etc.) 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 PSM and IS 14501 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. The BG 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 raising 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’ voices. FuelCell 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 40% of the VOCs received in 2018 was related to customer service at stores. 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 reporting all processes from receipt of an issue to completion of processing. It is structured such that individual VOCs are classified by their importance and responsibility to the customer is carried out based on the target time of each "TAT" stage. It shares the step-by-step progress of the received VOC to company employees on a regular basis to raise awareness of the issues at every level and improve the internal cause. Also, it is worked to better manage and supply the support chain. In 2018, the BG visited overseas agencies and conducted trainings, and carried out tours to production sites and factories on the domestic market and products for overseas sales agents, so they could offer best service to final customers.

* TAT (Turnaround Time): The time required from VOC reception to handling

Protection of Customers’ Personal Information

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

Customer Communications Channels

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Enhancement of Quality Management Systems

Doosan Corporation strives to satisfy the quality requirement of its global customers by acquiring the relevant quality certificates. Electro-Materials BG operates its quality management system based on IATF-16949 certification. In 2019, technical skill trainings for engineers and managers 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 reliable quality. Mottrol BG operates a quality management system based on ISO9001, and has upgraded its quality management by deploying SPC in conjunction with its suppliers. It also responds proactively to changes in quality management systems. For instance, the BG acquired a certification for the AS9100 Rev. D 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, KDS Design Group Inspection, KI, 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 BQMP certification through regular audit activities based on Safety and Drug Safety and is present in the process of obtaining the EFCI certification based on ISO9001 and IOS9001:2015. DDI BU established and operates its quality management system based on ISO9001 and ISO22000 (International Standards for IT service). In addition, it plans to introduce and apply a PPA (Process Performance Automation) system in 2019 to support activities for requesting and handling of system use authority or determining performance reduction and defects of servers all year round.

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 lost 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 SENK (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 and tasks was established by developing QR App v1.1, and the function for operating a GPS-based QRM (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 JohnsonJohnsson, Eistic Lauder and Arwayne, and obtained accreditation for product quality. In addition, the process of obtaining EFCI-GMP is under way to enable BU to respond proactively to the global quality standards; it is expected to be completed in 2019. By establishing RTDP and HMA, patients 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 to 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 master trainers 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.

Quality Management

Employee Communication

Talent Management

Fostering Talent

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 deeper understanding of the company’s strategies and enhance financial capability. In 2018, 40 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.
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 10 employees in October 2016. 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 workplace, 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 2016. 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 coaching methods. Leadership education for technical personnel and leaders to help influential leaders understand the Clifton Strength Finder, the participants were able to take the Clifton Strength Finder 360 survey at the beginning of the course. The results were displayed to them in the course. They also discussed methods of setting and attaining personal goals utilizing their strengths. Through this course, participants were able to understand Doosan as a whole and gained pride as members of Doosan.

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 risk 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.

Education and Conferences on Digital Trends

Doosan holds a conference for all BG/BU’s 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

Human Rights Impact Assessment

Human Rights Management Practice and Due Diligence System

Human Rights Management Practice and Due Diligent System

Human Rights Management Practice and Due Diligent System

"Roles playing based on actual cases was very effective in understanding the basic concepts." In 2019, two forms 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

Doosan held a conference for all BG/BU’s to provide insights into digital trends and help digital talent 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.
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.

Emerging Human Rights Risk Analysis Map

Possibility of occurrence

- Forced Labor
- Discrimination (gender-based)
- Forced Labor
- Long Working Hours
- Child Labor
- Data Protection and Privacy
- Dangerous Working Conditions
- Fatigue
- Uganda
- Republic of Korea
- Canada
- India
- Indonesia
- Malaysia
- Vietnam
- Myanmar
- Austria
- Philippines
- Indonesia
- United Arab Emirates
- UK
- Iran
- Germany
- Belgium
- Poland
- Protection of Consumer
- Freedom of Association
- Potential Human Rights Issue
- Production Plant
- Subsidiary

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 pursue positive behaviors in order to establish a culture of mutual respect.

Preventive and Mitigating Actions

For key emerging risks found through human rights impact assessment, we take improvement activities according to a timeline 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.

Doosan will continue to improve the grievance redressal system by strengthening the grievance process, identifying issues and establishing improvement measures.

Doosan has invested KRW 300 million to reduce pollutant concentrations in final effluents below 50% of the current standard. Bio BU Iksan has installed activated carbon in the environment pollution prevention facility to comply with the THC emission standards from the biological treatment to the combination of biological treatment and MBBR method 1), reducing the concentration of COD and SS, measures of waste water pollutants, by 70% (85ppm→19ppm) and 90% (70ppm→<5ppm), respectively, compared to those of previous levels.

1) MBBR method: Membrane Bio-Reactor

Environmental Investment Management

Doosan Corporation operates a system for the management of environmental expenditure to institutionalize 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 media (all Jungpyeong plant), also the replacement of wastewater treatment plant panels, along with improvement of ventilation of mixing equipment (at Gingshen plant), waste blowing and adsorption tower. Mottol BG invested KRW 680 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 “Albany System.” 1) For the legal treatment of wastes generated by various processes, Doosan periodically evaluates 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 2016), and wastewater treatment costs by about KRW 357 million, compared to those of 2017.

1) Albany System: As the IT-based waste management system of the Korean government, it controls the entire process of waste management, 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 IPCC 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 GMG emission trading system to the target management system in 2016. Mottol BG reduced costs and greenhouse gas emissions by the replacement of old air conditioners (76tCO2), the installation of cooling/heating remote control system (10.2 tCO2), the installation of cooling tower automatic on/off system (KRW 17.4 millions, 59.7 tCO2), and the addition of cooling fan automatic on/off function (KRW 6.5 millions, 37.4 tCO2).

1) IPCC (International Panel on Climate Change)
EHS Leadership Activities

Dooosan 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.

Basic Compliance with EHS Rules

All of Dooosan 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 policies 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

Dooosan 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.

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. Dooosan 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

Dooosan 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 that 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

Suppliers classified by 2025.

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

Supply Chain Status

Dooosan 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.

Sustainability Management Process

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 so on. The full text can be found in the Dooosan-e-procurement website.

All companies that wish to have business with Dooosan 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 candidates for the self-diagnosis are 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.
Sustainable Purchase Strategy

For management of sustainable supply chains, Doosan identifies worksites with high possibility of causing environmental accidents/events or violating environmental regulations; worksites with high possibility of employees and stakeholders causing physical/psychological 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 suppliers. 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 98% in 2018, and will achieve 100% in 2021.

Management of Conflict Minerals

Doosan Corporation 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 BOM, 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 RAD step and to reinforce the process of verifying the place of origin.

Enhancement of Suppliers’ Competitiveness through ESG

Doosan Corporation pursues diverse win-win activities to enhance the product competitiveness of its suppliers, including the provision of education by experts to 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.

‘Time Traveler’ Program for Nurturing Youth

Launchedin2012, the Time Traveler program is Doosan Corporation’s representative program supporting education on photography and humanities education, with a view to nurturing youths and instilling 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 disabilities. 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 38.8 million.

‘Woori Door’ Sports Program for Youths with Disability

‘Woori Door’ 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, Jeonan, 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-Goorim’, a Reading Support Program

DBU operates ‘Dadok-Goorim’, 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 Village located in Sejongdong-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-Goorim showed cognitive development, enhanced creativity, development of language skills, and better anger control, and reduced need for emotional therapy.
Economic Performance

Financial Performance

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total assets</td>
<td>KRW</td>
<td>3,478,223</td>
<td>3,744,673</td>
<td>3,950,029</td>
<td>4,734,223</td>
</tr>
<tr>
<td>Current assets</td>
<td>KRW</td>
<td>733,034</td>
<td>810,638</td>
<td>880,274</td>
<td>1,176,134</td>
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<tr>
<td>Non-current assets</td>
<td>KRW</td>
<td>2,745,189</td>
<td>2,934,035</td>
<td>3,069,755</td>
<td>3,558,089</td>
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<tr>
<td>Total liabilities</td>
<td>KRW</td>
<td>1,368,906</td>
<td>1,632,123</td>
<td>1,750,271</td>
<td>2,426,715</td>
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<tr>
<td>Current liabilities</td>
<td>KRW</td>
<td>870,354</td>
<td>1,042,961</td>
<td>1,319,120</td>
<td>1,404,103</td>
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<tr>
<td>Non-current liabilities</td>
<td>KRW</td>
<td>498,552</td>
<td>589,161</td>
<td>431,151</td>
<td>1,024,613</td>
</tr>
<tr>
<td>Total equity</td>
<td>KRW</td>
<td>2,109,256</td>
<td>2,112,350</td>
<td>2,190,759</td>
<td>2,305,508</td>
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<tr>
<td>Capital</td>
<td>KRW</td>
<td>134,838</td>
<td>134,838</td>
<td>134,846</td>
<td>134,846</td>
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<tr>
<td>Capital surplus</td>
<td>KRW</td>
<td>688,082</td>
<td>678,330</td>
<td>680,215</td>
<td>749,169</td>
</tr>
<tr>
<td>Total liabilities and equity</td>
<td>KRW</td>
<td>3,478,223</td>
<td>3,744,673</td>
<td>3,950,029</td>
<td>4,734,223</td>
</tr>
</tbody>
</table>

Balance Sheet

<table>
<thead>
<tr>
<th>Operating income</th>
<th>KRW/Million</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>KRW</td>
<td>1,873,556</td>
<td>2,067,136</td>
<td>2,624,829</td>
<td>2,919,401</td>
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<tr>
<td>Sales</td>
<td>KRW</td>
<td>1,759,222</td>
<td>1,887,802</td>
<td>2,530,569</td>
<td>2,822,149</td>
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<tr>
<td>Dividend profits</td>
<td>KRW</td>
<td>114,334</td>
<td>179,334</td>
<td>94,260</td>
<td>97,252</td>
</tr>
<tr>
<td>Operating expenses</td>
<td>KRW</td>
<td>1,660,155</td>
<td>1,641,764</td>
<td>2,346,072</td>
<td>2,866,756</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>KRW</td>
<td>1,377,076</td>
<td>1,410,840</td>
<td>1,832,771</td>
<td>2,163,103</td>
</tr>
<tr>
<td>Operating profits</td>
<td>KRW</td>
<td>283,079</td>
<td>364,324</td>
<td>415,301</td>
<td>529,225</td>
</tr>
<tr>
<td>Non-operating profit</td>
<td>KRW</td>
<td>213,401</td>
<td>225,371</td>
<td>276,757</td>
<td>353,303</td>
</tr>
<tr>
<td>Non-operating profits</td>
<td>KRW</td>
<td>44,342</td>
<td>42,678</td>
<td>30,329</td>
<td>45,221</td>
</tr>
<tr>
<td>Net income before income taxes</td>
<td>KRW</td>
<td>160,035</td>
<td>154,205</td>
<td>252,739</td>
<td>182,886</td>
</tr>
<tr>
<td>Corporate tax expenses</td>
<td>KRW</td>
<td>36,711</td>
<td>496</td>
<td>47,638</td>
<td>24,073</td>
</tr>
<tr>
<td>Income from continuing operations</td>
<td>KRW</td>
<td>123,324</td>
<td>153,802</td>
<td>205,100</td>
<td>158,613</td>
</tr>
<tr>
<td>Income/loss from discontinued operations</td>
<td>KRW</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Net income</td>
<td>KRW</td>
<td>123,324</td>
<td>153,802</td>
<td>205,100</td>
<td>158,613</td>
</tr>
</tbody>
</table>
Introduction
Design the Future Spark the Growth
Business & Impacts
CSR Management
> CSR Strategy and Key Activities
  · Transparency of Governance
  · Stakeholder Engagement
  · Research and Development
  · Customer Satisfaction
  · Quality Management
  · Talent Management
  · Environment and Safety Management
  · Supply Chain Management
  · Social Contribution
Appendix

Environmental Performance

Environmental Efficiency

Environmental Investments (Domestic/Overseas)

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>KRW 0.1 Billion</td>
<td>80.2</td>
<td>101.2</td>
<td>88.2</td>
<td>115.7</td>
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<tr>
<td>Overseas</td>
<td></td>
<td>52.8</td>
<td>72.6</td>
<td>61.9</td>
<td>75.4</td>
</tr>
</tbody>
</table>

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

Air Pollutants

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx Emissions</td>
<td>Tons</td>
<td>55.7</td>
<td>56.2</td>
<td>55.4</td>
<td>65.8</td>
</tr>
<tr>
<td>SOx Emissions</td>
<td>Tons</td>
<td>63</td>
<td>1.2</td>
<td>1.3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>Thousand Tons</td>
<td>1,089</td>
<td>967</td>
<td>1,011</td>
<td>1,042</td>
</tr>
<tr>
<td>Overseas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Water supply | 360 | 427 | 457 | 360 |
Groundwater | 176 | 73 | 58 | 83 |
All other sources | 0 | 0 | 0 | 0 |

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

Discharge of Wastewater

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>Thousand Tons</td>
<td>401</td>
<td>415</td>
<td>419</td>
<td>433</td>
</tr>
<tr>
<td>Overseas</td>
<td></td>
<td>181</td>
<td>168</td>
<td>178</td>
<td>184</td>
</tr>
</tbody>
</table>

Chemical Oxygen Demand (COD) | ppm | 20 | 21 | 22 | 32 |
Biochemical Oxygen Demand (BOD) | ppm | 12 | 18 | 16 | 17 |
Consumption of Resources

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>Tons</td>
<td>52,121</td>
<td>56,588</td>
<td>65,097</td>
<td>80,766</td>
</tr>
<tr>
<td>Copper foil</td>
<td></td>
<td>6,651</td>
<td>6,501</td>
<td>5,634</td>
<td>5,062</td>
</tr>
<tr>
<td>Glass fabric</td>
<td></td>
<td>17,852</td>
<td>20,125</td>
<td>18,042</td>
<td>16,920</td>
</tr>
<tr>
<td>Epoxy resin</td>
<td></td>
<td>10,190</td>
<td>10,066</td>
<td>9,679</td>
<td>11,441</td>
</tr>
<tr>
<td>Steel plate</td>
<td></td>
<td>3,963</td>
<td>3,503</td>
<td>4,178</td>
<td>5,120</td>
</tr>
<tr>
<td>Casting materials</td>
<td></td>
<td>13,201</td>
<td>13,196</td>
<td>27,230</td>
<td>41,943</td>
</tr>
<tr>
<td>Egg yolk powder</td>
<td>Tons</td>
<td>99</td>
<td>104</td>
<td>124</td>
<td>92</td>
</tr>
<tr>
<td>Ethanol</td>
<td></td>
<td>26</td>
<td>9</td>
<td>56</td>
<td>41</td>
</tr>
<tr>
<td>Acetone</td>
<td></td>
<td>37</td>
<td>32</td>
<td>106</td>
<td>75</td>
</tr>
<tr>
<td>Steel use stainless plate</td>
<td></td>
<td>32</td>
<td>19</td>
<td>21</td>
<td>31</td>
</tr>
<tr>
<td>Steel use stainless tube</td>
<td></td>
<td>9</td>
<td>5</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Steel sheet</td>
<td></td>
<td>31</td>
<td>18</td>
<td>18</td>
<td>29</td>
</tr>
</tbody>
</table>

Use of Recycled Materials

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption</td>
<td>Tons</td>
<td>56</td>
<td>45</td>
<td>141</td>
<td>104</td>
</tr>
<tr>
<td>Rate of consumption</td>
<td>%</td>
<td>34.6</td>
<td>28.8</td>
<td>49.0</td>
<td>49.0</td>
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</tbody>
</table>

Waste Generation (Domestic/Overseas)

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Generation</td>
<td></td>
<td>19.4</td>
<td>18.1</td>
<td>18.0</td>
<td>17.3</td>
</tr>
<tr>
<td>Domastic</td>
<td></td>
<td>16.6</td>
<td>15.1</td>
<td>14.7</td>
<td>13.7</td>
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<tr>
<td>General waste</td>
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<td>8.7</td>
<td>8.1</td>
<td>6.3</td>
<td>6.7</td>
</tr>
<tr>
<td>Designed waste</td>
<td></td>
<td>7.9</td>
<td>7.0</td>
<td>7.5</td>
<td>7.3</td>
</tr>
<tr>
<td>Total</td>
<td>Thousand Tons</td>
<td>2.8</td>
<td>3.0</td>
<td>3.3</td>
<td>3.6</td>
</tr>
<tr>
<td>General waste</td>
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<td>1.9</td>
<td>2.0</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Designed waste</td>
<td></td>
<td>0.9</td>
<td>1.0</td>
<td>1.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Domestic</td>
<td>Thousand Tons</td>
<td>10.4</td>
<td>9.7</td>
<td>10.3</td>
<td>11.0</td>
</tr>
<tr>
<td>Recycle</td>
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<td>1.0</td>
<td>0.7</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Landfill</td>
<td></td>
<td>5.2</td>
<td>4.7</td>
<td>3.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Infiltration</td>
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<td>2.7</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Overseas</td>
<td>Thousand Tons</td>
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<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
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<tr>
<td>Recycle</td>
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<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Landfill</td>
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<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Infiltration</td>
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<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

1) Scope of overseas data collection has expanded: Changshu, CPL, CFAPZ, DLE, DMC, DFCF
2) Including Corporate Center, Administration Center, and OLED

Economic Performance

Environmental Performance

Social Performance

Materiality Test

Principles of Charitable Contribution and Sponsorship

Human Rights Policy

GRI Index

Membership & Awards

Independent Assurance Statement

Greenhouse Gas Verification Statement

Climate Change

GHG Emissions (Domestic/Overseas)

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total GHG Emissions</td>
<td></td>
<td>165.6</td>
<td>172.4</td>
<td>169.8</td>
<td>175.1</td>
</tr>
<tr>
<td>Domestic</td>
<td>Thousand</td>
<td>77.5</td>
<td>81.6</td>
<td>86.0</td>
<td>85.5</td>
</tr>
<tr>
<td>Scope 1</td>
<td>Thousand</td>
<td>20.2</td>
<td>28.9</td>
<td>25.1</td>
<td>23.4</td>
</tr>
<tr>
<td>Scope 2</td>
<td>Thousand</td>
<td>48.3</td>
<td>52.7</td>
<td>60.9</td>
<td>62.1</td>
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<tr>
<td>Overseas</td>
<td>Thousand</td>
<td>86.1</td>
<td>90.8</td>
<td>103.8</td>
<td>95.6</td>
</tr>
<tr>
<td>Scope 1</td>
<td>Thousand</td>
<td>10.5</td>
<td>10.1</td>
<td>8.9</td>
<td>8.3</td>
</tr>
<tr>
<td>Scope 2</td>
<td>Thousand</td>
<td>77.5</td>
<td>80.6</td>
<td>94.8</td>
<td>87.3</td>
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</table>

GHG Emissions (GHG Emissions/Sales)

<table>
<thead>
<tr>
<th>Category</th>
<th>Thousand</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td>7.8</td>
<td>7.4</td>
<td>6.4</td>
<td>5.9</td>
</tr>
<tr>
<td>Domestic</td>
<td></td>
<td>4.4</td>
<td>4.3</td>
<td>3.4</td>
<td>3.3</td>
</tr>
<tr>
<td>Overseas</td>
<td></td>
<td>24.7</td>
<td>23.2</td>
<td>23.3</td>
<td>16.3</td>
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</tbody>
</table>

GHG Intensity (GHG Emissions/Sales)

<table>
<thead>
<tr>
<th>Category</th>
<th>Thousand</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td>3.8</td>
<td>3.7</td>
<td>3.6</td>
<td>3.4</td>
</tr>
<tr>
<td>Domestic</td>
<td></td>
<td>2.4</td>
<td>2.3</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Overseas</td>
<td></td>
<td>10.5</td>
<td>10.3</td>
<td>10.3</td>
<td>10.3</td>
</tr>
</tbody>
</table>

Energy Consumption (Domestic/Overseas)

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>TJ</td>
<td>2,209</td>
<td>2,312</td>
<td>2,442</td>
<td>2,366</td>
</tr>
<tr>
<td>Domestic</td>
<td>TJ</td>
<td>1,563</td>
<td>1,646</td>
<td>1,725</td>
<td>1,643</td>
</tr>
<tr>
<td>Electricity</td>
<td>TJ</td>
<td>965</td>
<td>1,081</td>
<td>1,189</td>
<td>1,185</td>
</tr>
<tr>
<td>Fuel</td>
<td>TJ</td>
<td>568</td>
<td>564</td>
<td>481</td>
<td>400</td>
</tr>
<tr>
<td>Others</td>
<td>TJ</td>
<td>-</td>
<td>21</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Overseas</td>
<td>TJ</td>
<td>646</td>
<td>666</td>
<td>717</td>
<td>723</td>
</tr>
<tr>
<td>Electricity</td>
<td>TJ</td>
<td>513</td>
<td>533</td>
<td>550</td>
<td>563</td>
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<tr>
<td>Fuel</td>
<td>TJ</td>
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<td>133</td>
<td>167</td>
<td>160</td>
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<tr>
<td>Energy Intensity</td>
<td>TJ/KRW Bilion</td>
<td>0.9</td>
<td>0.9</td>
<td>0.7</td>
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<td>Domestic</td>
<td>TJ/KRW Bilion</td>
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<tr>
<td>Overseas</td>
<td>TJ/KRW Bilion</td>
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<td>0.8</td>
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</table>

1) Scope of overseas data collection has expanded: Changshu, CPL, CFAPZ, DLE, DMC, DFCF
2) Including Corporate Center, Administration Center, and OLED
3) Overseas Data Collection Scope: Changshu, CPL, CFAPZ, DLE, DMC, DFCF
4) Among the overseas data for 2018, CFAPZ was added, but DFCF was excluded owing to credibility issue for the collected data.
## Social Performance

### Talent Management

#### Composition of Human Resources

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<thead>
<tr>
<th>Category</th>
<th>Unit</th>
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<th>2016</th>
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<th>2018</th>
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<tbody>
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<td>Total Employees</td>
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<td>3,942</td>
<td>4,186</td>
<td>3,600</td>
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<td>Employees by BG/BU</td>
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<tr>
<td>Corporate Office/CC</td>
<td>Persons</td>
<td>527</td>
<td>433</td>
<td>292</td>
<td>269</td>
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<tr>
<td>Administration Center</td>
<td>Persons</td>
<td>-</td>
<td>-</td>
<td>367</td>
<td>249</td>
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<td>Fuel Cell</td>
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<td>70</td>
<td>73</td>
<td>78</td>
<td>91</td>
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<td>Employment</td>
<td></td>
<td>3,045</td>
<td>3,327</td>
<td>3,047</td>
<td>3,126</td>
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<tr>
<td>Gender</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
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<td>3,703</td>
<td>3,479</td>
<td>3,047</td>
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<td>342</td>
<td>848</td>
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<tr>
<td>Contract</td>
<td>Person</td>
<td>297</td>
<td>297</td>
<td>297</td>
<td>297</td>
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<tr>
<td>Full-time</td>
<td>Person</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Person</td>
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*Personal resource data are calculated based on the tax payer at the end of 2018 and may differ from the figures reported in the business report.

### Employment and Turnover

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<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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</thead>
<tbody>
<tr>
<td>New Recruits</td>
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<td>76</td>
<td>317</td>
<td>259</td>
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<td>Employment</td>
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<td>226</td>
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<tr>
<td>Contract</td>
<td>Person</td>
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<td>92</td>
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<td>47</td>
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<tr>
<td>Dismissed</td>
<td>Person</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Wiki</td>
<td>Person</td>
<td>29</td>
<td>32</td>
<td>44</td>
<td>38</td>
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<tr>
<td>Employment Turnover</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-time</td>
<td>%</td>
<td>4.3</td>
<td>5.8</td>
<td>4.7</td>
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### Labor Practices

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<th>2016</th>
<th>2017</th>
<th>2018</th>
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</thead>
<tbody>
<tr>
<td>Ratio of Workers Embodied with Labor Unions</td>
<td>Person</td>
<td>78</td>
<td>78.6</td>
<td>79.1</td>
<td>78.8</td>
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</table>

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

### Assessment of Achievements

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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</thead>
<tbody>
<tr>
<td>Ratio of employees who received formal evaluation of performance</td>
<td>%</td>
<td>98.3</td>
<td>99.8</td>
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### Health and Safety

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<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of occupational accidents</td>
<td>%</td>
<td>0.31</td>
<td>0.17</td>
<td>0.05</td>
<td>0.08</td>
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<tr>
<td>LTRF1</td>
<td>%</td>
<td>0.70</td>
<td>0.96</td>
<td>1.38</td>
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<tr>
<td>CIPR1</td>
<td>%</td>
<td>0.14</td>
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</table>

1) Approval criteria for industrial accidents

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

1) CIPR (Occupational Illness Frequency Rate): Total number of illnesses / Total working hours * 1,000,000

### Development of Employees’ Capabilities

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
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<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Training Expenses</td>
<td>KRW Million</td>
<td>7,389</td>
<td>5,680</td>
<td>4,726</td>
<td>4,893</td>
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<tr>
<td>Total Training Hours</td>
<td>Hours</td>
<td>243,893</td>
<td>189,532</td>
<td>129,457</td>
<td>116,351</td>
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<tr>
<td>Training Expenses per Capita</td>
<td>KRW Million</td>
<td>1,889</td>
<td>1,385</td>
<td>1,313</td>
<td>1,464</td>
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<tr>
<td>Training Hours per Capita</td>
<td>Hours/Pen</td>
<td>118</td>
<td>82</td>
<td>60</td>
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### Human Rights

<table>
<thead>
<tr>
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<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Rights Education</td>
<td>Person</td>
<td>2,493</td>
<td>3,111</td>
<td>2,968</td>
<td>6,180</td>
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<tr>
<td>Employees Participating in Human Rights Education</td>
<td>%</td>
<td>100</td>
<td>100</td>
<td>100</td>
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### Corporate Community Involvement

<table>
<thead>
<tr>
<th>Category</th>
<th>Unit</th>
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<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Expenses</td>
<td>KRW Million</td>
<td>678.6</td>
<td>678.8</td>
<td>826.7</td>
<td>826.7</td>
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</tbody>
</table>

1) Top five categories of expenses in 2018: H2KOREA (KRW 150 million), Incheon Chamber of Commerce and Industry (KRW 60 million), Korea Employers Federation (KRW 79 million), Korea International Trade Association (KRW 73 million), Gimbong Chamber of Commerce and Industry (KRW 63 million)
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, CIJS, ISO26000, UNCG) 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 Test

**No. Area** Employee  
**Issue** Realization of a desirable organizational culture for workplaces  

**Core Issues**  
**Related Issues**  
- Realization of a desirable organizational culture for workplaces  
- Enhancement of employee competence

**Business Impact**  
- 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.

**Materiality Map**

- Realization of a desirable organizational culture for workplaces
- Enhancement of employee competence

**Materiality Test**

**Principles of Charitable Contribution and Sponsorship**

- The company establishes the “Social Contribution Committee” as a body to deliberate and decide upon all matters related to donations.
- The Committee consists of the Chairperson of CSR Committees, CFO and Legal Affairs Officer and eviews donations of more than KRW 10 million.
- It also deliberates and decides upon the purpose, type of charitable foundations, amounts and uses of donation money.

- The company avoids risks that may arise from donations, through the Social Contribution Committee.
  - Ensures corporate contributions are not used as bribes.
  - Identifies the justification and assesses the appropriateness of new charitable foundations.
  - Prevents donation and sponsorship risks that can be perceived as political contributions.

- Donations made by the company are disclosed to the public through the business report and CSR report.
Human Rights Policy

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.


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. Securcement 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 continually check policies and guidelines related to GRI 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.

Doxsan operates the online Whistle Blowing Center (https://ethicshelpline.doosan.com/ corp/thinkflex.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

<table>
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<th>Contents</th>
<th>Page</th>
<th>Reference information</th>
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<tbody>
<tr>
<td>102-1</td>
<td>Name of organization</td>
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<tr>
<td>102-2</td>
<td>Representative brand, products, and services</td>
<td>12-35</td>
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<td>102-4</td>
<td>Location of the home office</td>
<td>6-7</td>
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<tr>
<td>102-5</td>
<td>Location of business place/area</td>
<td>6-7</td>
<td></td>
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<td>102-6</td>
<td>Characteristics and legal form of ownership</td>
<td>6-7</td>
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<tr>
<td>102-6</td>
<td>Report on the targeted market</td>
<td>6-7</td>
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<tr>
<td>102-7</td>
<td>Sale of organization</td>
<td>6-7</td>
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<tr>
<td>102-8</td>
<td>Information concerning employees</td>
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<td>102-9</td>
<td>Description of the organization’s supply chain</td>
<td>52-54, 65-84</td>
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<td>Major changes in the scale, structure, and ownership of the organization or supply chain</td>
<td>52-54, 65-84</td>
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<td>102-11</td>
<td>Description of the principles of advance prevention and access methods</td>
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<td>102-12</td>
<td>External initiatives</td>
<td>61, 701</td>
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<tr>
<td>102-13</td>
<td>Membership in associations or national/international policy organizations</td>
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<tr>
<td>102-14</td>
<td>Declaration by the supreme decision maker of the organization and strategies related to sustainability</td>
<td>2-5</td>
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<tr>
<td>102-15</td>
<td>Key elements of impact, risk, and opportunity</td>
<td>10, 11, 12-36</td>
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</table>

Ethics and integrity

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<th>Page</th>
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<tr>
<td>102-16</td>
<td>Organizational values, principles, standards, and business standards, including code of conduct and code of conduct</td>
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<td>102-17</td>
<td>Internal and external mechanism for advice on compliance with ethics and statutes, integrity of the organization</td>
<td>72</td>
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Governance structure

<table>
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<th>Index</th>
<th>Contents</th>
<th>Page</th>
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<tbody>
<tr>
<td>102-18</td>
<td>Governance structure</td>
<td>66-67</td>
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<tr>
<td>102-19</td>
<td>Governance structure of the organization, including committees of the supreme governance body</td>
<td>66-67</td>
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<td>102-20</td>
<td>Procedure for the supreme governance body’s delegation of authority on economic, environmental, and social matters to high-ranking employees</td>
<td>66-67</td>
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<td>102-21</td>
<td>Report if any officer-level personnel has been appointed to posts responsible for economic, environmental, and social issues within the organization</td>
<td>66-67</td>
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<td>102-22</td>
<td>Processes by which the supreme governance body consults stakeholders concerning economic, environmental, and social issues</td>
<td>66-67</td>
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<tr>
<td>102-23</td>
<td>Supreme governance body and organization of its committees</td>
<td>66-67</td>
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<td>102-24</td>
<td>Report if the chairperson of the supreme governance body concurrently serves as an officer</td>
<td>66-67</td>
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<td>102-26</td>
<td>Procedure for the appointment and selection of the supreme governance body and its subordinate committees</td>
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<td>102-27</td>
<td>Roles of the supreme governance body and high-ranking officers in developing, approving, and improving the objectives, values of the organization, and the organization’s mission, strategy, policies, and objectives related to economic, environmental, and social impacts</td>
<td>66-67</td>
<td></td>
</tr>
</tbody>
</table>
Introduction

Doosan Group
Design the Future Spark the Growth
Business & Impacts

Appendix

CSR Management

> CSR Strategy and Key Activities
· Talent Management
· Environment and Safety Management
· Supply Chain Management
· Social Contribution

Appendix

GRI Index

Appendix

CSR Management
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Doosan Group
Design the Future Spark the Growth
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Appendix

CSR Management

> CSR Strategy and Key Activities
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· Environment and Safety Management
· Supply Chain Management
· Social Contribution
Introduction
Design the Future Spark the Growth
Business & Impacts
CSR Management
>CSR Strategy and Key Activities
· Environment and Safety Management
· Supply Chain Management
· Social Contribution

Appendix

Membership & Awards

Awards
<table>
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<tr>
<th>Classification</th>
<th>Name of Award</th>
<th>Honored By</th>
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<td>City of the Min ADDRESS: Technology Regulatory Industry Fore</td>
<td>Ministry of Industry, Trade and Energy</td>
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<td>Mobility BG</td>
<td>City of the Min ADDRESS: Mobility for contribution to green management</td>
<td>Ministry of Environment</td>
<td>2018.07</td>
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<td>City of the Min ADDRESS: Mobility for contribution to green management</td>
<td>Ministry of Environment</td>
<td>2018.07</td>
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<td>Ministry of Environment</td>
<td>2018.07</td>
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<td>2018.07</td>
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<td>2018.07</td>
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<td>Electric Vehicles</td>
<td>City of the Min ADDRESS: Mobility for contribution to green management</td>
<td>Ministry of Environment</td>
<td>2018.07</td>
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Introduction
Dooosan Group ("Dooosan") commissioned DNV GL Business Assurance Korea Ltd. ("DNV GL"), part of DNV GL Group, to undertake independent assurance of Dooosan corporation CSR Report 2018 (the "Report"). The directors of Dooosan have sole responsibility for the preparation of the Report. The responsibility of DNV GL in performing the assurance work is to the management of Dooosan 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 Dooosan’s headquarters and domestic facilities, we have evaluated the adherence to AA1000 Accountability Principles (AP) 2016 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;

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

We performed our work using AA1000AS (2018) and DNV GL’s assurance methodology VeriSustainTM (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 Dooosan’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.

Limitations
The engagement excludes the sustainability management, performance and reporting practices of Dooosan’s 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 Dooosan’s website(www.doorosan.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 Dooosan’s sustainability performance. Further opinions with regards to the adherence of material topics are made below.

The Principle of Inclusivity
Dooosan has identified 6 internal and external stakeholder groups such as Shareholders and Investors, Customers, Employees, Suppliers, Local Communities and Regulators. Dooosan engages with the stakeholders at the company and business unit levels through various channels. The Report provides the definition of stakeholders, expectations and requests by key stakeholders, and communication channels. Dooosan 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
Dooosan has conducted the materiality assessment to prepare the Report. 38 various issues have been derived by analyzing the topics covered in various global initiatives and standards, media research, global benchmarking (PRJC-59872-2019-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. Dooosan has divided material topics identified in the material assessment into 4 reporting topics and presented the management approach and major performances for each stakeholder issue in the Report. Dooosan discloses the prioritized material sustainability topics in a comprehensive and balanced way.

The Principle of Responsiveness
The "CISR Achievements and Plans" section of the Report in which Dooosan’s 2018 activities, plans, and performance indicators are addressed helps stakeholders understand Dooosan’s 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. Dooosan identifies, monitors and assesses the impacts of material topics to stakeholders. Dooosan has presented business relevance and key stakeholders corresponding to the respective material topic. In addition, Dooosan measures social values by taking into account not only financial performance but also the impact on all stakeholders. As a result, Dooosan discloses corporate social value as an effort to upgrade the level of social responsibility management.

Quality on sustainability performance information
We have based 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’s Code of Conduct during the assurance engagement and maintain independence where required by relevant ethical requirements. This engagement work was carried out by an independent team of sustainability assurance professionals. DNV 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 Dooosan and did not provide any services to Dooosan in 2019 that could compromise the independence or impartiality of our work.

Jang Sup Lee
Country Representative
DNV GL Business Assurance Korea Ltd.
July 2019

1) The VeriSustain protocol is available upon request at DNV GL Website (www.dnvgl.com)
2) DNV GL’s Code of Conduct is available from DNV GL website (www.dnvgl.com)
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 verification 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:

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 (1100120040)

Volume of greenhouse gas emissions of Doosan Corporation (Unit: tCO2e)

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<tr>
<th>Scope (Based on the Definitions under the Administrative Guidelines for the Greenhouse Gas Target Management System)</th>
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<tbody>
<tr>
<td>Volume of directly emitted greenhouse gases (Scope 1)</td>
<td>23,379</td>
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<tr>
<td>Volume of directly emitted greenhouse gases (Scope 2)</td>
<td>59,894</td>
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<tr>
<td>Total volume of greenhouse gas emissions</td>
<td>83,162</td>
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The data above correspond to the CO2 converted tonnage value based on the Corporation's domestic worksites.

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

TF Members of this Report

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<tr>
<th>Description</th>
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<tr>
<td>Industrial Vehicle</td>
<td>Business Strategy Team, HR Team, Technical HR Team, Purchasing Team, EHS Team, Production Technology Innovation Team, Quality Management Team, Domestic Sales Team, Research Strategy Team, Management Team</td>
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<tr>
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<td>Management Strategy Team, HR Team, Technical HR Team, Purchase Team, EHS Team, Organic Quality Team, R &amp; D 1 Team, Organic Division Sales Marketing Team</td>
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<tr>
<td>Retail</td>
<td>Management Team, HR Team, Management Support Team, EHS port, Sales Team</td>
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<td>Fuel Cell</td>
<td>Management Team, Management Support Team, HR Team, Purchase Team, EHS Team, Quality Team, Management Strategy Team, Sales Team, R&amp;D 1 Team</td>
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<td>DDI</td>
<td>Strategy Team, HR Team, Purchase Team, Quality Innovation Team</td>
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<td>CC</td>
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<td>Financial Accounting Team, IR Team, Management Support Team, Finance Team, HR Team</td>
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<td>Holding Company</td>
<td>Legal Affairs Office, HRM Personnel Support Team, Communication Office</td>
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